

Preschool *Policy Matters*

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NATIONAL
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EARLY
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RESEARCH

Contact Us:

120 Albany Street, Suite 500
New Brunswick, NJ 08901

Tel (732) 932-4350

Fax (732) 932-4360

Website: nieer.org

E-mail: info@nieer.org

Class Size: What's the Best Fit?

by W. Steven Barnett, Karen Schulman and Rima Shore

Is class size an important influence on the quality and educational effectiveness of preschool programs? Teachers and parents generally believe so. Common sense suggests that smaller classes and higher staff-child ratios are better for young children, allowing more individual attention, reducing the time and effort devoted to classroom management, and reducing the number of stressful interactions. Yet, some states do not set limits on class size in their prekindergarten programs, and some researchers have suggested there is no causal link between class size and educational effectiveness. Of course, no one really believes that it doesn't matter how many preschool children are packed into a classroom. Thus, it is useful to consider what research has discovered about the relationship of class size to preschool children's experiences and outcomes.

The relationship between class size and cost also deserves consideration. Just as smaller classes benefit young children, smaller classes also cost more. Therefore policy makers and parents face a tradeoff. They must weigh the value of the gains to children from reducing class size against the costs. This is a difficult task, made more difficult by the fact that the costs are easily measured while the benefits may be hard to see and measure. This brief provides information on costs and guidance on comparing the benefits from smaller classes to those costs.

What We Know:

- Class size reduction can by itself increase educational effectiveness.
- Small class size and better staff-child ratios offer health and safety benefits.
- Most state preschool programs and the federal Head Start program do not require the small class sizes found to produce the large educational gains desired for disadvantaged students.
- Some state preschool programs set no limits on class size.
- Costs of class size reduction depend on the starting point, opportunities for more efficient allocation of staff, and the extent of cost-savings from lower administrative costs (from reduced turnover, for example).

Policy Recommendations:

- All states should set program standards based on research that jointly addresses class size, ratios, teacher qualifications and teaching practices.
- Reductions in class size can be phased in gradually and should be accompanied by adequate financial support so as to avoid unintended consequences.
- Policies that support teachers in adapting their teaching to smaller class sizes may maximize the benefits of class size reduction.
- Given the potential benefits and costs of class size reduction, the federal and state governments should conduct experiments with different class sizes to identify the optimal class size for classrooms with various mixes of children with economic and other disadvantages, including special education needs.

Policy and Research Effects on Class Size

To address these issues of the benefits and costs of smaller (or larger) classes, this brief reviews research on the following questions:

- *What are current state policies regarding class size?*
- *What are the effects of class size on quality and on children's learning and development?*
- *How does class size influence quality and children's learning and development?*
- *What are the costs of reducing class size?*
- *What can be done to get the greatest possible benefits from smaller class sizes?*
- *What additional research on class size is needed?*

Current State Policies

State policies on class size and staff-child ratios at ages 3 and 4 are reported in Table 1. Policies are described for two different types of programs. The first is state-funded prekindergarten. These primarily serve children at age 4, though a few serve children at age 3 as well. Thirty-eight states fund prekindergarten. The second type is child care. State licensing regulations for child care centers set limits on class size and staff-child ratios that vary by age of child. Thus, state policies may differ between 3- and 4-year-olds. Some states exempt one or more types of child care centers from state licensing so that class size regulations may not apply to all centers in a state.

The majority of states with prekindergarten initiatives set class size and ratio requirements that are consistent with standards developed jointly by the American Public Health Association (APHA) and the American Academy of Pediatrics (AAP) and with the recommendations of the National Association for the Education of Young Children (NAEYC) for 3- and 4-year-olds. Class sizes of no more than 20 children and ratios of no more than 10

students per teacher are recommended. Of the 44 state prekindergarten initiatives (plus the District of Columbia), 31 have both class-size and ratio requirements that are equal to or better than recommended levels. However, 13 of the state prekindergarten initiatives (some states have more than one initiative) fail to meet the recommended levels for class size and/or ratios. Several state prekindergarten programs set no limits for class size and/or ratios.

States also are responsible for setting class size and staff-to-child ratios for licensed child care centers. These licensing standards are more likely to be out of step with the standards recommended by national organizations than are prekindergarten regulations. Only 12 states (plus the District of Columbia) have regulations that adhere to recommended levels for both class size and ratios for 3- and 4-year-olds. In several states, the requirements for child care differ sharply from those for prekindergarten programs. For example, Oklahoma requires its state-funded prekindergarten programs to limit classes to no more than 20 children with no more than 10 children per adult, while allowing its child care centers to have classes of as many as 30 children with up to 15 children per adult.

Research on Effects of Class Size

A large body of evidence links high-quality preschool education with substantial increases in school readiness and persistent achievement gains as well as lower rates of grade retention and placement in special education programs.¹ By following preschool participants over many years, researchers have also documented longer-term benefits that include higher rates of high school graduation and lower rates of delinquency and arrests.

While researchers have been most interested in the benefits of early education for children living in poverty, several studies show that quality preschool programs can enhance learning and development for all children.²

The strongest evidence that preschool programs can produce large educational benefits for economically disadvantaged children comes from studies in which programs had both highly capable teachers and relatively small groups of children.³ For example, the High/Scope program employed two teachers with 10 to 13 children per group and the Abecedarian program's class size was 12 at age 4 and even smaller at age 3.⁴ These studies don't prove that such large effects can be produced only when classes are this small. However, there is no counter evidence that comparable effects can be produced with programs that have much larger class sizes. And, preschool programs with larger class sizes have generally failed to replicate these results.⁵

Other studies demonstrate that class size is one of the components of a quality preschool program that produces positive outcomes for young children. Research on child care classrooms indicates that when groups are smaller and staff-child ratios are higher, teachers provide more stimulating, responsive, warm, and supportive interactions. They also provide more individualized attention, engage in more dialogues with children, and spend less time managing children and more time in educational activities.⁶ Studies also provide evidence of a link between class size and overall quality of the classroom.⁷ One study of child care centers in three states found that, among several structural characteristics examined, staff-child ratios were the only factor other than teacher wages that predicted the quality of preschool classrooms.⁸

Table 1. Class Size and Staff-Child Ratio

States	State Pre-K				Child Care			
	Max. Group Size		Min. Staff-Child Ratio		Max. Group Size		Min. Staff-Child Ratio	
	4s	3s	4s	3s	4s	3s	4s	3s
Alabama	18	NA	1:9	NA	NR	NR	1:16	1:10
Alaska					20	20	1:10	1:10
Arizona	20	20	1:10	1:10	NR	NR	1:15	1:13
Arkansas	20	20	1:10	1:10	30	24	1:15	1:12
California	No limit	No limit	1:8	1:8	NR	NR	1:12	1:12
Colorado	15	NA	1:8	NA	24	20	1:12	1:10
Connecticut	20	20	1:10	1:10	20	20	1:10	1:10
Delaware	20	NA	1:10	NA	NR	NR	1:15	1:12
Florida					NR	NR	1:20	1:15
Georgia	20	NA	1:10	NA	36	30	1:18	1:15
Hawaii	No limit	No limit	1:16	1:12	NR	NR	1:16	1:12
Idaho					NR	NR	1:12	1:12
Illinois	20	20	1:10	1:10	20	20	1:10	1:10
Indiana					24	20	1:12	1:10
Iowa	16	16	1:8	1:8	NR	NR	1:12	1:8
Kansas	No limit	NA	No limit	NA	24	24	1:12	1:12
Kentucky	20	20	1:10	1:10	28	24	1:14	1:12
Louisiana	20	NA	1:10	NA	15	13	1:15	1:13
Maine	No limit	NA	1:18	NA	30	24	1:10	1:8
Maryland	20	NA	1:10	NA	20	20	1:10	1:10
Massachusetts	20	20	1:10	1:10	20	20	1:10	1:10
Michigan	18	NA	1:8	NA	NR	NR	1:12	1:10
Minnesota (HdSt)	20	17	1:10	2:17	20	20	1:10	1:10
Mississippi					20	14	1:16	1:14
Missouri	20	20	1:10	1:10	NR	NR	1:10	1:10
Montana					NR	NR	1:10	1:8
Nebraska	20	20	1:12	1:10	NR	NR	1:12	1:10
Nevada	No limit	No limit	No limit	No limit	NR	NR	1:13	1:13
New Hampshire					24	24	1:12	1:8
New Jersey (Abbott)	15	15	2:15	2:15	20	20	1:12	1:10
New Jersey (ECPA)	No limit	No limit	No limit	No limit	20	20	1:12	1:10
New Mexico	24	24	1:12	1:12	NR	NR	1:12	1:12
New York (UPK)	20	NA	1:9 or 3:20	NA	21	18	1:8	1:7
New York (EPK)	20	20	1:9 or 3:20	1:9 or 3:20	21	18	1:8	1:7
North Carolina	18	NA	1:9	NA	25	25	1:20	1:15
North Dakota					20	14	1:10	1:7
Ohio (Pub. School)	28	24	1:14	1:12	28	24	1:14	1:12
Ohio (HdSt)	20	17	1:10	2:17	28	24	1:14	1:12
Oklahoma	20	NA	1:10	NA	30	24	1:15	1:12
Oregon	20	17	1:10	2:17	20	20	1:10	1:10
Pennsylvania	No limit	NA	No limit	NA	20	20	1:10	1:10
Rhode Island					20	18	1:10	1:9
South Carolina	20	20	1:10	1:10	NR	NR	1:18	1:13
South Dakota					20	20	1:10	1:10
Tennessee	20	16	1:10	1:8	20	18	1:13	1:9
Texas	No limit	No limit	No limit	No limit	35	30	1:18	1:15
Utah					30	24	1:15	1:12
Vermont	16	16	1:8	1:8	20	20	1:10	1:10
Virginia	16	NA	1:8	NA	NR	NR	1:12	1:10
Washington	24	24	1:9	1:9	20	20	1:10	1:10
West Virginia	20	20	No limit	No limit	24	20	1:12	1:10
Wisconsin (4K)	Det. Locally	NA	Det. Locally	NA	24	20	1:13	1:10
Wisconsin (HdSt)	20	17	1:10	2:17	24	20	1:13	1:10
Wyoming					30	24	1:12	1:10
District of Columbia	20	15	1:10	2:15	20	16	1:10	1:8

Policy and Research Effects on Class Size *(continued)*

Studies show that class size and staff-child ratios not only have an impact on the quality of the environment but also on children's outcomes. Data from The National Institute for Child Health and Human Development (NICHD) Study of Early Child Care involved a sample of 1,364 children from diverse backgrounds in nine states. These data were used to examine the relationship between standards in the areas of staff-child ratios, group sizes, caregiver training, caregiver education, and children's development. Children in classrooms that met more of the recommended standards displayed greater school readiness and language comprehension and fewer behavior problems at 36 months old.⁹

The National Day Care Study, which involved randomly assigning 3- and 4-year-olds to preschool classrooms with different child-staff ratios and levels of staff education, also demonstrated the beneficial outcomes from higher staff-child ratios. Children in smaller classes had greater gains in receptive language, general knowledge, cooperative behavior, and verbal initiative, and showed less hostility and conflict in their interactions with others.¹⁰

Expert reviews of research have reached similar conclusions. For example, *From Neurons to Neighborhoods: The Science of Early Childhood Development*, an exhaustive review of the research by the National Research Council, affirms

the positive impact of small groups on caregiver behavior and child outcomes.¹¹ They conclude that research shows the importance of regulated class sizes and higher ratios for preschoolers (ages 3 through 5) as well as for younger children.

In addition to studies involving child care centers and preschools, studies involving the early elementary grades, especially kindergarten, strengthen the case for smaller class sizes. Project STAR (Student/Teacher Achievement Ratio) in Tennessee offers by far the most compelling evidence to date regarding the effects of class size on learning and other education outcomes.¹² STAR was a true experiment

Table Notes:

Notes for Table on Class Size and Staff-Child Ratio

Four states—New Jersey, New York, Ohio, and Wisconsin—have two state-financed prekindergarten programs each. An abbreviation of the name of each individual program is provided in parentheses. In all cases, these states have different class size and/or staff-child ratio requirements for each program. In addition, Louisiana has three distinct prekindergarten programs, but they all have the same requirements, so they are not shown separately in the table.

The listed program standards for class size and staff-child ratio in Arizona's state pre-k initiative represent NAEYC requirements. All programs receiving state pre-k funds must be accredited.

Class size in California's state pre-k program is typically limited to 24, for both 3- and 4-year-olds.

Kansas does not mandate class size or ratios for state pre-k, but programs are encouraged to follow NAEYC recommendations and limit class size to 15 students with two teachers present.

In Michigan's state pre-k program, a qualified teacher must be present, plus an associate teacher in rooms with between 9 and 16 children. If more than 16 students are in a class, then a third adult (who does not have to meet any specified qualifications) must be present.

State pre-k programs in Nevada must provide a rationale for class size and ratio. The state recommends NAEYC guidelines.

In Texas, most state-funded pre-k classes do not exceed 18 children and a teacher and an aide are present in most classrooms, but there are no class size or ratio requirements.

Program standards in Washington's state pre-k program are targeted for 4-year-olds, but since 3-year-olds are in blended classrooms, standards apply to the educational setting for both ages. In classes of 24 students, the staff-child ratio must be 1:6. The staff-child ratio requirement in West Virginia's state-funded pre-k changed to 1:10 as of the 2003-2004 program year, with one certified teacher mandated in each classroom.

Abbreviations Used in this Table:

NA — not applicable (state pre-k program does not serve 3-year-olds)

NR — data were not reported

Data Sources:

State pre-k data are from the 2002-2003 program year and were gathered for NIEER's *The State of Preschool: 2004 State Preschool Yearbook*. Data are not presented for Alaska, Florida, Idaho, Indiana, Mississippi, Montana, New Hampshire, North Dakota, Rhode Island, South Dakota, Utah, and Wyoming, as these states did not offer state-funded pre-k in 2002-2003.

Child care data are from Lemoine, S. (2004). Compiled from licensing regulations posted on the National Resource Center for Health and Safety in Child Care web site at <http://nrc.uchsc.edu>.

in which children from a large statewide sample were randomly assigned to smaller (13-17 students) or larger (22-26 students) classes from kindergarten through grade three. Students assigned to smaller classes performed better than students in larger classes on all achievement tests in all subject areas in every grade.

Minority students and students attending inner-city schools benefited most. For all children, the magnitude of effects was modest — 0.5 months increase in reading achievement and 1.6 months increase in math achievement in kindergarten. Gains increased every year the children were in a smaller sized class, and the study found that “the earlier small classes are introduced, the greater the potential for a strong impact on academic achievement.”¹³ Smaller class size also reduced grade retention. Some achievement gains were found to persist at least through grade 8.

Several quasi-experimental studies on class size reduction in the early grades, while not as rigorous in their methodology, have findings that are consistent with those of the Tennessee’s Project STAR.¹⁴ Wisconsin’s Project SAGE (Student Achievement Guarantee in Education) found positive impacts of small classes on student achievement, especially for minority students, and these impacts were consistent for the four years from kindergarten to third grade.

Children attending smaller classes in Burke County, North Carolina, did better in math and reading at the end of first, second, and third grades and continued to outpace their peers after returning to regular classes in fourth and seventh grades. An evaluation of a large-scale effort to reduce class size in California that looked at effects in third

grade found small but significant gains in reading, language, and math achievement levels.

By contrast, a statistical analysis of data from the Early Childhood Longitudinal Study—Kindergarten Cohort (ECLS-K) found kindergarten class size to have small effects on reading and no effects on math.¹⁵ Such studies employing large national data sets and sophisticated statistical analyses with multiple controls for child and school characteristics can provide useful estimates. However, they are methodologically weaker than experimental (and even quasi-experimental studies) in which class size has been altered for research purposes and there is a good match between the teachers and children experiencing different class sizes. The lack of random assignment or other procedures to ensure that children in different size classes are truly comparable and that class size is not confounded with other aspects of the environment (e.g., differences among communities and schools) reduces the confidence that can be placed in the results of the ECLS-K analysis.

Finally, students are likely to have health and safety benefits in addition to benefits for learning and development with smaller preschool classes and more teachers relative to number of students. A number of studies have found larger groups to be associated with higher rates of infection for children, greater

risk of injury due to dangerous situations (e.g., children climbing on furniture and equipment not designed for this purpose), and increased teacher stress that may even result in child abuse.¹⁶

In sum, preschool research strongly indicates that smaller class sizes are associated with greater educational effectiveness and other benefits. Even within studies that focus only on preschool children, the effects of class size have been found to be larger for younger children.¹⁷ Moreover, only those programs with small effective class sizes (15 or fewer) and high ratios of teachers to children have been found to produce very large educational benefits.

The preschool research is bolstered by research on class size for children in K-12 education, which finds that smaller classes are most productive for younger and more disadvantaged children, and “the major benefits from reduced class size are obtained as the size is reduced below 20 pupils.”¹⁸ If anything, class size recommendations based on studies of children in kindergarten and the early grades may be too large, given the characteristics and educational needs of younger preschool children. The research is consistent with the recommendations of professional organizations such as NAEYC and APHA that smaller class sizes are needed for younger children.



Understanding Why Smaller Classes Make a Difference

It is important to examine why smaller classes appear to produce better results for young children. Intuitively, the reasons seem clear. Teaching young children requires immense energy and relentless attention. When there are fewer children in the room, the teacher has more time to devote to each child, and managing the group requires less teacher time. As a result, teachers have opportunities to have longer conversations with each child. Teachers also have more time to observe each child's interests and activities so they can develop lesson plans that respond to individual children's learning styles, strengths and weaknesses. The STAR experiment provides supporting evidence since teachers in small classes spent more time on instruction and less on managerial and organizational tasks.¹⁹

The increased interaction and communication made possible in smaller classes have been shown to affect children's outcomes. An analysis of data from the NICHD Study of Early Child Care determined that responsive, sensitive caregiving was related to cognitive and language outcomes throughout the first three years of life and that frequency of language stimulation by caregivers was a particularly important factor in this link.²⁰

In addition, it seems likely that child behavior is directly affected by class size. In smaller classes, children are more likely to be engaged in learning activities and less likely to disrupt class. Children's behavior may be affected this way because smaller classes make it harder for them to hide or disappear without the teacher noticing. Children may be more primed to participate, knowing they will not be able to avoid responding to the teacher's questions, and may be less likely to make trouble, knowing the teacher will catch them

if they do.²¹ STAR found that children in the smaller classes took greater initiative in class, exerted more effort in learning activities, and displayed less disruptive, inattentive, and withdrawn behavior.²²

Although the STAR data are from kindergarten and the first grades of school, it seems reasonable to extrapolate from these findings to 3- and 4-year-olds. As noted earlier, theory and evidence indicate that preschool children should benefit from small class size even more than do kindergarten children. The kinds of teacher and child behaviors that were affected by the STAR class size reduction present the greatest potential for producing educationally effective preschool programs.

Eager to Learn, a report by the National Research Council on preschool education, offers further insight into the link between class size and child outcomes. The report found that, in smaller

groups, child-initiated activities are more common, with teachers more likely to follow children's leads rather than directing or scheduling all activities.²³ This echoes the STAR findings and is a particularly important benefit, since self-initiated learning is a crucial feature of sound early education curricula. A report by NIEER, *High-Quality Preschool: Why We Need It and What It Looks Like*, analyzing the features of effective preschool programs emphasized this point, documenting adverse effects when all activities are teacher-directed.²⁴

Eager to Learn also noted that small classes allow teachers to spend more time supporting children's exploration and problem-solving. With more time for each child, they are better able to work on extending children's language experiences. In addition, when there are fewer children in the room, teachers can more closely mediate children's social interaction.²⁵



Addressing Concerns About the Benefits and Costs of Smaller Class Sizes

Despite extensive research supporting smaller class sizes, there is still some debate about whether reducing class size really does make a difference and, even if it does have an impact, whether it is worth the costs. Some researchers have raised questions about whether it is smaller class size itself that makes a difference for children, or whether smaller class size simply tends to be correlated with other aspects of quality that are less easily measured. The first question, at least, would appear to be settled by STAR. Reducing class size did yield greater educational effectiveness, and it really was class size that made the difference. There is no reason to doubt that these results generalize beyond Tennessee. Class size reduction can - by itself - increase educational effectiveness.

One analysis frequently cited as evidence that preschool class size does not make a difference used data from a four-state study of child care centers that examined two classrooms in each center to consider how quality varied within a center.²⁶ By comparing classrooms within a center, the analysis aimed to distinguish the impact on quality of measurable features such as class size, which may vary among classrooms within a center, from unmeasured features such as a center's policies or a center director's leadership skills, which are shared across center classrooms. The analysis found that within a center, quality was not related to difference in staff-child ratios or group size.

However, within-center analyses likely understate the effects of class size. Variation in class size and ratio between classrooms within a center will reflect idiosyncratic differences on particular days and not policy differences that characterize class size

and ratio throughout a year. Moreover, while trying to capture the impact of unmeasured aspects that affect the quality of care at the center level, this analysis overlooks other factors that were not measured at the classroom level. For example, a center may specifically decide to place a smaller number of children in one classroom to offset other challenges that class may have, such as a child that needs more individualized attention, or to accommodate differences in teacher capabilities. These and other problems could limit the usefulness of analyses that seek to control for unmeasured differences by looking at the effects of variation only within auspices and sectors.

Some who question the need for smaller classes point out that preschools in many other countries tend to have large classes. Preschool class size mandates vary considerably across Europe and among economically advanced countries around the globe. Some permit class sizes larger than is common in the United States.²⁷ This fact is used to argue that if preschool programs have well-educated teachers, as are required in some other countries, large class sizes are not a problem.

Yet, there is no evidence that programs in other countries that have large class sizes are as effective as they should be. Relatively little research has been conducted on preschool program effectiveness in other countries, and such programs might be more effective if they had smaller class sizes. One country that is frequently cited for larger class sizes, France, has begun to reduce class sizes for children from disadvantaged backgrounds. This indicates that France, even after a long experience with large classes, may view smaller classes as advantageous, at least for certain groups of children.

There is some plausibility to the notion that more highly qualified teachers would be more effective in working with larger classes, but it is equally plausible that the benefits from class size reduction are higher when teachers are more highly qualified. One might expect that children gain relatively little from the increased contact with teachers provided by smaller classes when their teachers are not very effective. By contrast, smaller class sizes that increased each child's interactions with well-educated, highly effective teachers might be expected to produce meaningful gains in children's learning and development.

Even those who accept that smaller class sizes improve educational outcomes may still question whether the benefits outweigh the costs. Publicly funded preschools do not pose the challenges that can result from decreasing class sizes for child care or preschools in the private sector, where the additional staffing costs involved can make it difficult for programs to remain financially viable or can drive up fees to the point that they are unaffordable for most parents. However, there are still costs for reducing class size that governments will have to bear. Smaller classes increase the cost per student, so public agencies must increase their overall budgets for the prekindergarten program if they are to achieve their class size goals without decreasing the number of children able to participate.

Estimates of the cost of lowering class size vary. One analysis, using data from a 1989 survey of 265 centers by the U.S. General Accounting Office, determined that increasing the staff-child ratio from 1:11 to 1:10 would be associated with increased costs of approximately 4.5 percent.²⁸

Making the Most of Small Classes

Several studies have attempted to isolate the impact of class size and weigh its importance relative to other factors that may contribute to quality such as teacher education and training. However, it may not be useful to focus on possible tradeoffs between class size and teacher training or other classroom characteristics, or on whether it is better to have highly qualified teachers in larger classes or teachers with lower education levels in smaller classes. Most preschool classrooms today are only marginally effective and do not produce the large gains in children's abilities that we know are possible and cost-effective. To change this, emphasis should be placed on examining how small classes can be combined with other factors that contribute to quality in order to produce the results policy makers want for preschool children.³⁰

Careful implementation of policy changes is required to avoid unintended consequences. Rapid increases in demand for classroom space and teachers can lead to a reduction in the quality of new teachers and facilities and to higher costs for both. Gradual change that gives labor (teacher), real estate and construction markets time to adjust may result in higher quality and lower cost. Also, reducing class size or improving ratios without attending to other aspects of quality and public subsidies has the potential to reduce other contributors to quality and increase fees to parents.³¹ Fee increases can lead parents to switch to unregulated alternatives or not enroll their children at all. Where programs are publicly funded, cost increases that are not fully reimbursed can lead providers to decide not to participate, close down, or reduce costs in other areas related

to quality. Class size, ratio, and teacher qualification standards must be set (and enforced) together, since changes in one have been found to alter the others and to affect fees.

Because program characteristics like class size, which are easy to regulate, do impact quality, it doesn't mean that policymakers and administrators can ignore program characteristics that are harder to regulate, such as the relationships between children and their teachers and encouragement of child-initiated activities. It does mean, however, that establishing smaller classes and addressing other core features through regulation can be first steps in fostering quality in prekindergarten programs. It is important that these measures be followed by more complex strategies that take full advantage of the smaller classes, such as providing training for teachers on teaching strategies.

Policymakers may have to simultaneously address the entire range of factors – from class size and teacher qualifications to teacher interactions with their students to program leadership – to see that full potential impacts are realized. While this may be more costly, it may also be the only way to reap the benefits that ultimately make a prekindergarten program pay off, in terms of increased achievement, lower rates of special education placements and grade retention, and higher graduation rates. There is much to be done. Closing even half the gap in skills and abilities at school entry between children in poverty and the middle class, would require a combination of supervision, teacher quality and class size reduction that lies beyond what Head Start and most state preschool programs currently require.

Remaining Research Questions

Although class size and ratios have been studied extensively, policy makers could benefit from more precise guidance. There are still many areas for further exploration. Important questions worthy of future research include:

- *Are there threshold levels at which lowering class size has a particularly large effect, or at which class size is so small that reducing it further has little impact?*
- *What are the costs of reducing class size (from specific high levels to other specific low levels)?*
- *What types of training help teachers take full advantage of smaller classes and the resultant increased opportunities for interaction with their students?*
- *Are there important interdependencies in program standards – for example, are gains from increasing teacher quality much larger with small classes?*
- *When it is not feasible to reduce class sizes to the desired level, are there other steps that can be taken to compensate until it is possible to reduce class sizes?*
- *Given that much of the research on class size involves child care centers serving infants, toddlers, and preschoolers, or the early elementary school grades, shouldn't consideration be given to whether the effects of class size differ appreciably for state prekindergarten program settings or Head Start compared to these other programs?*

Additional research could help shed light on these unresolved questions and enable policymakers to determine when and how it is best to modify class size. Strong preference should be given to true experiments (or strong quasi-experiments where class size is actively changed) over purely statistical studies that depend on “natural” variation.

Policy Recommendations

Although not all questions have been settled about class size, there is enough evidence for several policy recommendations:

Set and enforce program standards.

All states should set, implement, and enforce program standards for early childhood programs based on research covering teacher behaviors, child outcomes, and health and safety. The standards should jointly address teacher qualifications, class size, and staff-child ratios so as to prevent unintended consequences for one aspect of program structure relating to quality when another is targeted for improvement.

Review class size and ratio requirements.

Many states permit class sizes so large that they may jeopardize much of the potential educational benefit of preschool education. This is particularly

true when class sizes exceed those recommended by professional organizations, but even these recommended class sizes seem too large for children in poverty or with special needs.

Ensure that a focus on class size and ratios is complemented by attention to more difficult-to-regulate components of quality.

Any reduction in class size should be accompanied by other efforts, such as training for staff on teaching techniques, that take full advantage of the increased student-teacher interaction that is possible in smaller classes.

Provide resources needed when implementing smaller class sizes.

Smaller classes mean higher costs per student, so any effort to reduce class size must be accompanied by the resources to achieve this goal without reducing the number of children able to participate. States should also closely monitor the degree to which class size

reduction affects costs. Gradual implementation of class size change is likely to produce better outcomes and minimize cost increases.

Support new research on class size issues.

Research is needed to provide more precise information on the relationship of specific class sizes to child outcomes, the impacts of class size on subgroups of preschoolers, and whether there are threshold levels at which class size reduction has a particularly large impact or, conversely, at which making the class size any smaller has minimal or no effect. Research offers reasons to believe that reducing class size to 15 (or fewer) students, at least for disadvantaged children, could substantially improve educational outcomes. Given the costs and potential benefits, experiments with Head Start and state preschool programs to measure the costs and benefits of class size reductions would be extremely valuable.

Endnotes:

¹ Barnett, W.S. & Camilli, G. (2001). Compensatory preschool education, cognitive development, and 'race'. In J. M. Fish (Ed.), *Race and Intelligence: Separating Science from Myth* (pp. 369-406), Mahwah, NJ: Erlbaum, (2002).

² Shonkoff, J. & Phillips, D. (Eds.) (2000). *From Neurons to Neighborhoods: The Science of Early Child Development*. Washington, DC: National Academy Press.

³ Frede, E.C. (1998). Preschool program quality in programs for children in poverty (pp. 77-98). In W.S. Barnett & S.S. Boocock (Eds.) *Early care and education for children in poverty*. Albany: SUNY Press.

⁴ Class size is less clearly defined in the High/Scope studies where 20-24 children sometimes occupied one large space, but smaller groups functioned as separate classes within that space. In the Abecedarian Study, 2- and 3-year-olds were together in classes of 7 children, and children may have advanced to the next age group based on their development rather than a strict age cutoff.

⁵ Barnett, W.S. (1998). Long-term effects on cognitive development and school success. In W.S. Barnett & S.S. Boocock (Eds.) *Early care and education for children in poverty* (pp. 11-44). Albany: SUNY Press.

⁶ Vandell, D.L. & Wolfe, B. (2002). *Child care quality: Does it matter and does it need to be improved?* Institute for Research on Poverty, University of Wisconsin-Madison. ; Clarke-Stewart, K.A. Gruber, C.P. & Fitzgerald, L.M. (1994). *Children at home and in day care*. Hillsdale, NJ: Erlbaum; Howes, C. (1983). Caregiver behavior in center and family day care. *Journal of Applied Developmental Psychology*, 4: 99-107. ; NICHD Early Child Care Research Network (2000). Characteristics and quality of child care for toddlers and preschoolers. *Applied Developmental Sciences*, 4, 116-135. ; Phillipsen, L. C., Burchinal, M. R., Howes, C. & Cryer, D. (1997). The prediction of process quality from structural features of child care. *Early Childhood Research Quarterly*, 12, 281-303.; Volling, B. L., & Feagans, L.V. (1995). Infant day care and children's social competence. *Infant Behavior and Development*, 18, 177-188. ; Munton, T., Mooney, A., Moss, P., Petrie, P., Clark, A., & Woolner, J. (2002). *Review of international research on the relationship between ratios, staff qualifications and training, group size, and the quality of provision in early years and child care settings*. London: Thomas Coram Research Unit, Institute of Education, University of London.

Endnotes: *continued*

- ⁷ Vandell, D.L. & Wolfe, B. (2002). Howes, C., Phillips, D.A., & Whitebook, M. (1992). Thresholds of Quality: Implications for the social development of children in center-based child care. *Child Development*, 63, 449–460; McCartney, K., Scarr, S., Rocheleau, A., Phillips, D., Abbott-Shim, M., Eisenberg, M., Keefe, N., Rosenthal, S., & Ruh, J. (1997). Teacher-child interaction and child-care auspices as predictors of social outcomes in infants, toddlers, and preschoolers. *Merrill-Palmer Quarterly*, 43, 426–450; Scarr, S., Eisenberg, M., & Deater-Deckard, K. (1994). Measurement of quality in child care centers. *Early Childhood Research Quarterly*, 9, 131–151. ; Whitebook, M., Howes, C., & Phillips, D. (1990). *Who cares? Child care teachers and the quality of care in America. Final Report, National Child Care Staffing Study*. Oakland, CA: Child Care Employee Project.
- ⁸ Phillips, D., Mekos, D., Scarr, S., McCartney, K., & Abbott-Shim, M. (2000). Within and beyond the classroom door: Assessing quality in child care centers. *Early Childhood Research Quarterly*, 15(4), 475-496.
- ⁹ National Institute of Child Health and Human Development Early Child Care Research Network (1999). Child outcomes when child care classes meet recommended guidelines for quality. *American Journal of Public Health*, 89, 1071-1077.
- ¹⁰ Ruopp, R., Travers, J., Glantz, F., & Coelen, C. (1979). *Children at the Center: Final Report of the National Day Care Study*. Cambridge, MA: Abt Associates.
- ¹¹ Shonkoff, J. & Phillips, D. (Eds.) (2000).
- ¹² Finn, J.D. (2002). Class Size Reduction in Grades K-3. In A. Molnar (Ed.), *School Reform Proposals: The Research Evidence*, Tempe, AZ: Arizona State University.
- ¹³ Finn, J.D., Gerber, S., Achilles, C. & Boyd-Zaharias, J. (2001). The enduring effects of small classes. *Teachers College Record*, 103(2), 145-183.
- ¹⁴ Finn, J.D. (2002).
- ¹⁵ Walston, J. & West, J. (2004). *Full-day and half-day kindergarten in the United States: Findings from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99*. Washington, DC: National Center for Education Statistics, U.S. Department of Education. The vast majority of the variation in class size in this study is between schools. STAR systematically varied class size within schools.
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- ²² Finn, J.D. et al. (2001).
- ²³ Bowman, B.T., Donovan, M. S., & Burns, M. S. (Eds.) (2000). *Eager to learn: Educating our preschoolers*. Washington, DC: National Academy Press.
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by **W. Steven Barnett, Ph.D., Karen Schulman, M.P.P. and Rima Shore, Ph.D.**

W. Steven Barnett is director of the National Institute for Early Education Research. Dr. Barnett's research has focused on the long-term effects of preschool programs on children's learning and development, the educational opportunities and experiences of young children in low-income urban areas, and benefit-cost analyses of preschool programs and their long-term effects. He received his Ph.D. in economics from the University of Michigan. He is a professor of Education Economics and Public Policy at Rutgers University.

Karen Schulman is senior research associate at the National Institute for Early Education Research.
Rima Shore holds the Adelaide Weismann Chair in Educational Leadership at Bank Street College of Education.

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120 Albany Street, Suite 500 New Brunswick, New Jersey 08901
(Tel) 732-932-4350 (Fax) 732-932-4360

Website: nieer.org
Information: info@nieer.org

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