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Socioeconomic Diversity and Early Learning:

The Missing Link in Policy for High-Quality Preschools

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Introduction

"We know that each child brings different strengths, styles, and experiences into the mix, and that sparks cognitive growth. The diversity in experience and knowledge among the children naturally creates a larger scaffolding for learning, expanding a child's base of knowledge and problem-solving skills," says Steffani Allen, director of early childhood education in Norman,

The chapter is adapted from material that originally appeared in the author's dissertation, completed at Teacher's College at Columbia University, May 2011. The Multi-State Study of Pre-Kindergarten and SWEEP data used in the study described in this chapter were collected by the National Center for Early Development and Learning (NCEDL), using funds from the U.S. Department of Education, National Institute for Early Education Research (NIEER), Pew Charitable Trusts, and Foundation for Child Development. The contents of this chapter do not necessarily represent the positions or policies of NCEDL or the funding agencies, and endorsement by these agencies should not be assumed.

a suburb of Oklahoma City. "That's why so many of us believed so strongly in the concept of universal preschool, instead of just targeting kids based on need. We recognized that if you put peers together in a classroom—all at-risk or all wealthy, all black or all white—you would automatically limit their experience and their learning."[1]

What the preschool director quoted above knows about the value of socioeconomic composition in her classroom is often missing from policy and research discussions regarding early education. Amidst concerted efforts to identify the components of preschool quality and searching debates regarding the quality of Head Start, policymakers rarely consider the potential benefits of fostering socioeconomic diversity in preschool classrooms. Moreover, despite growing support for universal access to public preschool programs, the press to increase preschool quality generally sustains a "separate but equal" model, in which policymakers strive to improve high-poverty programs, rather than offer low-income children access to higher-income settings.[2]

The current policy context of early education, however, presents a historic opportunity to consider how socioeconomic diversity in preschool classrooms may promote children's learning relative to high-poverty settings, and thereby support policy efforts to expand access to high-quality preschool programs. While research on socioeconomic composition and children's learning in K–12 classrooms is plentiful, it is sparse in preschool settings. This study helps to fill that gap by exploring how the socioeconomic composition of classrooms may affect children's preschool learning.

In this chapter, I present my study that empirically tests the hypothesis that the socioeconomic composition of preschool classrooms is associated with children's learning. Using empirical data from eleven state Pre-K programs for four-year-olds, I examine whether children learn more in classrooms with a high average socioeconomic status (SES) relative to classrooms with a low average SES, and whether this is true for all children, regardless of their own SES and the racial/ethnic composition of their class. I also explore the mechanisms for this relationship, such as whether any association between average SES and children's learning is due to the presence of better teachers in high-SES Pre-K classrooms. Finally, I ask whether the relationship between average SES and children's learning is stronger in certain classrooms, such as when instructional quality is high or the classroom is relatively diverse in terms of children's family income. The results of the analysis, in brief, indicate:

- A positive association between the average SES of the children in a preschool classroom and their receptive language, expressive language, and math learning, regardless of their own SES and the racial/ethnic composition of the class. As the average SES of the class increased, children learned more during the Pre-K year, and this relationship did not depend on whether children in the classroom were from high-, middle-, or low-SES backgrounds.
- The association between average SES and children's learning was comparable in size to the relationship between children's own socioeconomic background and their learning during the Pre-K year. This suggests that policy measures to alter the SES composition of children's classrooms could prevent the gap in skills and knowledge between high- and low-SES children from widening during the Pre-K year.
- No association between social skills learning and socioeconomic composition after controlling for children's own SES and the racial/ethnic composition of their classrooms.
- The socioeconomic compositional effect appears to operate through direct peer interactions, not instructional quality or other aspects of quality in preschool classrooms.
- At the same time, the presence of high instructional quality and income diversity in the classroom interacts with average SES to further promote children's learning in high-SES classrooms.

The Policy Context

Three recent policy and research developments have created a fertile landscape for considering how the socioeconomic composition of preschool classrooms may relate to young children's learning. Together, these developments create an extraordinarily dynamic context to consider how policies that promote socioeconomic diversity in preschool classrooms may support the goal of expanding access to high-quality early education programs.

Pressure to Close Gaps in Readiness for Kindergarten

First, the pressure exerted by the No Child Left Behind (NCLB) law to close achievement gaps between children of different racial, ethnic, and socioeconomic backgrounds has aggravated concerns regarding the wide disparities in skills and knowledge among children entering kindergarten.[3]

With little explicit reference to early childhood, NCLB has raised expectations that preschool educators close these "readiness" gaps by assuring that all children, regardless of their race, ethnicity, or SES, are prepared for the academic demands of kindergarten.

This political pressure poses a formidable policy challenge. At a remarkably early age, children demonstrate substantial differences in their skills and knowledge that are primarily related to their social class.[4] The influential study by David T. Burkam and Valerie E. Lee, *Inequality at the Starting Gate,* found that, on average, children in the lowest SES quintile scored a full standard deviation below children in the highest SES quintile on both math and reading assessments, and that SES accounts for more of this variation than any other factor.[5] States have responded with a concerted push to give more parents access to preschool options that meet state standards of quality and improve children's outcomes.

While devoting substantial resources to close both readiness and achievement gaps, policymakers have found that making significant learning gains in high-poverty settings is extremely difficult. In early childhood education, the experience of Head Start demonstrates the challenge of fostering high-quality educational programs that serve only children living in poverty. As the federal government's largest effort to eradicate inequities in preschool enrollment, Head Start has successfully engaged thousands of parents in their children's development, and in the aggregate, the program produces modest, but significant improvements in children's learning. A randomized evaluation found that Head Start improved children's language, cognitive skills, and school-related behavior by 0.10 to 0.24 standard deviations, relative to a control group of children who may have attended other types of preschool.[6] These results place Head Start on par with good child care programs, and often it is the best option for many low-income parents who enjoy few affordable choices.

The uneven quality and modest results of many Head Start programs remain a concern, however.[7] A 2007 study found that 96 percent of Head Start classrooms scored in the low range on a measure of instructional quality; the average score for Head Start was 1.9 on a 7-point scale.[8] Moreover, its programs do not compare well, at least in the short run, with universal Pre-K programs.[9] One study compared children in Head Start with children who were eligible for Head Start but who attended Georgia's Pre-K program.[10] Although the two groups were statistically similar at the beginning of preschool, by the beginning of kindergarten, children in Georgia's Pre-K demonstrated better outcomes on five of six

cognitive and language assessments and fourteen of seventeen teacher assessments of children's academic and social skills, health, communication, and "general readiness."

This research has raised difficult questions for supporters of Head Start, who have responded with efforts to boost the quality of its programs. The 2007 Head Start reauthorization required that half of its teachers nationally have at least a bachelor's degree in early childhood education or a related degree with preschool teaching experience by 2013.[11] In addition, federal regulators are proposing to force lower quality programs to "re-compete" for their funding, an attempt to hold them accountable for meeting quality expectations.[12] But at least part of the problem may be related to the composition of the Head Start classroom. Even within state Pre-K programs, the quality of classrooms is lower when more than 60 percent of children come from poor families.[13]

Nevertheless, the practice of serving poor children separately from higher-income children is an enduring tradition in early childhood education, and Head Start enjoys a large contingency of supporters, many of them parents, who actively advocate for the program. From the earliest days of the republic to the advent of Head Start, early childhood policy has usually addressed the care and education of young children in low-income families separately from their higher-income peers.[14] Reimagining our approach to early education in ways that do not divide children by family income would be a momentous departure from this obdurate past.

New Research on Socioeconomic Composition of Classrooms in Early Childhood Education

Second, in the wake of legal decisions that have discouraged policies to pursue racial integration in K–12 settings, more school districts are considering the feasibility of integration by income for children from high-poverty schools.[15] As these policy efforts have grown, research on the benefits of socioeconomic diversity has also surged.[16]

Although early childhood researchers have only just begun to explore how socioeconomic composition of classrooms affects early learning, their focus has been mostly on kindergarten and elementary school data. One national study examined children's reading trajectories from kindergarten through third grade and found that, while family background made the largest contribution to initial reading disparities, school composition (such as poverty concentration) and neighborhood conditions

were more important in predicting SES differences in learning rates.[17] The authors concluded that student socioeconomic composition was "a critical component" of school context, more important than "teacher experience, preparation, and classroom literacy instruction."[18] Although other studies have found similar results among children, almost no attention has focused on preschool settings.[19] One small-sample study looked at preschool classrooms in Connecticut and found that, by the spring of preschool, low-income children who attended economically diverse programs learned more than children in high-poverty programs.[20] For children who spoke English at home, the gains were so substantial in the diverse programs that their spring scores did not differ significantly from those of their more affluent peers.

Each of these studies, of course, is subject to concerns regarding selection bias; that is, parents who enroll their children in more diverse schools may nurture their children's learning in ways that have nothing to do with the composition of their schools. Answering this critique, Heather Schwartz's longitudinal study, which forms the basis of chapter 2 in this volume, used a dataset of 850 low-income children who had been randomly assigned to housing and elementary schools in Montgomery County, Maryland, and found that from 2001 to 2007, children who attended the district's most-advantaged schools (measured by either subsidized lunch status or the district's own criteria) far outperformed in math and reading those children who attended the district's least-advantaged elementary schools.

This small but growing body of research indicates that the relationship between socioeconomic composition and children's learning extends down to kindergarten, and perhaps to preschool as well. Yet few early childhood researchers and policymakers, who together conduct the critical discussion about what constitutes high-quality preschool, explicitly consider the role of socioeconomic composition in early childhood learning. While the question of whether socioeconomic diversity in preschool classrooms promotes children's learning has not been fully explored, early results suggest it is fertile ground for nurturing children's growth and achievement.

The Expansion of State Pre-K

The third and perhaps most significant development in early education, and the one that makes this policy question so urgent, is the recent dramatic increase in state Pre-K programs. As neuroscience and

developmental research has highlighted the remarkable growth in children's development during the early years of life, the effectiveness of model preschool programs in promoting children's learning and long-term success in school and life has fostered broad support for publicly funded preschool.[21] In 2010, forty states enrolled 1.3 million children in Pre-K programs at a cost of $5.4 billion, representing one out of every four (26.7 percent) four-year-olds in the country.[22] Despite state budget woes caused by the dreary economic climate, total enrollment increased in 2010, and two states added Pre-K programs—a reflection of not only the enduring bipartisan support for such efforts but also the historic chance to promote effective learning opportunities for young children.

Although efforts to integrate high-poverty K–12 schools or to move their students into more diverse settings face an uphill political battle, early education is not bound by the same constraints. Unlike the K–12 system, parents of preschool-age children choose whether and where to enroll their children within the realm of affordable programs. Low-income parents usually have fewer high-quality options, however, than do high-income parents.[23] To expand access to quality programs, most states target their Pre-K programs so that they enroll only children from poor families, though many aspire to a universal framework that would serve low- and middle-income families who cannot afford private programs but do not qualify for public options.[24] In effect, states (and some urban areas, such as Washington, D.C., and Chicago) that are moving toward universality are inviting middle-income families to participate in public programs that previously had focused only on low-income children, a contrast to the K–12 experience of trying to integrate solidly middle-income K–12 schools in the 1970s by bringing in low-income children.

To expand Pre-K enrollment, states have generally taken one of two approaches, or a combination of the two. Some states offer enrollment in state-funded Pre-K programs (a supply-side approach); others offer vouchers or subsidies to low-income families for use in any state-approved Pre-K program (a demand-side approach).[25] In 2009, one-third of state-funded Pre-K children attended preschool in programs that also received private funding.[26] As long as the supply-side approach attracts middle-income families, both supply- and demand-side strategies create the possibility of socioeconomically diverse preschool classrooms.

Indeed, these policy strategies already are creating unprecedented diversity in Pre-K classroom. An analysis of 169 Pre-K classrooms found that, in half of the classrooms, 38 percent or fewer of the children were

poor (that is, had a family income up to 150 percent of the poverty line).[27] This suggests that state Pre-K programs have begun to alter the historical separation of preschool children in poor families from those in higher-income families. Whether policymakers should design their programs in ways that further encourage this diversity depends on the benefits they offer to children.

How Socioeconomic Composition May Affect Children's Preschool Learning

Early education research is playing an important role in this dynamic policy environment by delineating the components of preschool quality that are associated with children's learning.[28] Rarely are compositional aspects of preschool classrooms the focus of these efforts, however. For many policymakers, the model programs, such as the High Scope/Perry Preschool program, remain the gold standard of quality, and much of the preschool research considers quality in the context of such programs that serve mostly or entirely low-income children.[29] This perspective represents a narrow lens on the dimensions of quality. Reconsidering how socioeconomically diverse classrooms may contribute to children's learning requires a conceptual shift that creates new possibilities for how to support broad access to high-quality preschool.

The formation of effective policy requires an understanding of whether and how class composition may affect children's early learning. It is possible, for example, that any benefits associated with preschool classroom composition could be addressed through policies that do not require socioeconomic integration, such as the recruitment of good teachers to low-SES programs who might otherwise gravitate to higher-SES settings. Yet other benefits associated with high-SES classrooms, such as direct peer effects, might be inextricably linked with the assets of diverse middle- or high-SES classrooms, and therefore call for policies that promote diversity by social class in order to capture the benefits associated with such diversity.

To explore how the socioeconomic composition of preschools may affect children's learning, I look first to the literature from K–12 schools and then suggest how its findings might relate to preschool settings, given the lack of such research in early childhood. In general, K–12 research has focused on two theories for the underlying mechanisms that explain the relationship between class composition and learning: one suggests that

socioeconomically diverse schools promote children's learning through superior resources, such as better teachers, demanding curricula, and engaged parents; the other suggests that school composition influences how much children learn through direct peer effects that operate in the classroom. There are reasons to believe that both of these mechanisms operate in preschool settings as well.

Teaching and Curriculum

High-poverty K–12 schools are less likely to have qualified teachers than mostly middle-class schools, as defined by their educational degrees, experience, and credentials.[30] Schools with mostly low-performing students, often in high-poverty neighborhoods, have difficulty retaining their best teachers, and school composition appears to be more important than compensation in teachers' decisions to leave.[31] This suggests that, even when high-poverty and middle-class schools have equal financial resources, high-poverty schools are less able to keep the best teachers. Other studies also have found that low-SES schools tend to have less advanced coursework, less curricular emphasis on reasoning in addition to basic skills, less homework, lower teacher expectations, fewer teachers with experience relevant to their subject area, and less positive disciplinary climates than middle-SES schools.[32]

Some evidence suggests that disparities in teacher quality and curriculum exist in Pre-K classrooms as well. Pre-K programs that serve mostly low-SES children attract teachers with fewer qualifications and tend to offer lower quality instruction than Pre-K programs with higher-SES children.[33] In some high-poverty preschool classrooms, moreover, teachers favor didactic instruction of basic or nominal skills over more child-directed learning of analytic and problem-solving skills.[34] Critics view this detour into direct instruction, described as "drill and kill instruction," as deeply troubling.[35] Though direct instruction may improve the scores of children in the short-run, their academic success may wane when the curriculum requires more analytic and problem-solving skills.[36] Direct instruction has also been associated with lower levels of motivation and self-perceptions of competence.[37]

If higher-SES preschools attract better teachers who use a more demanding curriculum than do high-poverty settings, then socioeconomic composition could be an important factor, albeit indirectly, in promoting children's learning. While the K–12 literature indicates that the most qualified teachers often prefer not to teach in high-poverty settings, it

is unclear whether recent efforts to increase teacher education requirements and compensation in Pre-K and Head Start programs may alter this inequity.[38] But if Pre-K programs follow the pattern found in K–12 schools, higher-SES settings are more likely to offer low-SES children the quality of teaching that is most predictive of abundant learning by children. Alternatively, policy that expands access for low-SES children to high-poverty settings with poorer quality teaching could aggravate, rather than alleviate, the disadvantages that these children experience.[39]

The Power of Parents

Another important school resource is parents who actively promote their children's academic success. On average, low-SES schools are more likely to have parents with lower levels of education, higher rates of mental health issues, and highly stressful lives that may hinder participation in their children's education at home and school.[40] One study found that low-SES parents are more likely to delegate the job of educating children to the schools, while middle- and high-SES parents are more likely to communicate high academic expectations to their children and actively demand that schools help children fulfill such aspirations.[41] Higher-SES parents may also be able to garner larger and more stable financing for their public schools.[42] Together, these resource disparities among parents pose a formidable advantage for middle- and high-SES schools over their high-poverty counterparts, and it is plausible that the same advantages would accrue in a universal preschool system that engages middle- and high-SES parents.

Peer Effects for Lower-Skilled Children

The theory of "peer effects" in K–12 schools is that lower-skilled children who interact with higher-skilled peers learn more than they would in classrooms with only lower-skilled peers. Direct contact with higher-skilled peers may stimulate the learning of language, communication, social, and problem-solving skills among lower-skilled children. In addition, higher-skilled peers may nurture higher expectations among teachers, encourage a faster instructional pace, provide academic role models, and foster a positive disciplinary environment, all of which may enhance the learning of lower-skilled students.[43] While SES is by no means a proxy for ability, as measured by assessment scores, the two are strongly correlated due to the disadvantages of living in poverty. The result is that socioeconomically diverse classrooms are often higher in average skill level than are high-poverty classrooms.

Preschool scholars have only begun to explore the influence of peers on children's preschool learning, but their work suggests a positive association between the average ability of peers and how much children learn. One multi-state study found that the expressive language ability of children's Pre-K classroom peers, as measured by an assessment in the fall, was positively related to children's learning of expressive and receptive language skills during the Pre-K year.[44] The analysis controlled for children's race, ethnicity, and mother's education, and program variables such as class size, teacher-child ratio, and the quality of teacher-child interactions. Another study, using data on children who attended Pre-K in Georgia, similarly found that higher peer abilities were positively related to children's growth in receptive vocabulary, familiarity with print materials, and oral comprehension skills, regardless of children's own socioeconomic background and program variables such as class size, teacher experience and qualifications, and observed classroom quality.[45] A third study, using different data, found positive peer effects for low-skilled children with higher-skilled peers, while high-skilled children were largely unaffected by peer skills.[46]

Peers could influence children's preschool learning in myriad ways. Higher-SES children who have been socialized to engage assertively and verbally in learning activities could engage and stimulate their lower-SES peers who may not have been similarly socialized.[47] They may also encourage teachers to increase the pace of instruction and the level of content, which could foster greater learning among all children. In either case, the influence of peer effects may be particularly important in preschool due to the uniquely social aspect of early learning.[48] Most preschool classrooms are designed to exploit this fact by emphasizing child-to-child interactions more than the teacher-directed lessons commonly found in K–12 settings. While ability grouping is frequent in kindergarten, collaborative and play-based interactions predominate in preschool classrooms.[49]

Perhaps most prominently, the critical developmental task of acquiring language is inherently a social process. Higher-skilled children may serve as models of language use and vocabulary knowledge to their lower-skilled peers. One longitudinal study of children found that language-rich preschool settings promoted children's receptive language skills, particularly when they came from home environments with lower levels of language stimulation.[50] This finding is consistent with evidence that dramatic differences in children's early vocabulary growth seem to be explained, at least in part, by the amount and type of speech to which

children are exposed, such as the use of open-ended questions, expansions, and recasts.[51] Some scholars have suggested that peer interactions are especially beneficial to children who are learning English as a second language because they provide opportunities to hear and test communication skills, to expand their understanding of the sociolinguistic rules of a particular culture, to form cross-cultural friendships, and to take on positions of authority in the context of play.[52]

The mechanisms for peer effects on children's math skills have been less studied. While language skills permeate multiple activities in the classroom, math skills may be less salient and explicit. Nevertheless, children who possess stronger math skills might stimulate their less-skilled peers with their use of math and verbalization of math concepts in everyday interactions. Their presence in the classroom may also encourage teachers to increase the content and pace of math instruction.

While we do not know the exact mechanisms for peer effects in preschool settings, we do know that the social context for early learning is highly influential. This suggests that the socioeconomically diverse classroom is likely to be a fertile ground for the eager minds of young children.

Peer Effects for All Children

Peer diversity may evoke social and cognitive benefits that are not exclusive to lower-skilled children. Children from a variety of social class backgrounds may benefit from interactions and friendships with children who are different from them, and the effects may be enduring and profound. In K–12 settings, research on racial and ethnic diversity suggests that heterogeneous schools can reduce the prejudices and social isolation of children by race and class, and promote cross-cultural relationships that have long-term benefits such as greater social capital, employment opportunities, and comfort in multi-racial settings.[53] Supporters of diversity in higher education settings argue that racially and socioeconomically diverse peer interactions also create a rich forum for cognition that pushes students to consider new ways of understanding the world.[54]

In early childhood, research in this area is relatively sparse. By kindergarten, children have formed beliefs regarding racial, ethnic, and socioeconomic identities, and they are likely to have developed awareness of social status and skills of social comparison.[55] Exposure to peers from a variety of racial, ethnic, and socioeconomic backgrounds may inform these categorizations and destabilize emergent prejudices. One study found that in racially diverse kindergartens, children's acceptance of

peers and friendships transcends racial and ethnic identities.[56] Although this research does not focus on social class identities, it is plausible that friendships in socioeconomically diverse classrooms could diminish the social isolation that characterizes children in socioeconomically homogenous neighborhoods—whether they are high-, middle-, or low-SES.

In addition, it is plausible that diverse classrooms stimulate young children cognitively with the different perspectives of peers, pushing children to engage in active learning. This hypothesis is not unlike Piaget's theory of early cognitive development in which young children learn when their knowledge constructs and understandings (called "schema") are pushed into disequilibrium by new experience and, through assimilation and accommodation, new constructs and understandings take hold.[57] A preschool setting in which children come from diverse socioeconomic backgrounds could thus stimulate cognitive and social growth for all children through daily interactions, collaborative learning activities, and simply by playing together.

The Importance of Good Teaching in Socioeconomically Diverse Pre-K Programs

The possibility that all children benefit from socioeconomically diverse classrooms does not mean that they benefit equally, or that teaching in those classrooms is an easy task. Indeed, it is important to recognize that socioeconomically diverse classrooms may pose challenges as well as learning opportunities for children. Assuring that all children benefit may require teachers to adapt their pedagogy and raise the quality of their teaching.

It is unclear whether low- or high-SES children benefit the most from having high-ability peers. One study found that, on average, lower-skilled children benefited the most from sharing a preschool classroom with higher-skilled peers.[58] Yet another study found that, while the expressive language skills of peers positively affected children's language learning, the effect was larger for children who began preschool with more language skills.[59] One concern is that lower-skilled children may be less likely to engage in active conversation with their peers because they lack the vocabulary, grammar, and narrative discourse skills to participate fully with higher-skilled peers. They may also be valued less as play partners by their peers if they are perceived as lacking in the communication skills that facilitate collaborative play. If this is the case, teacher intervention may be crucial to capture the full benefits of a diverse classroom.

Indeed, to assure that all children benefit in socioeconomically diverse classrooms, teachers likely will need to address several pedagogical obstacles. Wide skill disparities among children may pose instructional challenges that require the stimulation of high- and low-skilled children simultaneously. This does not mean, however, that teachers must juggle multiple curricula. Early education research has identified the use of a comprehensive curriculum as an important organizing tool in preschool programs (that is, a curriculum that addresses the multiple developmental domains of early learning).[60] Within this curricular framework, teachers may need to offer individualized approaches to instruction that stimulate children with multiple skill levels.[61] Importantly, research in K–12 classrooms indicates that, when all children receive the same curriculum, high-scoring students appear unlikely to be "hurt" by the presence of lower-scoring students, as long as high-scoring students remain the majority.[62]

Children in socioeconomically diverse classrooms also are likely to vary in their cultural backgrounds and perhaps their home language. Such cultural and linguistic differences necessarily influence pedagogy in complex ways. For example, while research has found that "sensitive and stimulating teaching" predicts children's learning regardless of their socioeconomic background, the practices that constitute this measure may look quite different in programs that vary by class composition.[63] One study examined a sample of preschool programs that predominantly served African-American children and found that their version of "developmentally appropriate practice," a standard of practice in many early education programs, was infused with "African American cultural traditions, such as religiosity and community mothering."[64]

Teachers in culturally diverse classrooms likely will need to accommodate a variety of cultural expectations and reference points in their pedagogy:

- Effective classroom management may vary across cultures, with Latino, African-American, and poor families more likely to emphasize unquestioning obedience than white and non-poor families.[65]
- Fulfilling the goal of "parent engagement" could look different among different families. European-American parents may be more likely to volunteer in school, for example, while Chinese-American parents may be more likely to engage in systematic home schooling.[66]
- Teachers may need to reconsider their perceptions of "normal" behavior among their students. Whether and how children

demonstrate assertiveness, cooperation, independence, and internalizing or externalizing of social-emotional problems may vary widely across cultural identities.[67]

- If a teacher's expectations of children differ by their socioeconomic backgrounds, the result may be differential treatment that hinders low-SES children with low expectations.[68]
- In classrooms with children who are emergent bilinguals, pedagogy that is culturally *and* linguistically relevant can be even more challenging for teachers.

Cultural and linguistic differences between teachers and children thus require that teachers adapt their practice to the families they serve. While these differences do not reliably fall along social class lines, culturally competent teaching would likely be particularly important in socioeconomically diverse classrooms, where cultural gaps may open between teachers and children and between children themselves. In addition to adjusting their own pedagogy, teachers play an important role in nurturing the social-emotional skills and peer exchanges that support children's learning in the social setting of preschool. Their ability to foster positive peer interactions could be highly influential in diverse classrooms when children need a teacher to facilitate such interactions.[69]

Together, these multiple research findings suggest that, while the possibilities for learning may be greater in diverse classrooms, and not only for low-SES children, the demands of good teaching may also be higher. The K–12 desegregation experience showed how schools and teachers who serve racially and socioeconomically diverse students need an "educational logic" for how to meet the disparate needs of incoming students.[70] This challenge may loom large in diverse preschool settings as well. To capture the full benefits of socioeconomic diversity classrooms, teachers should be ready to bridge cultural and linguistic gaps between themselves and their children, attend to skill disparities that require individualized instruction, and nurture the peer interactions that may be highly influential in the social context of preschool learning.

Methods and Data

The study presented in this chapter empirically tests the hypothesis that the socioeconomic composition of preschool classrooms is associated with children's learning. After accounting for how children's own SES

might affect their learning, I explore the extent to which the socioeconomic composition of preschool classrooms affects learning outcomes, how it may do so, and whether the relationship between classroom composition and children's learning varies in different classroom contexts. Finally, I discuss the policy and research implications of the findings and suggest how policymakers could try to capture any apparent benefits of socioeconomic diversity in the context of parental choice regarding preschool education.

First, it is worth defining some terms. *Early childhood* refers to the years from birth to age eight. Learning before kindergarten takes place in a variety of settings—at home with family, in home- or center-based care, Head Start programs, private preschools, state Pre-K programs, and public or private elementary schools. In this study, a *preschool* experience refers to center-based care, Head Start programs, state Pre-K programs, and private preschools. This study focuses on a sub-set of preschools: *Pre-K* programs, whose provision is mostly funded by the states. Furthermore, the analysis considers four-year-olds, who have been the priority of state Pre-K efforts to date. *High-quality* programs connote programs that effectively nurture children's learning.

Consistent with other research in the social sciences, I consider children's family income and their mothers' level of education as measures of SES, or *social class*.[71] For the purposes of this study, I weight these two measures equally to create an SES measure. Children whose families are described as *poor* in this study have incomes below 150 percent of the poverty line, or about $22,000 for a family of three when the data were collected.[72] Finally, the focus of this study is *classroom* composition. Some of the relevant K–12 research looks at *school* composition, which can be an unreliable proxy for classroom composition.

Analytic Approach

An important contribution of the study is the use of multi-level modeling to explore the relationship between classroom composition and children's preschool learning. The dataset contains information on children and their preschool classrooms, a nested data structure that allows for a multi-level approach in which hierarchical linear modeling (HLM) partitions the variance in the dependent variable (the outcome) into two parts, the portion that lies between children within preschools and the portion that lies between preschools.[73] Children's learning is modeled simultaneously as a function of their own characteristics (*child-level* variables), as

well as characteristics of the preschool classrooms they attended (*class-level* variables). Multi-level modeling represents a significant improvement in the precision of analytic methods over single-level, ordinary least squares (OLS) regression, which has been employed in much of the research on school effects, including the Coleman Report.[74]

Using an eleven-state database of 2,966 children who attended 704 Pre-K classrooms, I employed multi-level modeling to assess the gains in receptive language, expressive language, math, and social skills, measured on fall and spring assessments, among children in classrooms with different socioeconomic compositions. Using spring assessment scores as an outcome and fall assessment scores as a covariate (an ANCOVA approach), I was able to interpret the parameter estimates as to how much the children learned between the two assessments. I had three research questions:

- RQ1: To what extent is the socioeconomic composition of preschool classrooms related to children's language, math, and social skills learning, above and beyond the association between their own SES and learning?
- RQ2: To what extent do aspects of preschool classrooms, such as instructional quality, explain the relationship between socioeconomic composition and children's preschool learning?
- RQ3: Is this relationship more important in certain classroom contexts, such as when income diversity or instructional quality is high?

I built a succession of models to address these three questions. First, I established whether socioeconomic composition is positively related to children's learning on each of the four outcomes, after accounting for their own SES and other background characteristics (such as race/ethnicity, single-parent status, and primary home language), and the racial/ethnic composition of the classroom. Then, because socioeconomic composition may act as a proxy for other aspects of classroom quality, I added class-level measures of quality to the model (such as instructional quality, teacher education level, and class size) to explore how such measures may explain this relationship. Finally, I considered interactions between class-level measures of quality and SES composition to see if SES composition is particularly important in certain contexts.

To measure the socioeconomic composition of classrooms, I combined the average family income and average level of mothers' education in the class to get a single measure of average class SES. I also used a measure of the standard deviation of family incomes within classrooms to assess

the extent to which the diversity of income within classrooms relates to children's learning.

The Data: Children in Pre-K Classrooms

For the analysis, I used data from two studies conducted by the National Center for Early Development and Learning (NCEDL): the Multi-State Study of Pre-Kindergarten, sponsored by the U.S. Department of Education's Office of Educational Research and Improvement, and the State-Wide Early Education Program Study (SWEEP), sponsored by the National Institute for Early Education Research, Pew Charitable Trusts, and Foundation for Child Development. Collecting data from eleven state Pre-K programs (California, Illinois, Georgia, Kentucky, New York, Ohio, Massachusetts, New Jersey, Texas, Washington, and Wisconsin), the two studies had the same research team and measures, similar sampling designs, and the common goal of understanding the relationship between features of Pre-K programs and child outcomes.[75] Both studies included extensive classroom observations and child assessments in the fall and spring of a Pre-K year. Though the eleven states represented 80 percent of the national Pre-K population at the time the studies were conducted, the sample was not meant to be nationally representative.

Within each state, NCEDL chose a stratified random sample of centers/schools to maximize variation in teacher credentials, program setting, and intensity. Within each center/school, NCEDL then chose one classroom, collected demographic data on families of children in the classroom, and randomly selected four children for assessment in the fall and spring of preschool. Children were eligible for assessment if they (1) would be old enough for kindergarten in the following year, (2) did *not* have an individualized education plan (IEP) in the fall, and (3) could follow simple instructions in English or Spanish. Because the average class size was eighteen, the children assessed represent about 22 percent of all children who were enrolled in the class.

Class-Level Variables

My primary variable of interest at the class level is the combined measure of class mean family income and class mean level of mothers' education, which represents the average SES in the class. Another variable of interest is a measure of the standard deviation of mean family income *within* classrooms, an indicator of the diversity of incomes in classrooms. While high-poverty classrooms by definition have a narrow distribution

of family income, as class mean income rises, so does the potential for income diversity. Indeed, class mean income and the standard deviation of incomes within classrooms are strongly correlated ($r = 0.597$; $p < .01$). However, some high-SES classrooms may have little diversity at all. By using both class mean SES and the standard deviation of income, I am able to consider what portion of a compositional effect might relate to having high-SES children in the classroom, and what portion might relate to having a wide distribution of income within the classroom.

The data offer additional measures of classroom composition that I consider as covariates: the percentage of children in the classroom who are white or racial/ethnic minorities; whether 15 percent or more of the children in a classroom are English language learners (ELLs), and whether 15 percent or more of the children have IEPs or referrals for IEPs, by the spring of the preschool year. Most children (at least 70 percent) attended classrooms that had fewer than 15 percent ELLs or fewer than 15 percent children with IEPs or IEP referrals.

To account for other aspects of classroom quality that may relate to a compositional effect, I included a measure of teacher quality, which has two dimensions: (1) instructional interactions and (2) social/emotional interactions. I also included a global quality measure of the classroom (the ECERS). Details regarding these measures appear in Appendix 3.1 (see page 123). I also considered variables that represent particular aspects of structural quality, such as the child-teacher ratio; class size; whether the program was full-day; whether the class was part of a Head Start program; whether it was located in a public school; whether the program offered meals, family services, and/or health services, as well as measures of teacher education; whether the teacher had been certified for less than four years; whether the teacher spoke Spanish; and whether the teacher used a comprehensive curriculum, such as High/Scope or the Creative Curriculum. In the final models, I included only those variables that were statistically significant for at least one of the four outcomes.

Child-Level Variables

In the fall and spring of the pre-K year, four children in each classroom participated in direct assessments of their receptive language, expressive language, and math skills. (Children demonstrate receptive language skills when they show their understanding of language implicitly, as when they follow a directive such as "Put the book on the shelf." Expressive language skills are demonstrated explicitly, such as when children

answer a question in a way that indicates comprehension.) In addition, in the fall and spring, teachers completed a behavioral rating scale to assess children's social competence. Details regarding these assessments appear in Appendix 3.2 (see page 124).

To account for the associations between children's own background characteristics and their learning during the preschool year, I included child-level covariates such as age, gender, race/ethnicity, single-parent status, ELL status, IEP status in the spring, and days absent from preschool. To represent children's own SES, I combined their family income and mother's education level to make a single measure of SES. This allowed me to compare the relative importance in children's learning of their own SES and the average SES in their classrooms.

Portrait of the Children and Their Pre-K Classrooms

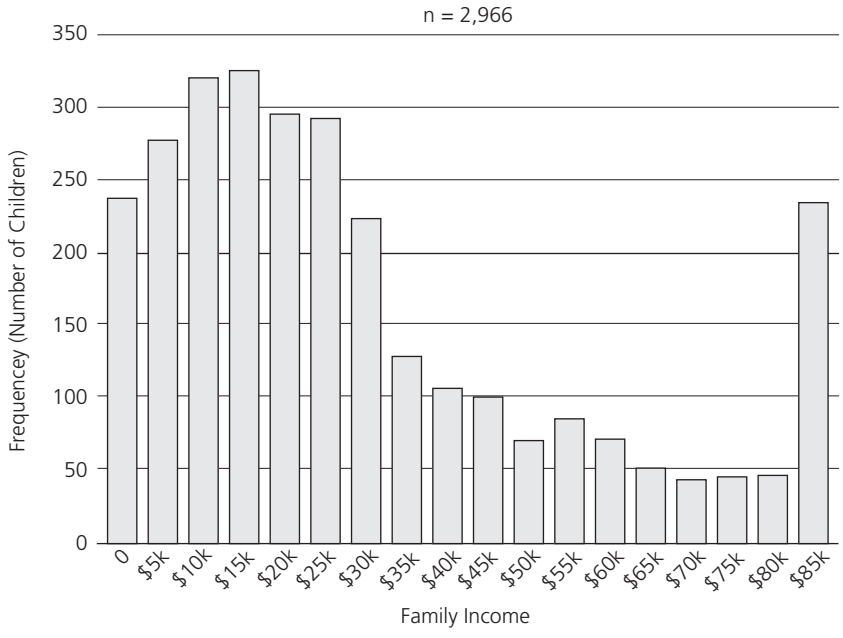
I began with a descriptive analysis of children in the sample and how they were distributed among classrooms, and then examined how their classrooms differed in terms of various aspects of quality. The results of these analyses suggest that, while the data represent unusual levels of socioeconomic diversity within public preschool programs, the pattern of concentrating low-SES children in lower-quality classrooms persists.

The Children

A threshold requirement for a study of socioeconomic diversity in preschool classrooms is the presence in the dataset of children with a range of socioeconomic backgrounds, some of whom share the same classrooms. The data in Figure 3.1 indicate that roughly half (49.2 percent) of the children in the combined dataset were from families with incomes of $25,000 or below, which was just above 150 percent of the poverty line for a family of three at the time the data were collected.[76] A quarter (25.4 percent) of the children came from families whose incomes were from $25,001 to $45,000. Another quarter (25.4 percent) came from families whose incomes exceed $45,000, which was above the median family income ($43,000) at the time the data were collected.[77] Though the dataset contains a disproportionate number of children from low-income families, they reflect a mix of children that is unusual among public preschool datasets.

The results of the analysis also indicate that many children attended classrooms that were reasonably diverse in terms of family income. As

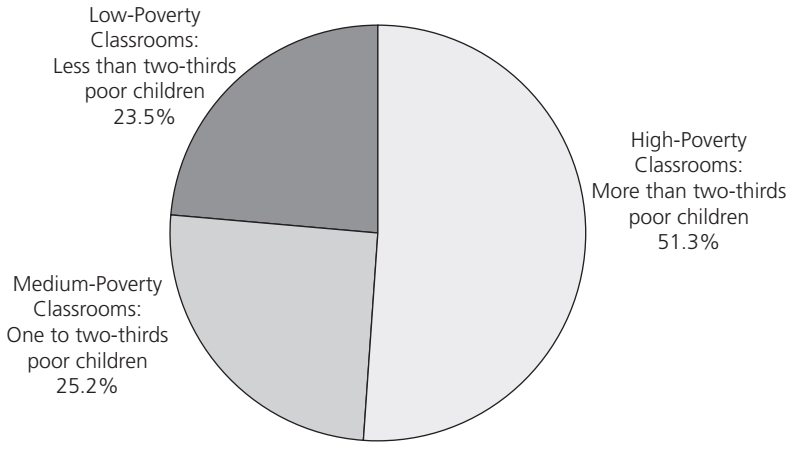
FIGURE 3.1. Children's Family Income



shown in Figure 3.2, about half of the children (51.3 percent) attended classrooms that could be considered high-poverty (more than two-thirds of the children were poor). But a quarter of the children (25.2 percent) attended classrooms that were more mixed (one-third to two-thirds of children were poor), and another quarter of the children (23.5 percent) were in classrooms that could be considered low-poverty (less than one-third of children were poor). While about half of the children attended high-poverty classrooms, the results suggest that a significant number attended classrooms that were more diverse.

Another way to examine the diversity of classrooms is to look at how widely family income varied within classrooms. The analysis indicates that half of the children attended classrooms in which the standard deviation of family incomes was more than $15,927. This finding suggests that, in those classrooms, roughly one-third of the children were more than $31,854 apart in family income. Together, these results suggest that, while many children attended high-poverty classrooms, as might be expected in publicly funded preschools, a substantial number attended

FIGURE 3.2. Percent of Children in Low-, Medium-, and High-Poverty State Pre-K Classrooms



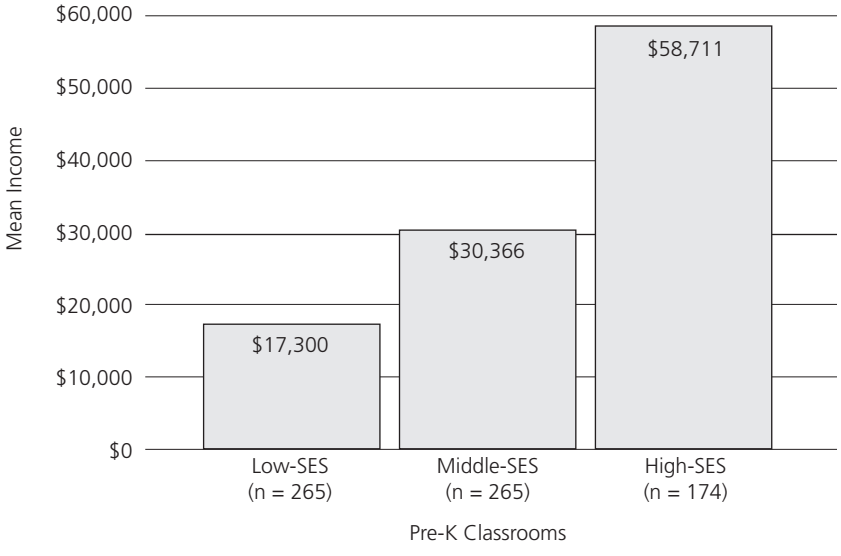
classrooms in which there was a wide mix of family incomes, reflecting states' efforts to reach beyond the poorest families as they have expanded their Pre-K programs and to give low-SES children access to programs that may serve higher SES families.

While other early childhood databases reflect a socioeconomically diverse mix of children in public and private settings, only the Multi-State and SWEEP data, to my knowledge, provide a large-scale, nested data structure regarding children from a wide spectrum of socioeconomic backgrounds in publicly funded preschool classrooms. This creates a unique opportunity to explore the extent to which socioeconomically diverse preschool classrooms promote children's learning.

To assess further how children in the dataset differ among classrooms, I compared those in low-, middle-, and high-SES classrooms. As shown in Figure 3.3, the class mean income in low-SES classrooms was $17,300, slightly more than half of the mean family income in middle-SES classrooms, which was $30,366 ($p < .001$). Children in high-SES classrooms had a mean family income of $58,711 ($p < .001$), nearly twice the average of children in middle-SES classrooms and more than three times the average in low-SES classrooms.

Mothers of children in the three types of classrooms differed significantly by the average number of years of education they had attained. On average, the mothers of children in low-SES classrooms lacked a high

FIGURE 3.3. Mean Income in Low-, Middle-, and High-SES Classrooms



school diploma (11.7 years of education; $p < .001$), while mothers of children in middle-SES classrooms had eight months of education beyond high school (12.7 years). Mothers of children in high-SES classrooms had the highest levels of education with an average 2.6 years of postsecondary education (14.6 years; $p < .001$).

Stratification by other socio-demographic characteristics was also evident. Children were disproportionately distributed among classrooms by race/ethnicity ($p < .001$). Black and Latino children were much more likely to attend low-SES classrooms. Together, they comprised 63.9 percent of children in low-SES classrooms (compared to 45.1 percent of the sample), while white children comprised 69.8 percent of children in high-SES classrooms (compared to 41.2 percent of the sample). Middle-SES classrooms had roughly equal portions of white children (39.7 percent) and black or Latino children (45.8 percent).

The results suggest a strong relationship between whether children had single parents and their likelihood of attending a low-SES classroom ($p < .001$). Children in low-SES classrooms (50.0 percent) were more than twice as likely to have single parents as those in high-SES classrooms (20.5 percent). The analysis also indicates a strong association

between ELL status and the average social class of children in preschool classrooms ($p < .001$). Children in low-SES classrooms (32.7 percent) were three times more likely to be learning English as a second language than children in high-SES classrooms (10.1 percent). Children in low-SES classrooms also missed more days of preschool than their peers in middle-SES classrooms ($p < .001$), while children in high-SES classrooms missed even fewer than those in middle-SES classrooms ($p < .001$). Children in low-, middle-, and high-SES classrooms did not differ significantly in age, gender, and whether they had an IEP or IEP referral by the spring of their preschool year.

The differences among children in low-, middle-, and high-SES classrooms are most striking in terms of the skills they possessed at preschool entry. Children in low-SES classrooms began preschool with receptive language skills that were one-third of a standard deviation below those of children in middle-SES classrooms ($p < .001$), while children in high-SES classrooms began preschool with receptive language skills that were two-thirds of a standard deviation above those of children in middle-SES classrooms ($p < .001$). This suggests that children in low- and high-SES classrooms were, on average, a full standard deviation apart in receptive language development when they began Pre-K.

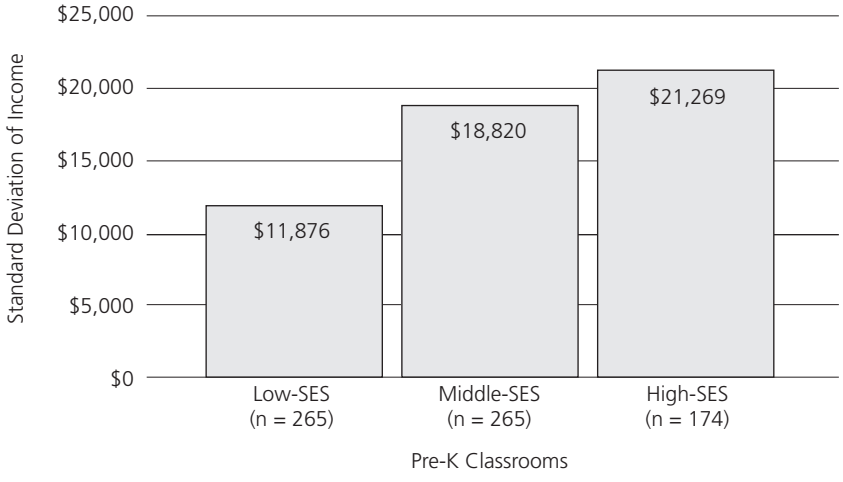
The disparities in expressive language and math skills followed the same pattern, though with somewhat smaller disparities. Children in low- and high-SES classrooms were, on average, more than three-quarters of a standard deviation apart on both expressive language skills and math skills when they began Pre-K. The gap in social skills, however, was statistically significant only when comparing children in high-SES classrooms with those in middle-SES classrooms. Children in high-SES classrooms demonstrated social skills that were more than one-quarter of a standard deviation higher than those of children in middle-SES classrooms ($p < .001$).

Overall, even while a substantial number of classrooms were characterized by socioeconomic diversity, the predominant pattern is the clustering of advantaged children in high-SES classrooms and disadvantaged children in low-SES classrooms, measured by family income, mother's education, single-parent status, race/ethnicity, ELL status, days absent, and children's skills at the beginning of the Pre-K year.

The Classrooms

The descriptive analysis of class-level measures reveals some of the same patterns of concentrated disadvantage that were evident in the child-level

FIGURE 3.4. The Range of Incomes in Low-, Middle-, and High-SES Classrooms



data. For example, the results indicate the unequal distribution of poor children among classrooms. Children living in poverty comprised 85.2 percent of children in low-SES classrooms ($p < .001$) and only 17.5 percent of those in high-SES classrooms ($p < .001$). Even so, it is striking that one in six children in high-SES classrooms was poor. Indeed, the presence of low-income children in higher-SES classrooms indicates that some state Pre-K programs have achieved a remarkable degree of classroom diversity, which makes this study possible.

Importantly, the class-level results reveal a significant relationship between the diversity of income within classrooms and the average SES in those classrooms.[78] As shown in Figure 3.4, the average standard deviation of family incomes in low-SES classrooms, $11,876, was about two-thirds of the average standard deviation of income in middle-SES classrooms, $18,820 ($p < .001$). The average standard deviation of family income in high-SES classrooms, $21,269, was higher still ($p < .001$), and almost twice as high as that of low-SES classrooms. In other words, as average classroom SES increased, so did the diversity of family income. Low-SES classrooms were likely to represent a concentration of children whose families were poor or near poor, while middle- and high-SES classrooms were likely to offer more economic diversity.

The descriptive results also indicate that classrooms of varying socioeconomic composition differed significantly in terms of quality, affirming

concerns that despite concerted policy efforts to standardize levels of quality across publicly funded classrooms, more work remains to be done. As measured by the ECERS, the average quality level in high-SES classrooms was almost one-third of a standard deviation higher than the average quality level in middle-SES classrooms ($p < .01$), and a half a standard deviation higher than the average quality level in low-SES classrooms ($p < .001$). Low-SES classrooms were most likely to have teachers who lacked a BA ($p < .01$) and least likely to have teachers who have earned more than a BA ($p < .01$). However, low-SES classrooms appeared most likely to have teachers with a Child Development Associate certificate (CDA) ($p < .01$), and to have teachers who spoke Spanish ($p < .001$), which corresponds with the higher number of ELL students in those classrooms.

Some aspects of structural quality did not differ across classrooms. Variations among the classrooms in size, the child/teacher ratio, whether they were full-day, and whether they were located in a public school were not statistically significant. Yet children in low-SES classrooms attended Pre-K for fewer hours per week than did children in high-SES classrooms ($p < .05$). Combined with higher rates of absenteeism in low-SES classrooms (found in the child-level analysis), this is cause for concern.[79] As might be expected, low-SES classrooms were twice as likely to offer meals ($p < .001$), 1.4 times more likely to offer family services ($p < .001$), and 1.9 times more likely to offer health services ($p < .001$) than high-SES classrooms.

Aspects of process quality were significantly related to the SES level of classrooms, mostly suggesting lower quality in low-SES classrooms. The quality of emotional support offered by teachers in the course of the preschool day was much higher in high-SES classrooms than in either middle- or low-SES classrooms ($p < .001$). The average level of emotional support in high-SES classrooms was almost one-half standard deviation higher than the average level of emotional support in middle-SES classrooms ($p < .001$), and two-thirds a standard deviation higher than the average level in low-SES classrooms ($p < .001$). Differences in the quality of instructional support in high-, middle-, and low-SES classrooms followed the same pattern, but were not large enough to be statistically significant. Surprisingly, the use of a comprehensive curriculum was 1.7 times more common in low-SES classrooms than in high-SES classrooms ($p < .001$), where some teachers may have followed a flexible curricular path to meet the needs of more-advantaged students.

Overall, the class-level findings reveal some important differences between low-, middle-, and high-SES classrooms in terms of their composition and quality, with lower-SES classrooms more likely to have had higher numbers of disadvantaged children and more teachers who possessed lower levels of education and who offered less emotional support to their children. Differences in instructional quality among the three types of classrooms, however, were not large enough to be considered statistically significant. Despite the wide gaps in initial skills among low- and high-SES children, children in low-SES classrooms spent fewer hours there than did children in high-SES classrooms.

The Findings

In the multivariate analysis, I explored the relationship between socioeconomic composition and children's learning during the preschool year. I began with a simple child-level model for each of the four outcomes to establish the relationship between children's characteristics and their preschool learning, without adjusting for any variables at the class level. Then I built a series of models to answer the three research questions.

The unadjusted child-level model establishes a baseline of how much children learned during the preschool year. Across each of the four outcomes, the findings indicate a moderately strong and highly significant relationship between children's SES and their preschool learning, controlling for other aspects of their background such as their race/ethnicity, whether English was their second language, and whether they had an IEP. This means that the skills gap between lower- and higher-SES children widened during the Pre-K year. For each standard-deviation increase in their SES, children's receptive language learning improved by 0.077 standard deviations ($p < .001$) and their expressive language learning improved by 0.078 standard deviations ($p < .001$). The relationship between children's SES and their learning was even stronger for math skills (Effect Size [ES] = 0.122; $p < .001$) and somewhat weaker for social skills (ES = 0.057; $p < .001$).

The skills gap between white and minority children also grew on most outcomes during the preschool year. Regardless of SES and other aspects of children's background, black children learned fewer receptive language (ES = –0.293; $p < .001$), expressive language (ES = –0.142; $p < .001$), math (ES = –0.224; $p < .001$), and social skills (ES = –0.077; $p < .10$) than white children. Latino children similarly learned fewer receptive language

skills than white children (ES = –0.313; $p < .001$), and fewer expressive language skills (ES = –0.182; $p < .001$). Asian children also learned fewer expressive language skills than white children (ES = –0.241; $p < .01$).

The finding that low-SES and minority children in Pre-K learned less, on average, than high-SES and white children is an urgent policy concern, given the near-universal goal of using Pre-K to help close the wide readiness gaps among these children that are apparent in kindergarten. A common explanation for this troubling finding is that low-SES and minority children are likely to attend lower-quality programs, an argument that finds some support in the descriptive findings here.[80] The obstacle remains, then, to identify the components of quality that allow low-SES and minority children to learn as much as, or more than high-SES and white children. This study explores the extent to which socioeconomic composition may help to address this challenge.

RQ1: Socioeconomic Composition and Children's Learning

The first research question asks: To what extent is the socioeconomic composition of children's preschool classrooms associated with their learning of language, math, and social skills, above and beyond the association between their own SES and preschool learning? To answer this question, I built five models. The first model simply asked whether class mean income was related to children's learning, controlling for children's SES, race/ethnicity, single-parent status, ELL status, IEP status, gender, and age. In Model 2, I added the standard deviation of income within classrooms to assess the extent to which the class mean-income coefficient reflects the diversity of income in classrooms, rather than the presence of high-income children. In Model 3, I added the average level of mothers' education, and in Model 4, I use only the average SES level to estimate the relationship between the socioeconomic composition of the class and children's learning. Finally, in Model 5, I added a measure of the racial/ethnic composition of the class (the percentage of children who are white) to assure that the estimate of socioeconomic composition is not attributable to racial/ethnic composition.

RQ1: Receptive Language Learning. The results from Model 1 indicate that class mean income was significantly associated with children's receptive language learning, beyond their own SES and other background characteristics (ES = 0.036; $p < .10$). In Model 2, the standard deviation of family income within classrooms was not statistically significant, but

was strong enough to render class mean-income non-significant. This suggests that, by itself, income diversity was not a significant predictor of children's learning, but it was an important aspect of the relationship between high-SES classrooms and learning. In Model 3, I added the mean level of mothers' education and found that it was a stronger predictor of children's receptive language learning than was class mean income. For each one standard-deviation rise in the average level of mothers' education in the classroom, children's learning rose by 0.057 standard deviations ($p < .05$), compared to 0.036 standard deviations for a comparable rise in class mean income ($p < .10$).

The single measure of socioeconomic composition, used in Model 4, suggests a significant relationship between socioeconomic composition and children's learning of receptive language skills (ES = 0.055; $p < .05$). The addition of the percentage of white children in the classroom in Model 5 attenuated the effect of socioeconomic composition, though it remained significant (ES = 0.042; $p < .10$). It is noteworthy that the effect of socioeconomic composition was comparable to the coefficient for children's own SES (ES = 0.051; $p < .05$).

RQ1: Expressive Language Learning. The results from Models 1 and 2 indicate that neither class mean income nor income diversity was significantly related to children's learning of expressive language skills, adjusting for their background characteristics. However, in Model 3, the mean level of mothers' education in classrooms was significantly related to children's expressive language development, controlling for children's own SES and other background characteristics (ES = 0.066; $p < .001$).

When class mean income and mean mothers' education were combined in Model 4, the results indicate a significant relationship between the socioeconomic composition of preschool classrooms and children's expressive language learning, regardless of their own SES and other background characteristics (ES = 0.061; $p < .05$). This association persisted in Model 5, which included racial/ethnic composition (ES = 0.052; $p < .05$). Once again, the estimate for the relationship between socioeconomic composition and children's learning was comparable in size to the coefficient for children's own socioeconomic background (ES = 0.047; $p < .05$).

Interestingly, the main effect for the percentage of white children in the classroom was positive (ES = 0.133; $p < .10$), but the so-called quadratic term was negative (ES = –0.108; $p < .10$). This means that, on average,

attending a classroom that was high-minority/low-white (that is, two standard deviations below the mean) was associated with a 0.697 standard-deviation decline in how much children learned relative to children at the mean. As the percentage of white children increased, children's learning improved; a classroom with a percentage of white children that was one standard deviation above the mean was associated with a 0.026 standard-deviation rise in children's expressive language development. Yet above that level, the advantage of having white children in the classroom dissipated; classrooms that were two standard deviations above the mean were associated with a 0.165 standard-deviation decline in learning relative to children at the mean. This nonlinear relationship implies that racial/ethnic diversity improves children's expressive language learning when neither whites nor minorities are in the overwhelming majority, once we control for classroom SES.

RQ1: Math Learning. The results from Model 1 indicate that class mean income was significantly related to children's math learning, after adjusting for their own SES and background characteristics (ES = 0.065; $p < .01$). The quadratic term for class mean income was also significant and positive (ES = 0.032; $p < .10$), which suggests that the beneficial effect of higher class mean-income grew stronger as the mean income increased. Again, the measure of income diversity was not significant in Model 2. In Model 3, the classroom average of mother's education was significantly associated with children's math learning (ES = 0.053; $p < .05$).

When mean class income and mothers' education were combined in Model 4, the results indicate a significant relationship between socioeconomic composition and children's math learning, controlling for their SES and other background characteristics (ES = 0.061; $p < .01$). The coefficient decreased slightly in Model 5 with the addition of racial/ethnic composition (which was not statistically significant), but the effect of socioeconomic composition remained significant and positive (ES = 0.058; $p < .05$). It is again striking that the socioeconomic composition coefficient was comparable to that associated with children's own SES (ES = 0.092; $p < .001$).

RQ1: Social Skills Learning. In contrast to the other three outcomes, the relationship between class mean income and children's social skills learning was significant but negative (ES = -0.060; $p < .01$). This result suggests that for each standard deviation increase in the socioeconomic level

of the classroom, children's social-skills learning was 0.06 standard deviations *less* than in classrooms where the SES level was average. In Models 2 and 3, neither the measure of income diversity within classrooms, nor the measure of mothers' education was significant.

Combining class mean income and mother's education, the results in Model 4 indicate a significant and negative relationship between socioeconomic composition and children's social skills learning, adjusting for children's SES and background characteristics (ES = –0.044; $p < .10$). However, this estimate was no longer significant when the percentage of white children was incorporated into Model 5 (ES = –0.045; $p < .10$).

Of the four outcomes, the social skills measure is the only one that relied on teacher evaluations and the sole outcome for which socioeconomic composition was not significant when I included the racial/ethnic composition of the classrooms in the model. In my analysis, I explored the implications of this finding and will discuss the results below.

RQ2: Socioeconomic Composition, Classroom Quality, and Children's Learning

The second research question asks: To what extent do aspects of preschool quality, such as instructional quality, explain the relationship between the socioeconomic composition of preschool classrooms and children's learning? To answer this question, I added measures of classroom quality to the last model in RQ1 (Model 5) to create a new model (Model 6). These variables included measures of instructional quality and emotional support, teacher education, class size, whether the program consumed a full day, whether the classroom was a Head Start program, and whether the teacher used a comprehensive curriculum. If a covariate was significant for any one of the four outcomes, I included it in the models for all four outcomes to make them comparable. In the final version of the models, six class-level covariates were significant for at least one outcome, and hence included in the models for all four outcomes.

To the extent that the coefficient for socioeconomic composition decreases upon the inclusion of these covariates, the compositional effect can be interpreted to be spurious. For example, if the inclusion of instructional quality diminishes the coefficient for socioeconomic composition, we could infer that the compositional effect was related to the fact that higher-SES classrooms are likely to attract higher-quality teachers. But if the inclusion of instructional quality, or other measures of classroom quality, does not diminish the compositional coefficient, then we would

need to consider alternative explanations for how socioeconomic composition relates to children's learning.

RQ2: Receptive Language Learning. Only one of the six covariates was significantly related to children's receptive language learning: instructional quality (ES = 0.034; $p < .10$). When this measure and the other five class-level covariates were incorporated into the model, the coefficient for socioeconomic composition remained constant (ES = 0.046; $p < .10$). Because the class-level covariates did not reduce the estimate for socioeconomic composition, they do not explain its relationship to children's receptive language learning.

RQ2: Expressive Language Learning. Again, among the six covariates, only one, instructional quality, was significantly related to children's expressive language learning (ES = 0.057; $p < .001$). With the inclusion of the class-level covariates, the estimate for socioeconomic composition remained constant (ES = 0.064; $p < .05$). Because none of them reduced the coefficient for socioeconomic composition, the covariates do not explain its relationship to expressive language learning. Their inclusion in the model, however, rendered the measure of racial-ethnic composition non-significant. This finding suggests that the association between the percentage of white children and expressive language learning is explained, at least in part, by the preponderance of higher-quality instruction in classrooms with more white children.

RQ2: Math Learning. Two of the classroom covariates were significantly associated with children's math learning: instructional quality (ES = 0.034; $p < .05$) and a small class (ES = –0.056; $p < .10$). Somewhat surprisingly, the coefficient for class size was negative, suggesting that children in smaller classes learned fewer math skills than children in larger classes. In the presence of these and the other classroom covariates, the socioeconomic compositional estimate remained constant (ES = 0.061; $p < .05$), indicating once again that the covariates do not explain the relationship between socioeconomic composition and children's math learning.

RQ2: Social Skills Learning. Several of the classroom quality measures were significantly related to social skills learning. After adjusting for their SES and other background characteristics, children in classrooms with higher levels of instructional quality developed more social skills (ES = 0.041;

$p < .05$), as well as children whose teachers had a BA (ES = 0.092; $p < .10$) or more than a BA (ES = 0.153; $p < .01$), when compared to those whose teachers lacked a BA. Children in Head Start classrooms learned more social skills than children in non-Head Start classrooms (ES = 0.104; $p < .10$), but children in full-day programs acquired fewer social skills than those in half-day programs (ES = –0.078; $p < .10$).

Despite the significance of these covariates, the association between socioeconomic composition and social skills development remained non-significant. The results of the social skills analyses represent the only findings, thus far, when socioeconomic composition was not significantly related to children's learning. For the other three outcomes, it has remained a durable predictor of learning, even in the presence of classroom covariates that are commonly thought to be important aspects of high-quality preschool classrooms.

RQ3: Socioeconomic Composition, Classroom Contexts, and Children's Learning

The third research question asks: Is the relationship between socioeconomic composition and children's learning stronger in certain classroom contexts, such as when income diversity or instructional quality is high? To answer this question, I began by creating interaction terms between each class-level covariate and two measures: (1) classroom SES and (2) the standard deviation of family income within classrooms. I then added the interaction terms to Model 6 to create a new Model 7. If an interaction term was not significant, I excluded it from the model. Though the measure of income diversity within classrooms was not significant by itself in Model 2, I included it here to test whether it was a significant predictor of children's learning when combined with aspects of classroom quality. For each of the four outcomes, only one interaction term was significant. Yet the findings have important research and policy implications.

RQ3: Receptive Language Learning. The results indicate that socioeconomic composition and income diversity interacted to promote receptive language learning (ES = 0.046; $p < .01$). When socioeconomic composition and income diversity were both one standard deviation above the mean, children's learning improved by 0.103 standard deviations, compared to classrooms where both measures were only average. Conversely, when socioeconomic composition and income diversity were both one standard deviation below the mean, children's receptive language learning declined

by 0.103 standard deviations relative to children's learning in classrooms that were average on both measures.

This result indicates that classrooms in which both the SES level and income diversity were high enjoyed an advantage beyond the sum of the two coefficients by themselves. On the other end of the spectrum, high-poverty classrooms in which there was little variation in family income suffered a double disadvantage that substantially suppressed children's receptive language development. The finding that above-average SES and above-average income diversity combine to promote learning also implies that there is a "tipping point" above which high SES and high diversity promote learning, and below which income diversity pulls down the SES average so much that it no longer confers a learning advantage. (I discuss the issue of tipping points further below.)

RQ3: Expressive Language Learning. The results indicate that socioeconomic composition and instructional quality interacted to promote children's expressive language learning (ES = 0.032; $p < .05$). When socioeconomic composition and instructional quality were both one standard deviation above the mean, children's expressive language learning improved by 0.147 standard deviations, compared to children's learning in classrooms where both measures were only average. Conversely, when socioeconomic composition and instructional quality were both one standard deviation below the mean, children's expressive language learning declined by 0.147 standard deviations relative to children's learning in classrooms that were average on both measures.

This finding indicates that classrooms in which both the SES level and instructional quality were high enjoyed a big advantage that promoted children's expressive language development. At the same time, high-poverty classrooms in which instructional quality was low endured a big disadvantage that significantly suppressed how much children learned.

RQ3: Math Learning. The results indicate that the diversity of income within classrooms interacted positively with teachers who had more than a BA to promote children's math learning (ES = 0.089; $p < .05$). When income diversity was one standard deviation above the mean and the teacher had more than a BA, children's math learning improved 0.089 standard deviations relative to children's learning in classrooms where income diversity was average. When the teacher had only a BA or less and income diversity was a standard deviation below the mean, children's acquisition of math

TABLE 3.1. The Combined Effects of Socioeconomic Composition, Instructional Quality, Income Diversity, and Teacher Education (n = 2,966)

	Receptive Language	*Expressive Language*	*Math Skills*
Child-level SES[a]	0.049*[b]	0.048*	0.093***
Class-level effects:			
SES composition[c]	0.057*	0.054*	0.059~
Instructional quality	0.031~	0.061***	0.033~
SES composition + income diversity	0.046**		
SES composition + instructional quality		0.032*	
Income diversity + teacher has > BA[d]			0.089*
Total of class-level effects[e]	0.134	0.147	0.181

~ $p < .10$ *$p < .05$ **$p < .01$ ***$p < .001$ [a]All measures are z-scored; socioeconomic status is the average of two z-scored variables: child's family income and mother's education. [b]Coefficients are empirical Bayes estimates adjusted for child-level characteristics, such as race/ethnicity, IEP status, and fall assessment score, and class-level characteristics, such as teacher education, class size, use of a comprehensive curriculum, and whether the site is a Head Start program. [c]Socioeconomic composition is the average of two z-scored variables: class mean income and class mean mothers' education. [d]Comparison group is "no BA." [e]The totals do not include the discrete coefficients for income diversity and teachers with more than a BA because, by themselves, they were close to zero and not statistically significant.

skills declined by 0.089 standard deviations relative to children's learning in classrooms with only an average level of income diversity.

This finding suggests that classrooms in which income diversity was above average and teachers had more than a BA, children's math learning improved. At the same time, when income diversity was low and teachers had only a BA or less, children suffered a double disadvantage that suppressed their math development.

RQ3: The Combined Effects of High Classroom SES, Instructional Quality, Income Diversity, and Teacher Education. The results of the analysis indicate that classrooms that offer above-average SES, instructional quality, income diversity, and teacher education levels may substantially benefit children, regardless of their own SES. Table 3.1 summarizes the combined effects of these variables in classrooms, including the value of their interactive effects. For receptive language learning, the combined effect of above-average classroom SES, instructional quality, and income diversity is 0.134 standard deviations. For expressive language learning, the combined effect of above-average classroom SES and instructional quality is 0.147 standard deviations. For math learning, the combined effect of

above-average classroom SES, instructional quality, and teacher education levels is 0.181 standard deviations. In each case, these combined effects are roughly twice the size of the coefficient for children's own SES.

Because these aspects of the classroom interact to promote children's learning, combining them creates additional benefits for children, beyond the sum of their discrete coefficients. Policy that tries to capture these interactive effects by supporting diverse preschool classrooms with high-quality, highly qualified teachers could thus offer substantial advantages to children.

RQ3: Social Skills Learning. For social skills learning, the coefficient for socioeconomic composition continued to be non-significant, but the interaction term for socioeconomic composition and instructional quality was significant and negative (ES = –0.033; $p < .10$). This means that when both the SES level and instructional quality were one standard deviation above the mean, children's social skills learning improved by a negligible 0.008 standard deviations, compared to a more substantial improvement of 0.041 standard deviations associated with instructional quality when the SES level was average. Moreover, in the presence of these covariates, the measure of racial/ethnic composition (the percentage of white children) remained significant and negative (ES = –0.073; $p < .01$).

These findings are somewhat puzzling. Throughout the social skills analysis, the fact that the coefficients for socio-composition (though non-significant) and racial/ethnic composition were negative calls for explanation. The interaction findings add to this puzzle by suggesting that a high SES-level virtually eliminated the benefits associated with instructional quality. Together, do these findings imply that high-poverty, high-minority classrooms promoted children's social skills learning?

A plausible explanation for this negative coefficient is that it reflects a ceiling effect on the social skills measure (that is, high-SES children began Pre-K with higher skills and thus had less room to improve on the social skills assessment), which made it appear that children in high-SES classrooms were not learning as many social skills as children in low-SES classrooms. Yet, the negative correlation between initial skills and gains, which indicates a ceiling effect, was not stronger on this outcome than on the other three, and this was the only outcome for which the coefficient was negative. It is also possible that teachers in mostly white classrooms had higher expectations for their children's social development and were

less generous with their evaluations of them, which would produce "less" social skills learning in those classrooms.

Another explanation, however, is that high-poverty, high-minority classrooms somehow supported children's social skills development in ways that high-SES, predominantly white classrooms did not. Other research has found that common disciplinary practices among low-SES, minority parents may differ from those of high-SES, white parents.[81] Perhaps teachers in high-poverty, high-minority classrooms can take advantage of this common approach to create consistent social expectations for children that, in turn, foster their social development.

To explore this possibility, I tested a model in which I used the percentage of children in poverty and the percentage of children who are minorities for my class-level compositional variables. I also included an interaction term for the two measures to explore if they interacted to promote children's social development.

The results suggest that classrooms that were both high-poverty and high-minority conferred a *disadvantage* in terms of children's social skills learning. The relationship between the percentage of minority children in the classroom and children's social skills learning was positive (ES = 0.121; $p < .01$), and the relationship between the percentage of children in poverty and their social development was also positive, though non-significant. But their interaction term was negative and significant (ES = –0.138; $p < .05$). When both compositional measures were one standard deviation above average, which means the classroom was both high-poverty and high-minority, children's social skills learning was 0.017 standard deviations less than when both measures were average. Conversely, in low-poverty and low-minority classrooms (that is, both one standard deviation below the mean), children's social development improved by 0.017 standard deviations relative to when both measures were average.

These findings indicate that the negative coefficients for the socioeconomic and racial/ethnic compositional measures do not imply that high-poverty, high-minority classrooms somehow promote children's social development. In the absence of an alternative explanation, this result provides support for the hypothesis that the negative coefficient for racial/ethnic composition may reflect higher teacher expectations in predominantly white classrooms, which would produce the appearance of less learning on the social skills assessments. At the same time, teachers in mostly minority classrooms may have had relatively low expectations

for their children's social skills, and subsequently rated them higher in terms of their progress over the preschool year. Because only the estimate for racial/ethnic composition was statistically significant, these expectations would appear to relate more to the racial/ethnic composition of the classroom than to its socioeconomic composition.

Again, it is noteworthy that with the exception of the social skills analysis, socioeconomic composition remained a reliable predictor of children's learning, even with the inclusion in the final model of numerous classroom measures and interaction terms that prior research had found to be associated with children's learning. Only one other aspect of the classroom, instructional quality, was an equally reliable predictor.

Limitations of the Study

The nature of the dataset introduces three limitations to the study related to (1) the narrow scope of the outcomes, (2) the possibility of selection bias, and (3) the inability to determine whether certain groups (such as low-SES students) are more or less influenced by the socioeconomic composition of their classroom than other groups (such as high-SES students).

Choosing the Right Outcomes

Though the Multi-State/SWEEP data are remarkably rich in aspects of children's learning and classroom quality, the short time-span between assessments precludes the analysis of longer-term outcomes that may be relevant to an analysis of socioeconomic composition and children's learning. While short-term pre-academic outcomes predict later achievement, they represent necessary, but not sufficient measures of how young children may benefit from attending high-quality preschools.[82] Economist James Heckman, for example, has posited that the most enduring benefit of high-quality preschool is the nurturance of motivation, perseverance, and self-esteem.[83]

Short-term pre-academic outcomes are also likely to neglect the particular benefits of early education in diverse classrooms that may extend to all children in the class. In fact, learning in such classrooms may create a durable imprint on all children's minds that affects how they perceive the meaning of social class and the strengths and challenges of living in a diverse community. Children from any socioeconomic background may learn how to befriend and work with a variety of children with ease and confidence, a skill that would serve them well in the labor force and their

social and civic lives. Diverse classrooms may also nurture parental interactions across social classes, easing the social isolation that segregated communities create and the structural inequalities that result.

Is it realistic to think that socioeconomically diverse preschool classrooms would contribute to such profound social and economic outcomes? We know that children in early childhood absorb stereotypes about particular groups that affect their cross-cultural beliefs and relationships, and that as children grow into middle childhood, racial and cultural perceptions solidify and in-group biases that favor sameness often develop. During this time of foundational development, which Piaget called "the construction of reality in the child," the experience of a diverse preschool classroom is likely to provide rich learning opportunities that foster long-term cross-cultural skills and friendships, and perhaps an appreciation of the strengths of diverse communities.[84]

Selection Bias

The problem of selection bias deserves careful consideration when interpreting the findings of this and any quasi-experimental study. Separating the effect of treatment from the effect of selection has long been a critical challenge to the researcher.[85] One could argue that parents who seek out socioeconomically diverse preschool programs are different in ways that positively affect a child's learning, and thus inflate the apparent effect of socioeconomic composition. It is also possible that the effect of socioeconomic composition is, at least in part, reflecting the effect of a child's neighborhood. At the same time, it may be that parents whose special-needs children are having trouble in their local preschools seek out higher-quality programs, which could suppress the apparent effect of socioeconomic composition if those children land in diverse programs but tend to learn less. Moreover, though the Multi-State/SWEEP data collectors randomly chose children for assessment, they could choose only children whose parents had allowed them to participate. How these varieties of selection may have affected the results is hard to discern precisely and demands caution when interpreting these results.[86]

To address this concern, the models tested here control for an unusually wide variety of children's background characteristics, including maternal education, which has been found to account for a large portion of the relationship between child care quality and children's learning.[87] Such characteristics can be expected to account for many if not most aspects of the home environment that affect children's learning while

they attend preschool. Though not perfect, the ANCOVA approach also helps to address non-equivalency between families in low- and high-SES preschools by comparing the treatment effect on different groups as if they had started with the same pretest scores.[88]

Moreover, other research has suggested that distortions due to selection bias in early education research may be less substantial than previously thought. In an attempt to address such bias, one study employed propensity score matching and found a significant relationship between high-quality child care and children's academic achievement.[89] Another study analyzed data on low-income elementary school children who were randomly assigned to high- or low-poverty elementary schools, which should eliminate selection bias, and found significant learning benefits for children in low-poverty schools.[90]

Differential Sensitivity

Some researchers (including James Coleman) found different levels of sensitivity among groups of students to classroom socioeconomic composition. In particular, Coleman found that low-income and black students were more influenced by school environment, including school SES, than wealthier and white students. The sample used in this study, which included only four assessed children per classroom, did not allow me to determine whether some groups of children benefit more from SES composition than others.

The Policy and Research Implications

The findings indicate that the socioeconomic composition of preschool classrooms was a significant and positive predictor of children's receptive language, expressive language, and math learning during the preschool year, regardless of children's own SES, other background factors, and the racial/ethnic composition of the class. Socioeconomic composition was not significantly related to children's social skills development after controlling for children's SES, other background factors, and the racial/ethnic composition of the class.

The relationship between socioeconomic composition and children's language and math learning was not explained by an association with structural or instructional aspects of preschool quality that other research has found to be related to children's learning. Children who benefited from attending higher-SES classrooms were not learning more purely

because they enjoyed higher levels of instructional quality or smaller classes, for example. Socioeconomic composition promoted children's learning through some other pathway, which, I argue, is likely to be direct peer effects.

The strength of the relationships between socioeconomic composition and children's language and math learning depended on whether other aspects of preschool quality were present in the classroom. For receptive language skills, socioeconomic composition and income diversity interacted to increase children's learning beyond the sum of the two coefficients. For expressive language skills, instructional quality and socioeconomic composition combined to promote more learning, and for math skills, income diversity and teachers' education levels combined to increase how much children learn. These results underline the value of income diversity and the importance of highly competent teaching, or the education that may support it, to capture the full benefits of diverse classrooms.

The results have multiple and important ramifications for the current policy dialogue regarding the expansion of access to quality preschool programs, as well as ongoing research to help inform this debate. In the following sections, I discuss these ramifications, as well as the overarching implications for policy and research on how to pursue high-quality preschool programs. Finally, I address whether policies to promote socioeconomically diverse preschool classrooms are feasible and the implications for Head Start.

The Substantive Significance of Socioeconomic Composition

The results from the analysis indicate that across three of the four outcomes, socioeconomic composition, as measured by the average SES in the classroom, was significantly related to children's preschool learning, regardless of their own SES and other background characteristics, the racial/ethnic composition of preschool classrooms, and other aspects of classroom quality. The relationship between socioeconomic composition and children's receptive, expressive, and math development was statistically significant, but modest, which raises the question of whether it is substantively significant.

I would not expect the association between socioeconomic composition and the growth in children's language and math skills to be large, given how little time the children in the dataset spent in preschool. The average time between the fall and spring assessments was five months (157.1 days), and more than half (54.1 percent) of the children attended

half-day programs. For them, the average number of hours per week spent in preschool was only 13.3, a mere 2.7 hours per day. Such limited exposure to diversity in the classroom is unlikely to produce large effects on children's learning. Moreover, on average, in the Multi-State/SWEEP data, children spent only 20 percent of their day on literacy and language activities and 6 percent of their day on math activities.[91] For children in half-day programs, this amounts to an average 32 minutes on language and literacy and only 10 minutes on math.

More troubling, the descriptive analyses indicate that low-SES children were more likely than their higher-SES peers to be absent from Pre-K and, when they did attend, to be there for fewer hours per week. Other research has found that low-SES children in kindergarten also were more likely to have teachers who spent fewer hours per week on instructional activities, even while time on instruction was associated with their learning.[92] These findings suggest that low-SES children are receiving an even smaller "dose" of preschool than their higher-SES peers, further constraining the effects that we would expect to find.

Despite this limited exposure, the findings also indicate that the coefficient for socioeconomic composition on the three outcomes is comparable in size to two other aspects of children's learning that we know from other research are very important: children's own SES and instructional quality.[93] The equally modest coefficients for the relationships between these aspects of children's lives and their learning suggest that the short time between assessments is indeed a cause of their small size in this study, and that the socioeconomic composition of children's preschool classrooms belongs on the list of important components of children's early learning.

To explore further the substantive significance of the findings here, I looked at other research for context and comparability. To do so, I used two approaches: (1) comparing the results to policy-relevant gaps, and (2) comparing the results to those from relevant studies.[94]

Policy-Relevant Gaps. The first approach examines the effects found here in the context of the skills gaps between low-, middle-, and high-SES children. The descriptive analyses indicate that children in low- and high-SES classrooms were, on average, a full standard deviation apart in receptive language skills when they began Pre-K, and that children in low- and high-SES preschool classrooms were, on average, more than three-quarters of a standard deviation apart on expressive language and math skills. (The

gaps in achievement between low-, middle-, and high-SES children are similar to those between low-, middle-, and high-SES classrooms.) The findings suggest that, on average, if more low-income children could attend higher-SES classrooms, their learning would improve by 0.06 standard deviations in receptive language skills, 0.05 standard deviations in expressive language skills, and 0.06 standard deviations in math skills for each standard deviation increase in the average SES-level of the classroom (Table 1). In the context of such wide gaps in skills, an improvement of 0.05 to 0.06 standard deviations looks like small progress.

However, a more reasonable goal might be to try to move more low-income children into middle-SES classrooms. The descriptive analyses indicate that the skill disparities between children in low- and middle-SES classrooms were one-third of a standard deviation (0.322) in receptive language, one-fifth a standard deviation (0.208) in expressive language, and one-quarter a standard deviation (0.249) in math when they began Pre-K. In this context, a coefficient of 0.05 to 0.06 looks more substantial. In expressive language and math, the gains in learning represent a quarter of the initial gap between low- and middle-SES students.

Moreover, if the classrooms offer above-average SES levels, income diversity, instructional quality, and teacher education levels, then we could capture the interactive effects among these aspects of the classroom, and the gains would be even greater: 0.134 standard deviations in receptive language skills; 0.147 standard deviations in expressive language skills; 0.181 standard deviations in math learning. If such increases were cumulative over several years in higher-SES classrooms, they would represent very important improvements in low-SES children's learning.[95]

Even in a single year of preschool, the results suggest that moving a child who attends a very low-SES classroom (that is, two standard deviations below the mean) to a classroom that is in the middle (that is, the mean for all classrooms) would boost their language and math skills substantially and would prevent the skills gap from widening. First, an increase in classroom SES of two standard deviations could boost children's receptive language learning by about 0.12 standard deviations (0.06×2). By comparison, the Head Start Impact Study found that children's receptive language skills improved by 0.12 standard deviations during one year in Head Start.[96] This means that moving Head Start children from a very-low-SES classroom to one where the average SES-level is the average for all Pre-K classrooms could substantially improve how much they learn. In math, moving from a very-low-SES school to a more

affluent classroom that is three standard deviations higher in SES could result in a substantial gain of 0.18 standard deviations (0.06 × 3).

Second, this and other studies have found that the skills gap between children from low- and high-SES families may widen during the preschool year, a serious policy concern given the devotion of substantial resources to close these gaps. The findings here indicate the potential for creating access to higher-SES, higher-quality settings for low-SES children. For example, for each standard-deviation increase in children's SES, the receptive language skills they learn between the two assessments increases by 0.049 standard deviations (see table 3.1). The findings here suggest, however, that for both the receptive and expressive language outcomes, this disadvantage for low-SES children would be erased by moving them into higher SES classrooms because the coefficient for socioeconomic composition is comparable in size to the coefficient for children's SES. Similarly, for math learning, the socioeconomic composition coefficient is nearly as large as the estimate for children's SES. Moving children out of high-poverty classrooms could thus largely prevent the widening of socioeconomic learning gaps during a year in preschool.

From a policy perspective, even small effects may be worth pursuing if their benefit-to-cost ratio is better than alternative policy measures. This type of calculation requires careful consideration of the full benefits of a policy measure, as well as the related costs, which are beyond the scope of my study. But it is worth remembering as researchers explore the benefits of diverse preschool classrooms.

Comparisons with Relevant Studies. The second method for evaluating the substantive significance of the findings compares their magnitude with the results from other studies that have addressed similar questions and populations. Two lines of research are useful for comparison with the current findings: those that have looked at the relative contribution of socioeconomic composition to children's learning, and those that have assessed the magnitude of preschool peer effects.

The results appear to contradict a key finding of the Coleman Report, which stated that children's own family background was by far the most important predictor of their achievement in high school, with school composition a distant second.[97] In contrast, the findings here indicate an association between classroom socioeconomic composition and language and math learning that is comparable in size to the association between children's SES and their language and math development. However,

these findings are consistent with recent research that has exploited the strengths of multi-level modeling and reanalyzed Coleman's ninth-grade data, finding that socioeconomic composition had an equal or even larger effect on children's learning than their own social class.[98] The implication is not that we have overestimated the importance of children's social class in the long-term trajectory of children's achievement, but rather that we have underestimated the potential of classroom composition to narrow learning gaps between low- and high-SES children.[99]

Although no similarly large-scale, multivariate, multi-level analyses have assessed the extent to which socioeconomic composition promotes children's preschool learning, studies on preschool peer effects, measured by peer assessment scores, offer relevant findings for comparison, given the high correlation between children's SES and assessment results. Compared to my findings, a study of data from Georgia's Pre-K programs found larger coefficients for the relationship between peer abilities and receptive language learning (ES = 0.28; $p < .05$) and math learning (ES = 0.36; $p < .05$), and a smaller coefficient for the relationship between peer abilities and expressive language learning (ES = 0.02; $p < .10$).[100] The authors noted that their findings were larger than those from most peer effects studies in K–12 settings, but suggested that peers may be more important in early childhood due to the emphasis on direct peer interactions in preschool.

In sum, the estimates for socioeconomic composition look slight at first. Yet, upon further consideration in the context of policy-relevant benchmarks and related research, socioeconomic composition appears to be an important aspect of preschool quality that deserves policy and research attention

The Salience of Mothers' Education

The analysis indicates that for both receptive and expressive language, the average level of maternal education in preschool classrooms is more strongly related to children's learning than average family income. For math skills, the coefficient for family income is slightly higher than the coefficient for maternal education, but both are significant and positive. These results are consistent with a substantial body of research that has indicated the salient contribution that mothers' education makes to their children's early learning and development.[101] This contribution appears to operate independently from family income and to be mediated by children's home experience. Such findings have inspired early childhood

interventions that seek to foster children's learning at home by directly nurturing parenting skills in low-SES families.[102]

My findings add to this body of work by providing evidence that the development of mothers' own children is associated not only with maternal education, but also with the learning of their peers in preschool classrooms. This "spillover effect" for maternal education could enhance the returns attributed to policy interventions that seek to promote educational attainment among mothers. It also serves as a cautionary example to researchers who use family income as a lone proxy for classroom composition; they may miss an important aspect of classroom learning.

Socioeconomic and Racial/Ethnic Composition

For receptive language skills, the findings indicate that both socioeconomic composition and racial/ethnic composition are significant and positive aspects of classroom quality. For expressive language and math learning, only socioeconomic composition was a significant predictor of children's learning.

These results suggest that, although socioeconomic composition is a more reliable, positive predictor of children's learning, racial/ethnic composition is also an important aspect of classroom quality, at least in terms of receptive language learning. Clearly, one is not an adequate proxy for the other in either research or policy discussions. These findings are consistent with research in K–12 settings, which suggests that the socioeconomic composition and racial/ethnic composition of classrooms are independently associated with educational outcomes.[103] The results here may be especially important for children who are both low-SES and minority, because they often enter kindergarten with substantially lower skill levels than peers who are either minority or low-SES.[104] The findings indicate that attending preschool classrooms that are diverse both by SES and race/ethnicity may help address this double disadvantage.

Classroom Composition and Social Skills Learning

Despite the consistently positive and significant estimates for socioeconomic composition on the language and math outcomes, the coefficient for socioeconomic composition and children's social skills learning was negative, and when racial/ethnic composition was incorporated in the model, non-significant. I have suggested that this finding is the result of higher teacher expectations in classes that are predominantly white. While I cannot say so definitively, the explanation for this finding may

relate to the fact that the social skills assessment was the only instrument of the four that relied on teacher ratings of children's progress. To clarify the nature of the association between social skills development and compositional aspects of classrooms, future research could explore this relationship with alternative instruments that rely on independent observations, rather than teacher assessments.

Capturing Peer Effects

The apparent role of peer interactions as the mechanism for the compositional effect suggests that efforts to improve the quality of high-poverty programs, such as Head Start, are limited in their effectiveness. To capture the effects found here, policymakers may need to expand access for low-SES children to higher-SES preschools

Can we assume that the durable significance of socioeconomic composition, even in the presence of multiple measures of classroom quality, indicates that it operates through direct peer effects? Other research suggests that we can. One study of Pre-K classrooms, which found a compositional effect and tested its durability by including numerous class-level covariates, similarly concluded that peer effects were likely to be the mechanism for the persistent compositional effect.[105] Using an even more abundant array of covariates, I similarly find that a significant compositional effect remains after their inclusion. If peer effects do not explain this relationship between SES composition and children's learning, what would?

One possible answer is the influence of a child's neighborhood, a context that is probably shared by many children in the preschool classroom. However, I would argue that in this dataset, neighborhood measures are an unlikely explanation for a compositional effect, given that in socioeconomically diverse classrooms, children are less likely to share the same neighborhood than in classrooms that are low-SES and homogenous. Another possible answer is that, despite the inclusion of a wide variety of covariates, the analysis fails to control for teacher expectations and efficacy, which may be higher in diverse classrooms than in high-poverty classrooms, and consequently promote children's learning. However, the study of children in Georgia's Pre-K programs included these two measures and found no change in their compositional estimates.[106]

I suggest, therefore, that direct peer effects are likely to be the mechanism for the relationship between socioeconomic composition and children's language and math learning. If so, the policy strategy of promoting

children's learning by trying to improve the quality of high-poverty programs will not capture this important aspect of classroom learning.

High SES, Income Diversity, and the Tipping Point

The findings do not suggest that income diversity within classrooms, as measured by the standard deviation of income, is *by itself* related to children's learning. But importantly, such diversity appeared to work in concert with higher-SES levels to promote children's learning.

For receptive language learning, the estimate for high-income classrooms fell into non-significance when the measure of diversity was incorporated into the model as a separate variable, rather than one embedded in the variable of socioeconomic composition. In other words, both high-income levels and income diversity were important parts of the learning equation. Moreover, the combination of above-average SES and income diversity in classrooms promoted children's receptive language learning more than when the two measures were only average for all classrooms. This further suggests that, in terms of receptive language, the combination of higher-SES and economically diverse classrooms offers a powerful and positive context for children's learning. (It is worth noting that the non-linear relationship between the racial/ethnic composition of classrooms and children's expressive language learning implies that racial/ethnic diversity also promotes children's expressive language learning, regardless of the average SES in the classroom.)

To capture the benefits of classrooms that are both high-SES and relatively diverse by income requires a balance, of course. Introducing lower-SES children to high-SES classrooms will necessarily bring down the SES average. Hence, if you have a homogenous, high-SES classroom, you would increase learning in the classroom if you make the class more diverse in terms of income. But if you add so many lower-SES children to the classroom that the class falls to the mean SES for all classrooms, then you lose the benefit of high-SES classrooms *and* the additional benefit of combining high SES with high diversity.

This tipping point has important policy implications. First, it suggests that encouraging the creation of more mixed-SES classrooms will promote children's learning relative to high-poverty settings, but that middle- and high-SES children should represent a majority of children in the classroom. This, in turn, suggests that policymakers need to attract more middle- and high-SES families to public Pre-K programs, given the current predominance of low-income families, or create access for

low-SES children to higher-SES settings. Indeed, the results indicate that policymakers cannot escape the disadvantages associated with high-poverty classrooms by attracting a few higher-SES children to such programs. To capture the apparent benefits of more diverse classrooms, early education policy should support as many middle- and high-SES preschool classrooms as possible and open them to low-SES children. I discuss below how to pursue this outcome through either supply-side or demand-side strategies.

The Combined Power of Socioeconomic Composition and High-Quality Teaching

On the expressive language outcome, socioeconomic composition interacts positively with instructional quality to improve children's learning; on the math outcome, income diversity and teachers who have more than a BA interact positively as well. While other research has not found teacher education to be a reliable predictor of children's learning, it appears that in economically diverse classrooms, teachers with postgraduate degrees may be better able to promote the math development of their children. Why would the quality of instruction, or the teacher education that may support it, be so important in high-SES and diverse classrooms?

High-SES classrooms are more likely to be socioeconomically diverse classrooms, and this diversity may pose both opportunities and challenges to teachers. In such classrooms, children may come to preschool with different behavioral norms, cultural reference points, and communication styles. They may demonstrate skill levels that are relatively high on average, but also widely divergent. Together, these characteristics create possibilities for learning as well as obstacles to curricular and social cohesion in the classroom. The teachers in these classrooms may need to be especially skilled at creating individualized instructional support and facilitating peer interactions, such as exploring books, solving math puzzles, and engaging in dramatic play together.

Does this mean that policy should encourage postgraduate education for preschool teachers? Not likely, given the inconsistent relationship between even secondary education for teachers and children's learning.[107] Instead, many scholars have argued that preparing preschool teachers demands sustained and cohesive professional development.[108] This type of teacher training could nurture teacher skills and strategies to manage the disparate skill levels and cultural norms in socioeconomically diverse classrooms, while exploiting the rich learning opportunities they offer. These

challenges also deserve research attention as an important component of effective pedagogy in socioeconomically diverse preschool classrooms.

Socioeconomic Composition and the Policy Dialogue about Quality

The findings indicate that the current policy debate about preschool quality is critically inadequate. Although early childhood researchers and policymakers are engaged in a constructive conversation about how to nurture high-quality preschool programs, rarely mentioned in this dialogue is the potential of classroom composition, and socioeconomic composition in particular, to bolster quality. When the relationship between socioeconomic composition and children's learning is mentioned, it often comes with an implicit acknowledgment of the need for more empirical evidence to support the idea.[109] The results of this study help to address the urgent need for empirical evidence and represent an important step toward changing the conversation regarding preschool quality to include a fundamental piece of the policy equation: the children with whom a child learns in a preschool classroom.

The historic omission of classroom composition from preschool policy and research has had two important consequences. First, any study on preschool quality that has not included classroom composition may suffer from omitted variable bias that may have produced inaccurate results.[110] Researchers should routinely include measures of classroom composition in models of preschool quality.

Moreover, lack of attention to the potential of socioeconomic diversity in preschool classrooms may lead policymakers to miss an important opportunity to cultivate both excellence and equity in the nation's emerging preschool landscape. While the argument for diversifying K–12 classrooms has often been made in terms of social justice, the empirical evidence here indicates that allowing children from different social classes to attend the same classrooms is a component of preschool quality. Without this recognition, concerted efforts to design policies that expand access to high-quality preschool are neglecting an important piece of the puzzle.

Is Socioeconomic Diversity Feasible?

Even if policymakers decide that reducing the number of high-poverty preschool classrooms would offer worthwhile benefits to children's

learning, the policy challenge remains of how to expand access to higher-SES classrooms. Across the country, a premise of early education policy is that parents should be allowed to choose whether and where to send their children to preschool, which demands a voluntary approach to any attempt to encourage socioeconomic diversity. In this context, parents are the ultimate arbiters of quality within the constraints of supply and will be the determinants of whether socioeconomic diversity is possible.

Accordingly, I argue that a voluntary framework that could foster socioeconomically diverse settings requires three policy steps: (1) giving parents high-quality choices beyond their neighborhoods, (2) making these choices practically feasible with support services and adequate funding, and (3) re-imagining the role of Head Start.

Giving Parents Choices

Much of current state and federal preschool policy already is focused on expanding the menu of high-quality choices when parents consider preschool for their children. As noted earlier, these options can be fostered with a supply-side approach, in which the government funds or subsidizes programs, such as Head Start, public school, and nonprofit or for-profit Pre-K providers. They also may proliferate with a demand-side approach, in which the government lets parents choose among preschool programs that meet state requirements and pays public money to the program to serve the family. Either approach, or a combination of the two, has the potential to foster socioeconomic diversity, if certain policy choices are made.

One threshold requirement for fostering diversity is avoiding the neighborhood assignment that is common in K–12 school districts. If policymakers rely on neighborhood assignment for Pre-K programs, they are likely to replicate the residential segregation by race, ethnicity, and income that characterizes many communities across the country. Expanding choices beyond neighborhood boundaries creates possibilities for socioeconomic diversity that otherwise would be unlikely. With a geographically expanded menu of choices, for example, parents may decide that preschools close to their place of employment are more desirable than a neighborhood preschool, creating opportunities for diversity that would otherwise not occur.

When taking a supply-side approach to pursue universal access, state policymakers who want to encourage socioeconomic diversity could do so by making careful choices regarding location. Rather than fund new

programs in the heart of high-poverty neighborhoods, they could seek locations on the borders of urban or suburban neighborhoods that might attract families from nearby low-income and higher-income communities. In more rural areas, choosing locations that are reasonably convenient for all residents makes it more likely that residents of all incomes may choose to attend the same preschool when few alternatives exist. Funding or subsidizing preschool centers that are located within employment settings, such as hospitals, may also attract a broad spectrum of income levels that represents the parents who work for the organization.[111]

The demand-side approach introduces low-SES children to programs that are privately funded and possibly serving higher-SES children as a result. This funding strategy offers a practical advantage over supply-side approaches in that it does not depend on the large-scale recruitment of middle-income families into entirely state-funded programs to expand access to higher-SES classrooms. The existence of socioeconomically diverse classrooms in the Multi-State/SWEEP data is suggestive evidence that such policies are already allowing children from different social classes to mix in preschool classrooms, despite the residential segregation that persists. In this context, the question is not whether socioeconomic diversity is feasible, but how to encourage it.

Making Choices Feasible for Parents

If state Pre-K policies avoid neighborhood assignment and allow parents to choose from a range of providers, will socioeconomically diverse programs naturally emerge? Without empirical evidence, we do not know when parents, given high-quality options both within and beyond their neighborhood, might choose preschools that offer such diversity. However, existing research on preschool and K–12 choices offers some ideas on what key components will make their choices informed and practically feasible.

- The provision or subsidizing of transportation is perhaps an obvious necessity for policy that strives to allow low-SES parents to travel outside their neighborhood to a preschool.[112] In families with multiple children attending different child-care, preschool, and K–12 locations, transportation would be particularly important.
- Parent-friendly information about preschool choices likely would be necessary to help parents learn about programs both within and outside their neighborhoods. State QRIS initiatives, for example,

may enable parents to make informed choices about preschools and consider aspects of quality beyond proximity.[113] Culturally sensitive outreach, which attends to the values and cultural expectations that shape preschool choices, may help to engage parents who might otherwise disregard publicly funded, center-based options.[114]

- Structural components of preschool quality, such as the provision of full-day preschool, also could be important to foster parent participation across different social classes. Low-SES parents who often are subject to welfare-to-work program requirements, and middle-SES parents who may also be working long hours, might consider only full-day programs.[115]
- Adequate financing is critical as well so that voucher or subsidy levels are sufficient to fund capacity for both low-SES and higher-SES children in quality programs. A sliding scale of Pre-K subsidies, which vary by a family's income, can assure that no one is excluded on the basis of cost.[116]

In short, the mere presence of high-quality choices likely will not be enough to foster broad participation in socioeconomically diverse programs. Each of these factors—transportation, accessible and culturally sensitive information about the choices and their relative quality, full-day programs, and adequate funding—may be essential components of policy to support parents' preschool decisions that, in turn, foster the socioeconomic diversity that my findings suggest will enhance children's learning.

The Future of Head Start

Despite Head Start's challenges, the success of the model programs indicates that high-poverty programs can indeed be effective. At the same time, how to "bring to scale" what appears to work in model programs at considerable cost is an obstinate challenge, and rising child poverty rates and income inequality only add to the urgency of such an endeavor.[117] The policy moment created by the state Pre-K expansion offers an opportunity to consider the strengths and weaknesses of Head Start, and the possibility that expanding the number of quality slots for children might better be achieved in more diverse settings.

The role of Head Start—a program that, by design, clusters poor children in the classroom—is uncertain in the evolving terrain of preschool choices. As support for universal programs has grown, Head Start programs have found themselves under fire for practicing "reverse

discrimination," "deliberately segregating" poor children, and failing to provide many of them with the high-quality preschool settings they deserve.[118] There is some poignancy to this critique because Head Start began with the hope of providing preschool services primarily to low-income children and families to compensate for the extreme disadvantages they experienced. Head Start's founders also presciently envisioned a program that could be socioeconomically diverse by trying to reserve up to 10 percent of its slots for children whose family incomes were above the poverty line, a vision that never came to be. Today, some of Head Start's strongest supporters argue that the program's enactment as a preschool solely for poor children is untenable.

In this heated context, the accusation that the quality of Head Start is inadequate has been growing in the face of disappointing results.[119] The consensus response, if one exists, is to apply a rigorous standard of "what works," based on empirical evidence, to improve Head Start: a laser focus on teaching and learning, higher-quality instruction, better-educated and trained teachers, and the de-funding of consistently low-quality programs. The findings from my study, however, suggest that this approach neglects an important element of what works in promoting children's language and math learning: diverse classrooms that do not segregate poor children.

The accumulation of empirical evidence that children often learn less in high-poverty classrooms calls for a fundamental re-imagining of Head Start's purpose and structure. Certainly, it would be irresponsible to abandon a program that thousands of families rely upon when policymakers are struggling to create sufficient capacity for families who need and desire full-day preschool services. And it is worth noting that being a Head Start classroom was a positive predictor of social skills learning in this study. While helping to fill gaps in capacity, Head Start represents a valuable nationwide repository of expertise on how to serve culturally diverse families who face the harsh realities of poverty. Yet it is time to re-imagine Head Start's place in a preschool policy environment that is increasingly informed by empirical evidence and broadening its reach to serve middle- and high-SES families.

Looking forward, one option is that Head Start could open its doors to families from all socioeconomic backgrounds. As state Pre-K programs expand and middle-income families increasingly enroll, new families could be invited to attend Head Start and non-Head Start programs alike. While it is hard to imagine that Head Start centers located in high-poverty neighborhoods would attract significant numbers of higher-SES

families, Head Start locations that are closer to middle-income neighborhoods could appeal to a broader array of families, particularly if they offer needed services such as full-day coverage for working parents. In the short run, this approach seems sensible. But in the long run, as state Pre-K programs approach universality, it might make more sense to reorient Head Start, particularly where its programs are lower or inconsistent in quality, as a complement to universal state Pre-K programs that focus on providing high-quality preschool education to children from all socioeconomic backgrounds.

What would this complementary role be? Sally Styfco of the Yale Center on Child Development and Social Policy has posed three possibilities for Head Start's reformation, which are not mutually exclusive: (1) Head Start would no longer provide preschool for four-year-olds and instead focus its efforts on families with children from birth to age three, as it already does with Early Head Start. (2) Head Start would become a general family support program for families with children from birth to age eight. Its mission would be to provide comprehensive services, such as social, physical, and mental health services, crisis intervention, housing assistance, and adult education—all of which are highly needed and yet beyond the scope of state Pre-K programs. These services could be focused on families in poverty, but not limited to them as resources allow. (3) Head Start could offer a therapeutic preschool setting for children with disabilities and/or mental health needs when Pre-K programs do not have the capacity to do so.[120] Unlike state Pre-K programs, Head Start has long been required to serve children with disabilities and harbors valuable expertise as a result.

Each of the three options would build on Head Start's considerable experience addressing the multiple strengths and challenges of families who are living in poverty, and which lie beyond the resources of Pre-K programs. None of these options requires that Head Start abandon its goal of nurturing young children's school readiness. On the contrary, Head Start as "a multi-faceted program designed to promote whole child and family development" could very significantly promote children's readiness for academic success and life's challenges.[121] This role would be quite important and pressing. Even as universal Pre-K programs expand, the substantial needs of families in poverty continue to be demanding and complex. Head Start is perfectly positioned to address them and thus could honor its past by serving and empowering families who face urgent challenges, but leaving the core mission of preschool education to

universal Pre-K programs, which offer the possibility of socioeconomically diverse classrooms.

Rethinking Preschool Quality

With a wealth of research pointing to the benefits of intensive preschool programs that foster learning opportunities through high-quality teaching and play, many policymakers are admirably committed to funding quality programs in a time of severe fiscal austerity. In this context, it is critical to identify the necessary components of programs that produce positive outcomes. The results from this study suggest that socioeconomic composition is a significant aspect of quality that is frequently missing from this dialogue.

Policymakers are imagining an early childhood system that allows all children to learn, develop, and thrive in high-quality preschools. In a challenging political context, adding socioeconomic diversity to this ambitious goal may seem unrealistic. The findings here suggest that it is not. The presence of children in socioeconomically diverse classrooms in the Multi-State/SWEEP data indicates that, whether by design or accident, some state Pre-K systems are already fostering such diversity, and the findings indicate they are getting a reward for doing so in terms of children's learning.

Socioeconomically diverse preschool classrooms are by no means a panacea, and they may pose pedagogical challenges. But the evidence suggests that providing universal Pre-K with the possibility of socioeconomically diverse classrooms should be our goal as we design policy that systematically supports preschools of the highest quality. Putting together the quality equation accurately and reliably is more than an academic exercise. At stake is the effective use of billions of taxpayer dollars and, most important, the learning opportunities offered to millions of young children.

Appendix 3.1
Classroom Quality Measures

Classroom Assessment Scoring System

The Classroom Assessment Scoring System (CLASS) is an instrument that measures several dimensions of teacher-child interactions in classrooms.[122] Based on the theory that interactions between teacher and children are the primary mechanism through which children learn, the CLASS observes two main types of these interactions: social/emotional and instructional. Social/emotional features of the CLASS include the extent to which teachers are sensitive and responsive to children's needs and cues. Instructional features of the CLASS include the extent to which teacher behaviors promote children's concept development, and provide quality feedback and language modeling. Each feature is rated on a scale of 1 to 7 (1 or 2 = *low quality;* 3, 4, or 5 = *mid-quality;* and 6 or 7 = *high quality*).

Early Childhood Environment Rating Scale

The Early Childhood Environment Rating Scale (ECERS) is a global measure of classroom quality.[123] The instrument includes thirty-six items that try to capture several dimensions of classroom quality: space and furnishings, routines, language reasoning, activities, interactions, and program structure. The average of the thirty-six items provides a single overall measure; scores range from 1 to 7 (1 = *inadequate quality;* 3 = *minimal quality;* 5 = *good quality;* and 7 = *excellent quality*).

Appendix 3.2
Child Outcome Measures

Peabody Picture Vocabulary Test

The Peabody Picture Vocabulary Test (PPVT) is a norm-referenced instrument for measuring the receptive (listening) vocabulary of children.[124] For each item on the assessment, the examiner shows the child four pictures and says a word; the child responds by selecting a picture that best illustrates the word's meaning. Raw scores are converted to standard scores (m = 100; SD = 15), which reflect the child's performance relative to children in the population of the same age.

Oral and Written Language Scales

The Oral Expression Scale from the Oral and Written Language Scales (OWLS; Carrow-Woolfolk, 1995) is an instrument to assess children's comprehension and use of spoken language. For each item on the assessment, the examiner shows the child a picture and offers a verbal stimulus; the child responds by completing a sentence, answering a question, or making new sentences. Raw scores are converted to standard scores (m = 100; SD = 15), which reflect the child's performance relative to children in the population of the same age.

Woodcock-Johnson-III Test, Applied Problems

The Woodcock-Johnson-III Applied Problems Subtest seeks to measure children's basic math skills, such as counting, numeracy, comparisons, and word problems.[125] Items on the assessment include questions of addition, subtraction, how to read a thermometer, and how to tell time. Raw scores are converted to standard scores (m = 100; SD = 15), which reflect the child's performance relative to children in the population of the same age.

Teacher-Child Rating Scale

In the fall and spring, children's preschool teachers completed the Teacher-Child Rating Scale (TCRS), a behavioral rating scale that seeks to measure social and emotional skills.[126] Following directions from the scale authors, NCEDL researchers created a social competence scale for the Multi-State and SWEEP studies with four sub-scales: assertiveness, peer social skills, task orientation, and frustration tolerance. Items include "participates in class discussions" on the sub-scale

for assertiveness, "well-liked by classmates" on the sub-scale for peer social skills, "completes work" on the sub-scale for task orientation, and "copes well with failure" on the sub-scale for frustration tolerance (NCEDL, 2005). Teachers use a five-point scale (1 = *not all;* 2 = *a little;* 3 = *moderately well;* 4 = *well;* and 5 = *very well*) to indicate how well the statements describe the child. I use a mean of the four sub-scales as a measure of social competence.