EDUCATION

# The Pseudoscience of Single-Sex Schooling

Single-sex schooling lacks scientific support and may exaggerate sexism and gender stereotyping.

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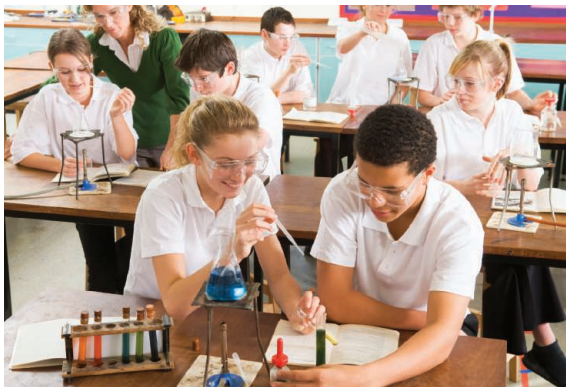
In attempting to improve schools, it is critical to remember that not all reforms lead to meaningful gains for students. We argue that one change in particular—sex-segregated education—is deeply misguided, and often justified by weak, cherry-picked, or misconstrued scientific claims rather than by valid scientific evidence. There is no well-designed research showing that single-sex (SS) education improves students' academic performance, but there is evidence that sex segregation increases gender stereotyping and legitimizes institutional sexism.



## Little Evidence of Academic Advantages

Title IX of the U.S. Education Amendments of 1972 outlawed discrimination on the basis of sex in educational programs receiving federal funds. Admissions policies of SS primary and secondary schools were exempt, but regulation prohibited virtually all SS classes in coeducational schools. In 2006, U.S. Department of Education regulations reinterpreted Title IX to permit SS classes within coeducational schools under limited circumstances, including a requirement that the SS nature of the class be "substantially related" to the achievement of an important governmental or educational objective (*1*).

From a policy perspective, implementation of SS schooling should stand on evidence that it produces better educational outcomes than coeducational schooling. But such evidence is lacking. A review (*2*) commissioned by the U.S. Department of Education itself to compare SS and coeducational outcomes concluded: "As in previous reviews, the results are equivocal." Large-scale reviews in Great Britain, Canada, Australia, and New Zealand, as well as analyses of data from the Programme for International Student Assessment, similarly found little overall difference between SS and mixed-sex academic outcomes (*3*–*7*).

Although SS outcomes may at first appear promising, apparent advantages dissolve when outcomes are corrected for preexisting differences (*3*–*6*). Students entering SS schools are often academically more advanced. For example, students at a public middle school in the Southwest United States boast higher test scores than most students in their district. But they had significantly higher test scores in the year before admission than girls who applied but were not admitted, although admission was reported to be a lottery, and their subsequent achievement was no better than that of students in a coeducational program with similar entry-level scores (*8*).

In addition, underperforming children in SS schools often transfer out prematurely, which inflates final performance outcomes. An example is Chicago's Urban Prep Charter Academy for Young Men, a school whose high college admission rates have led to its praise as a success story for SS education (*9*). However, when graduation rates at Urban Prep (*10*) and similar schools (*11*) are computed relative to freshman enrollment, they are comparable to those of other area public schools.

A new curriculum, like a new drug or factory production method, often yields a short-term gain because people are motivated by novelty and belief in the innovation (*12*). Novelty-based enthusiasm, sample bias, and anecdotes account for much of the glowing characterization of SS education in the media [e.g., (*13*)]. Without blind assessment, randomized assignment to treatment or control experiences, and consideration of selection factors, judging the effectiveness of innovations is impossible.

In short, although excellent public SS schools clearly exist, there is no empirical evidence that their success stems from their SS organization, as opposed to the quality of the student body, demanding curricula, and many other features also known to promote achievement at coeducational schools.

## No Evidence from Brain Research

"Brain researchers have proven that boys learn differently than girls," said a teacher in a SS public-school classroom (*14*). This statement reflects misinformation about neurobehavioral science. Neuroscientists have found few sex differences in children's brains beyond the larger volume of boys' brains and the earlier completion of girls' brain growth, neither of which is known to relate to learning (*15*). In adults, certain sex differences have been reported (e.g., in brain activation patterns, auditory thresholds, memory performance) (*16*–*18*), but none are substantial enough to justify different educational methods. Moreover, sex differences in adult brains cannot be assumed to be mirrored in children. Sex differences in adults' neural structure or function may result from a lifetime of sex-differentiated experiences rather than "hard-wiring" (*17*).

But this is not what educators, parents, and school boards hear about brain-related sex differences. In an article in a teachers' journal, for example, Leonard Sax (Executive Director of the National Association for Single Sex Public Education) states that boys and girls need different classrooms because of differences in autonomic nervous system function (*19*). Extrapolating from research

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on adults' cardiovascular regulation, he concludes that boys respond to classroom stress by activating the sympathetic nervous system, whereas girls respond by activating the parasympathetic nervous system. Sax then infers that boys are "thrilled" and "aroused" by loud, energetic teachers, whereas girls are intimidated, even to the point of nausea. He consequently counsels that boys should be taught through loud confrontation ("What's your answer, Mr. Jackson? Give it to me!"), whereas, girls should be approached with a gentler touch ("Lisa, sweetie, it's time to open your book.") (*19*). In his books, Web site, and teacher-training programs, Sax rationalizes different educational experiences for boys and girls by using obscure and isolated findings about brain maturation, hearing, vision, and temperature sensitivity (*20*). Although scientists have debunked many such claims as "pseudoscience" (*17*, *21*), this message has yet to reach many educators who are implementing such recommendations in SS classes within coeducational schools.

### Negative Impacts of Highlighting Gender

Some proponents of SS education claim it is well suited to countering sexism found in coeducational classrooms that may promote gender stereotypes. Teachers may interact less often with girls than boys (with low-achieving boys who interrupt class) (*22*) and highlight gender through labeling (e.g., "Good morning, boys and girls") or classroom organization (e.g., lining children up by sex). But gender divisions are made even more salient in SS settings because the contrast between the segregated classroom and the mixed-sex structure of the surrounding world provides evidence to children that sex is a core human characteristic along which adults organize education.

Research has demonstrated that, when environments label individuals and segregate along some characteristic (e.g., gender, eye color, or randomly assigned t-shirt groups), children infer that the groups differ in important ways and develop increased intergroup biases (*23*–*25*). Such effects have been shown explicitly for gender even within coeducational classes (*25*), and it is likely that these effects would be even more powerful when sex is used to divide children into entirely separate classrooms or schools rather than merely into separate lines to go to lunch. The choice to fight sexism by changing coeducational practices or segregating by gender has parallels to the fight against racism. Many instances of daily racial discrimination faced by students of color in racially integrated schools could be eliminated by creating, for example, all-African American or all-Latino academies. But the preponderance of social science data indicates that racially segregated schools promote racial prejudice and inequality (*26*).

The strongest argument against SS education is that it reduces boys' and girls' opportunities to work together in a supervised, purposeful environment. When teachers make children's sex salient, students choose to spend less time interacting with other-sex peers (*25*). Even in coeducational schools, boys and girls spend considerable time with same-sex peers, which exaggerates sex-typed behaviors and attitudes. Boys who spend more time with other boys become increasingly aggressive (*27*), and certain boys experience greater risk for behavior problems because they spend more time with boys (*28*). Similarly, girls who spend more time with other girls become more sex-typed (*27*). Institutionalizing gender-segregated classrooms limits children's opportunities to develop a broader range of behaviors and attitudes. Positive and cooperative interaction with members of other groups is an effective method for improving intergroup relationships (*29*).

Beyond fostering academic skills, public education has many goals, including preparing children for mixed-sex workplaces, families, and citizenry. The idea that there are far-reaching consequences is supported by a large-scale study in the UK showing that men in their early 40s were more likely to be divorced if they attended SS rather than coeducational schools, although no parallel differences were found for women (*30*).

### Institutional Sexism Disguised as Choice

Advocates argue that although SS education may not be beneficial for all children, it creates diversity of opportunity and thereby benefits certain students. This is a specious argument (*11*), and there are several policy reasons why SS education is not a choice that public schools should embrace. First, there are no data identifying children who stand to benefit from SS education in particular. Rather, student characteristics that predict success in SS settings predict success in coeducational settings (e.g., higher family income) (*31*). Second, schools face scheduling nightmares if they must offer all-boys, all-girls, and coeducational options for every subject. Third, funds spent on training teachers in nonexistent "gender-specific learning styles" could be better spent on training them to teach science, mathematics, and reading, or to integrate boys and girls more completely in the learning environment.

The Obama Administration has declared that the Department of Education is committed to "evidence-based policy-making" (*32*). This principle must be applied to decisions about SS public education. We call upon policy-makers to heed the scientific evidence and rescind the regulatory changes that weaken Title IX.

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