

SINGLE-SEX VERSUS COEDUCATIONAL EDUCATION



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ABSTRACT

Single-sex education refers most generally to education at the elementary, secondary, or postsecondary level in which males or females attend school exclusively with members of their own sex. This report deals primarily with single-sex education at the elementary and secondary levels. Research on the question of whether public single-sex education might be beneficial to males, females or a subset of either group (particularly disadvantaged youths) has been limited. However, because there has been a resurgence of single-sex schools in the public sector, it was deemed appropriate to conduct a systematic review of single-sex education research.

INTRODUCTION

A number of theoretical advantages to both coeducational (CE) and single-sex (SS) schools have been advanced by their advocates, a subset of whom have focused specifically on the potential benefits of SS schooling for disadvantaged males who have poor success rates in the educational system. The interpretation of results of previous studies in the private sector or the public sectors of other countries has been hotly debated, resulting in varying policy

recommendations based on the same evidence. However, no reviews on this topic have been conducted using a systematic approach similar to that of the Campbell Collaboration (CC) or the What Works Clearinghouse (WWC). Thus, the objective of this review is to document the outcome evidence for or against the efficacy of single-sex education as an alternative form of school organization using an unbiased, transparent, and objective selection process adapted from the standards of the CC and WWC to review quantitative studies.

Concurrently with this review of the quantitative literature, we conducted a review of the qualitative literature on the subject of single-sex schooling using parallel coding techniques. Unlike quantitative studies, qualitative studies are not viewed by WWC as appropriate methodology when determining causal relationships. Rather, they contribute to theory building and provide direction for hypothesis testing. Few qualitative studies satisfied the criteria for inclusion. Therefore, the primary focus of this paper is the systematic review of quantitative research.

The following are the major research questions addressed by the systematic quantitative review:

1. Are single-sex schools more or less effective than coeducational schools in terms of concurrent, quantifiable academic accomplishments?
2. Are single-sex schools more or less effective than coeducational schools in terms of long-term, quantifiable academic accomplishment?
3. Are single-sex schools more or less effective than coeducational schools in terms of concurrent, quantifiable indicators of individual student adaptation and socioemotional development?

4. Are single-sex schools more or less effective than coeducational schools in terms of long-term, quantifiable indicators of individual student adaptation and socioemotional development?
5. Are single-sex schools more or less effective than coeducational schools in terms of addressing issues of procedural (e.g., classroom treatment) and outcome measures of gender inequity?
6. Are single-sex schools more or less effective than coeducational schools in terms of perceptual measures of the school climate or culture that may have an impact on performance?

As in previous reviews, the results are equivocal. There is some support for the premise that single-sex schooling can be helpful, especially for certain outcomes related to academic achievement and more positive academic aspirations. For many outcomes, there is no evidence of either benefit or harm. There is limited support for the view that single-sex schooling may be harmful or that coeducational schooling is more beneficial for students.

Summary of Findings in Each Domain

Concurrent, quantifiable academic accomplishments

In general, most studies reported positive effects for SS schools on all-subject achievement tests. Studies examining performance on mathematics, science, English, and social studies achievement tests found similar findings with one caveat. Within each of these subject-specific categories, roughly a third of all studies reported findings favoring SS schools, with the remainder of the studies split between null and mixed results. This minimal to medium support for SS schooling applies to both males and females and in studies pertaining to both elementary and high schools. The overall picture is split between positive findings for SS schooling and no

differences or null findings, with little support for CE schooling. The one study that found advantages for CE schooling found advantages for white females but not for Asian or black females. Males continue to be underrepresented in this realm of research.

Long-term, quantifiable academic accomplishment

As opposed to concurrent indicators of academic achievement, any positive effects of SS schooling on longer-term indicators of academic achievement are not readily apparent. No differences were found for postsecondary test scores, college graduation rates, or graduate school attendance rates. However, all the findings in this domain came from a pair of studies, indicating the lack of high- quality research on these important criteria. Although some studies favor single-sex education in the case of postsecondary test scores, there is a dearth of recent studies using controls. There has been a similar lack of research on other potential criteria in this domain, such as college grade point average, meritorious scholarships or funding attained, postgraduate licensure test scores, and any career achievement that could ostensibly be tied to quality of schooling.

Concurrent, quantifiable indicators of individual student adaptation and socioemotional development

This category includes a range of outcomes that are not easily grouped together, and the results are mixed. Regarding self-concept and locus of control, the studies are split between those showing positive effects for SS schooling and those showing no differences. In the case of self-esteem, a third of the studies supported CE schooling while half found no difference. Given a recent extensive review concluding that self-esteem's relationship to school success, occupational success, better relationships, leadership, delinquent behavior, and other desirable outcomes is modest to nonexistent, the implications of findings regarding self-esteem appear complementary.

Furthermore, CE schooling only had a positive impact on the self-esteem of males.

Findings regarding school track and subject preferences were mixed, with the overall weight of the findings lying somewhere between pro-SS findings and no differences. A majority of studies favored SS schools on the outcome of higher educational aspirations, as evidenced by SS students showing more interest in and taking more difficult courses. SS schools fostered higher educational and career aspirations for girls. More studies emphasized the positive effect of SS schools on career aspirations than CE schools for boys, but evidence regarding their educational aspirations was mixed.

A category called “attitudes toward school” showing mixed results was actually a combination of single studies using somewhat different outcome variables, thus reducing the meaningfulness of the category. In terms of actual behaviors, a few studies focused on delinquency, reporting differences in favor of SS schools that were moderated by individual developmental differences. What is lacking is a conceptual framework to tie together the myriad academic-attitude outcome measures used in this realm so that studies will be more directly comparable.

Long-term, quantifiable indicators of individual student adaptation and socioemotional development

The outcomes in this domain generally do not appear in more than one or two studies that made it to Phase III review. Therefore, one must be cautious in generalizing from these results. Having said that, the results still suggest the potential that SS schooling could be associated with a number of post– high school, long-term positive outcomes. These include postsecondary success or participation in collegiate activities while maintaining full-time enrollment for a four-year period, reduced unemployment (males and females), reduced propensity to drop out of high school (males and females), the choice of a nontraditional college major (for females), and

political activism (for females). The sole exception is eating disorders; one study found more SS students to have eating disorders than CE students.

Procedural (e.g., classroom treatment) and outcome measures of gender inequity

This question could not be addressed because of a lack of any quantitative studies that used gender equity as an outcome variable at the school level. Any studies that compared SS and CE *classrooms* within a CE school were outside the purview of this study and were not reviewed.

Perceptual measures of the school climate or culture that may impact performance

This category includes a number of disparate, single-study results. One of the two studies addressing leadership opportunities found more opportunities for both males and females in SS schools; however, the statistical significance of this finding depended on what other variables had been controlled for. The other found that both males and females in SS schools put more value on grades and leadership and less on attractiveness and money. However, there remains a dearth of high-quality empirical studies using this class of outcome variables as criteria.

A final category of outcomes examined as a subset of culture was the realm of subjective satisfaction of students, parents, and teachers with the school environment. The one study in this review that found the social environment more appealing in CE schools is a good case in point in that the same study found that SS students are more interested in grades and leadership and less interested in money and looks. Some qualitative studies have looked at why certain parents prefer SS schooling, and studies in other cultures have found mixed results regarding teacher

satisfaction with CE versus SS schooling. However, no empirical studies comparing current parental satisfaction in equivalent SS and CE schools were available for review using the stated guidelines. There remains a lack of research both on this class of criteria and on the relationship of subjective satisfaction to other more critical criteria.

Expected Outcomes Not Seen in the Review

Teenage pregnancy, college performance, differential treatment by teachers, parental satisfaction, bullying in school, and teacher satisfaction were among the many outcomes that we expected to see in the review or that should be addressed but were not found in any included study.

Review Methodology

A systematic review of literature on a topic consists of the following steps:

1. An exhaustive search of electronic databases for citations, supplemented by other sources
2. An initial Phase 1 exclusion of sources whose subject matter falls outside the defined scope of the study
3. A Phase 2 exclusion based on obvious methodological considerations (e.g., nonstudy, weak study)
4. A Phase III evaluation and coding of remaining articles

SEARCH STRATEGY

The first step in a systematic review is to conduct an exhaustive search of the extant literature. Various search strategies were used to identify relevant studies. First, we conducted an electronic search of popular academic databases. Next, articles by authors mentioned by a panel of subject-matter experts were obtained. Finally, we used the Social Sciences Citation Index (SSCI) to locate any recent articles that cited a small number of influential studies on this topic.

The electronic search strategy began by reviewing the following databases: 1) ERIC, Educational Resources Information Center; 2) PsycINFO; 3) Campbell Collaboration's C2-SPECTR (Social, Psychological, Educational, and Criminological Trials Register); and 4) Dissertation Abstracts International. Each electronic database was searched from 1988 to the present, except for C2-SPECTR because year limitations cannot be set within that database. The following key words were used: Single Sex, Single Gender, Same Sex, Same Gender, Separate Sex, Separate Gender, Coeducation, Coeducational, and Mixed Sex. We selected 1988 as the starting point because of the seminal pieces by Lee and Bryk (1986) and Marsh (1989), which fueled the debate throughout the research community. Still, it is important to note that our search was not limited to studies published in 1988 or later. Studies from years prior to 1988 were collected from subsequent phases of searching, such as citation searches in the Social Sciences Citation Index and three core review publications.

The next phase of searching identified all citations in three core publications containing relevant reviews of the literature: 1) the book *Same, Different, Equal: Rethinking Single-Sex Schooling* by Rosemary Salomone (2002); 2) *Gender in Policy and Practice: Perspectives on Single-Sex and Coeducational Schooling*, a book of edited chapters by Amanda Datnow and Lea Hubbard (2002); and 3) a review article by Fred Mael (1998). All single-sex school research references from these sources provided a baseline of most relevant articles and theoretical arguments advanced for and

against single-sex schooling. Any supplemental references from these three sources were added to the list of references compiled through the electronic databases.

The final phase of the search entailed using the SSCI to find all articles that had cited any one of a few seminal pieces in the topic area. Publications that cited these influential articles were then added to, and crosschecked against, the database of references.

Implications of Review

Specific Implications

We begin our synopsis of this review by summarizing the findings within each broad domain of outcome measure, using the structure of the original research questions:

Are single-sex (SS) schools more effective than coeducational (CE) schools in terms of concurrent, quantifiable academic accomplishments? Conversely, are any adverse effects associated with single-sex schools in this realm?

In general, more studies reporting the positive effects of SS schools on all-subject achievement test scores were found than studies reporting the positive effect of CE schools on the same outcomes. Studies examining the mathematics, science, English, and civics achievement outcomes for SS schools reported findings similar to those of overall academic achievement with one caveat. In each case, roughly a third of all studies reported findings favoring SS schools, with the remainder of the studies split between null and mixed results. In the one study (Garcia, 1998) favoring CE schooling, the advantages accrued only to white females, but not to Asian or black females. Given this small to medium support for SS schooling, it is important to note that this finding applies to both males and females and in studies

pertaining to both elementary and high schools. This is consistent with Mael's (1998) finding that "the assertion that SS schooling has positive benefits for the academic achievement of both sexes is supported by the predominance of research, though effects appear more pronounced and less ambiguous for females than for males" (p. 117). Males continue to be underrepresented in this realm of research.

Are SS schools more effective than CE schools in terms of long-term, quantifiable academic accomplishment? Conversely, are any adverse effects associated with single-sex schools in this realm?

As opposed to concurrent indicators of academic achievement, any positive effects of SS schooling on longer-term indicators of academic achievement are not readily apparent. No differences were found for postsecondary test scores, college graduation rates, or graduate school attendance rates. However, all the findings in this domain came from only two studies (Marsh, 1989; Riordan, 1990), indicating the lack of research on these important criteria. Although some evidence favors single-sex education in the case of postsecondary test scores, there is a dearth of recent studies using controls. There has been a similar lack of research on other potential criteria in this domain, such as college grade point average, meritorious scholarships or funding attained, postgraduate licensure test scores, and any career achievement that could ostensibly be tied to quality of schooling. This severely limits the ability to come to any conclusions about the efficacy of SS schooling in this domain. A series of studies by Tidball and colleagues, as well as additional studies supporting and refuting her findings (Oates and Williamson, 1978; Rice and Hemmings, 1988; Tidball, 1973; Tidball and Kistiakowsky, 1976), deal with the postschool accomplishments of graduates of women's colleges and are not directly relevant.

Are single-sex schools more effective than coeducational schools in terms of concurrent, quantifiable indicators of individual student adaptation and socioemotional development? Conversely, are any adverse effects associated with single-sex schools in this realm?

This category includes a range of outcomes that are not easily grouped together, and the results are mixed. More studies reporting positive effects of SS schools on self-concept and locus of control were found than those reporting positive effects of CE schools. However, results regarding self-esteem were indicative of the opposite as the majority of studies were pro-CE—at least for males—or reported no differences between SS and CE schools. For males, the single high school study favored CE schools, whereas for elementary school males, one study each favored either CE or SS schooling. Thus, it is difficult to draw any conclusions about this variable. It is also noteworthy that in a wide-ranging review of the self-esteem literature, Baumeister et al. (2003) concluded that self-esteem's relationship to school success, occupational success, better relationships, leadership, delinquent behavior, and other desirable outcomes is modest to nonexistent, and in each case the direction of causality is unclear. Although self-reported self-esteem is correlated with happiness, they found no evidence that efforts to boost self-esteem were successful. Thus, even if more studies were to show SS schooling to be associated with high or low self-esteem, the implications of that finding might be minimal, given that self-esteem is a relatively poor indicator of a type of school's efficacy.

A majority of studies supported the position that SS schooling resulted in higher academic aspirations, as evidenced by students showing more interest in and taking more difficult courses. The findings of a recent unpublished study by Spielhofer et al. (2002) with a large sample and excellent statistical controls were especially impressive. SS schools also resulted in higher educational and career aspirations for girls. A category called "attitudes toward school" showing mixed results was actually a combination of single studies using different outcome variables, thus reducing the meaningfulness of the category. In terms of actual behaviors, a few studies looked at delinquency. Although none found advantages for CE schools, any

differences in favor of SS schools were moderated by individual developmental differences. This is one of a number of socioemotional outcome variables that can be measured by objective criteria and would benefit from additional studies. A single study showed SS females to have more positive attitudes toward working women (Riordan, 1990); however, the study was published 15 years ago and participation in the workplace for all women has increased so much that the data and the SS-CE differences may be dated. Generally, across this category, the preponderance of new studies and previous ones that Mael (1998) did not properly highlight support the view that SS schooling is associated with more positive attitudes toward and aspirations about education and careers.

What is lacking is a conceptual framework to tie together the myriad academic-attitude outcome measures used in this realm so that studies will be more directly comparable. The same can be said for the studies using the relatively amorphous “self-concept” as an outcome variable. In particular, the research is sketchy about how malleable self-concept and self-esteem are as a function of type of school, holding all other life influences constant.

Are SS schools more effective than CE schools in terms of long-term, quantifiable indicators of individual student adaptation and socioemotional development? Conversely, are any adverse effects associated with single-sex schools in this realm?

The outcomes in this domain generally do not appear in more than one or two studies that made it to Phase III review. Therefore, we must be cautious in generalizing from these results. Having said that, the results still suggest the potential that SS schooling could be associated with a number of post-high school, long-term positive outcomes. These include postsecondary success or participation in collegiate activities while maintaining full-time enrollment for a four-year period, reduced unemployment (males and females), reduced propensity to drop out of high school (males and females), the choice of a nontraditional college major (for females), and

political activism (for females). The sole exception is eating disorders, in which one study found negative effects for SS schooling on eating disorders. However, Mensinger's relatively small Australian sample highlights the need for additional research.

Are single-sex schools more effective than coeducational schools in terms of addressing issues of procedural (e.g., classroom treatment) and outcome measures of gender inequity? Conversely, are any adverse effects associated with single-sex schools related to gender equity?

This question could not be addressed because we did not come across any quantitative studies that used gender equity as an outcome variable at the school level. Any studies that compared SS and CE classrooms within a CE school were outside the purview of this study and were not reviewed.

Are SS schools more effective than CE schools in terms of perceptual measures of the school climate or culture that may have an impact on performance? Conversely, are any adverse effects associated with single-sex schools in this realm?

School culture or climate refers to the informal rules, norms, and "ways things work" that create expectations for students and socialize students into certain modes of behavior. Culture and climate have the potential to increase aspiration levels and open new opportunities for students or, conversely, to teach students to stay within certain culturally mandated constraints deemed appropriate for persons like themselves (e.g., females, Hispanics). Advocates of SS schooling have argued that the cultures in SS schools foster greater academic aspirations and make it acceptable to be interested in academics more than in socializing. In addition, it has been argued that all-female schools allow women to pursue non-stereotypical courses and majors and hold leadership roles and that all-male schools for disadvantaged youths allow their students to pursue academic interests without peer censure. Evidence supporting claims that better culture leads to

better organizational outcomes has been mixed, as is much research attempting to tie organizational culture to performance (Wilderom, Glunk, and Maslowski, 2000). This category includes a number of disparate, single-study results. The only study addressing leadership opportunities found more opportunities for both males and females in SS schools (Riordan, 1990); however, and the statistical significance of this finding depended on what other variables had been controlled for. Another study found that SS schools put more value on grades and leadership and less on attractiveness and money for both males and females (Schneider and Coutts, 1982). However, there remains a dearth of high-quality empirical studies using this class of outcome variables as criteria.

A final category of outcomes examined as a subset of culture was the realm of subjective satisfaction of students, parents, and teachers with the school environment. Extensive research in the late 1960s and 1970s found that CE schools had friendlier and more relaxed atmospheres, with more opportunities for pleasure-centered social contact (Dale, 1971, 1974; Hyde, 1971). Although not formally part of the K-12 sample of this study, it is useful to note that at the college level, Astin (1977) and Smith (1990) also found that CE colleges were rated as having more enjoyable campus social life by males and females, respectively. Whether enjoyment of campus life should take priority over other academic and socioemotional criteria is debatable. The one study (Schneider and Coutts, 1982) in this review that found the social environment more appealing in CE schools is a good case in point because the same study found that SS students are more interested in grades and leadership and less interested in money and looks. Although some qualitative studies have looked at why certain parents prefer SS schooling, we did not review any empirical studies comparing current parental satisfaction in equivalent SS and CE schools. Studies in other cultures have found mixed results regarding teacher satisfaction with CE versus SS schooling (Marsh, Owens, Myers, and Smith, 1989; Payne and Newton, 1990). There remains a lack of research both on this class of criteria and on the relationship of subjective satisfaction to other more critical criteria.

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