

# DANGEROUS DATA: HOW DISPUTED RESEARCH LEGALIZED PUBLIC SINGLE-SEX EDUCATION

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## I. INTRODUCTION

In fall 2006, four classes of second- and third-grade boys and girls started back to school at Belcher Elementary, a public school in Clearwater, Florida, but this year these students learned apart from each other.<sup>1</sup> In addition to these segregated classes, the Florida House Education Committee considered requiring single-sex classes at schools that earned a D or F on the state's annual report card.<sup>2</sup> These four single-sex classes joined the then 262 public schools in the United States offering single-sex educational programs,<sup>3</sup> and more are forthcoming.<sup>4</sup> In 1995, only three public

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1. Donna Winchester, *The Mars-Venus Approach*, St. Pete. Times 1A (Jan. 21, 2007).

2. Leslie Postal, Orlando Sentinel Blog, *Boys in this Room, Girls in that One: Do You Want Single-Sex Classes for Your Kids?* [http://blogs.orlandosentinel.com/news\\_education\\_edblog/2007/03/boys\\_in\\_this\\_ro.html](http://blogs.orlandosentinel.com/news_education_edblog/2007/03/boys_in_this_ro.html) (Mar. 26, 2007).

3. Natl. Assn. Single Sex Pub. Educ. (NASSPE), *Single Sex Classrooms*, <http://www.singlesexschools.org/schools-classrooms.htm> (last accessed Oct. 17, 2007) (the number of public schools offering single-sex educational opportunities continues to increase and as of April 2008 the Web site reported 366 such schools). As of May 2007, Belcher Elementary was one of seven coeducational public schools in Florida to offer single-sex classes. *Id.* Of the 262 public schools offering single-sex programs in May 2007, 210 were coeducational schools offering single-sex classes, such as Belcher Elementary. *Id.* In August 2007, the NASSPE found the distinction between single-sex schools and coeducational schools with single-sex classes arbitrary and began listing all public schools offering single-sex classrooms on the same Web page. *Id.*

4. *Supra* n. 3; Tom Marshall, *School Board Willing to Hear Plan for Single-Sex Classrooms*, St. Pete. Times 1 (Dec. 7, 2006). Florida's Hernando County agreed to allow Westside Elementary School to offer single-sex classrooms. *Id.* The school wanted to offer

schools offered single-sex classes in the United States.<sup>5</sup> Barely ten years later, single-sex schools and classes are on the rise, especially since 2002 when the Department of Education<sup>6</sup> (DOE) indicated its intent to amend Title IX of the Education Amendments of 1972<sup>7</sup> (Title IX) to “provide more flexibility for educators to establish single-sex classes and schools at the elementary and secondary levels.”<sup>8</sup>

In the fall of 2006, the DOE announced new rules (Amendments) permitting single-sex public education.<sup>9</sup> These Amendments represent a major change in Title IX, which prohibits sex discrimination in educational programs or activities that receive federal funds, generally public schools.<sup>10</sup> According to the amended regulation, states and school districts may have public single-sex classes, schools, or activities as long as students, or their parents, volunteer to participate in them *and* there is a “substantially equal” coeducational (or another single-sex) class, school, or activity for students of the excluded gender.<sup>11</sup>

These Amendments, which took effect on November 24, 2006,<sup>12</sup> radically changed the interpretation of Title IX, which previously disallowed public single-sex classes and activities except for limited occasions.<sup>13</sup> In fact, the Amendments are consid-

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this program in the past, but the school board attorney would not allow it upon the interpretation of Title IX that technically did not allow single-sex classrooms under federal law. *Id.* However, that changed in October when the Department of Education announced a single-sex education regulation, so now the school may legally offer single-sex classrooms. *Id.*

5. Cathy Grimes, *Boys, Girls May Spell Success: Forrest Elementary School's Experiment with Single-Sex Classrooms Is Part of a Growing Trend*, Daily Press (Newport, Va.) (Dec. 18, 2006).

6. The Department of Education Organization Act created the DOE, which “[e]stablishes policy for, administers, and coordinates most federal assistance to education” as well as promotes equal access and excellence in education. Natl. Archives & Recs. Admin., *Guide to Federal Records in the National Archives of the United States*, vol. II Rec. Group 441-1 (U.S. Govt. Printing Off. 1995). The Department of Education Organization Act is codified at 20 U.S.C. § 3411 (2006).

7. 20 U.S.C. § 1681 (2006).

8. 67 Fed. Reg. 31098, 31098 (May 8, 2002); Kimberly J. Jenkins, *Constitutional Lessons for the Next Generation of Public Single-Sex Elementary and Secondary Schools*, 47 Wm. & Mary L. Rev. 1953, 1956 (2006).

9. 34 C.F.R. § 106.34 (2006).

10. Anne Marie Chaker, *U.S. Eases Rules on Educating Sexes Separately*, Wall St. J. D1 (Oct. 25, 2006).

11. 34 C.F.R. at § 106.34.

12. 71 Fed. Reg. 62530, 62530 (Oct. 25, 2006).

13. 20 U.S.C. § 1681(a)(1)–(9), (c).

ered the most significant policy change in public education since the landmark passage of Title IX barring sex discrimination in education thirty years ago.<sup>14</sup>

The DOE promulgated this regulation under its rulemaking authority as a federal administrative agency.<sup>15</sup> The federal Administrative Procedure Act<sup>16</sup> grants this authority and mandates minimum rulemaking procedures for federal agencies to follow in promulgating regulations.<sup>17</sup> These procedures must be followed so that an administrative agency can evaluate the reliability of the information and create a final rule that incorporates the supporting facts and public comments.<sup>18</sup> It is imperative that the DOE takes adequate measures to ensure the reliability of its data because “it is an agency’s duty to establish the statistical validity of the evidence prior to reaching conclusions based on the evidence, not the public’s duty to inform the agency of statistical invalidities in its evidence.”<sup>19</sup>

Currently, there is a very heated debate about public single-sex education among politicians, scholars, educators, and even students.<sup>20</sup> Part of this debate is fueled by social-science re-

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14. Diana Jean Schemo, *Change in Federal Rules Backs Single-Sex Public Education*, N.Y. Times A1 (Oct. 25, 2006).

15. With a general grant of rulemaking authority, an agency like the DOE may “promulgate regulations reasonably related to . . . its enabling legislation.” *Pinney v. Natl. Transp. Safety Bd.*, 993 F.2d 201, 202 (10th Cir. 1993).

16. 5 U.S.C. § 551 (2006).

17. See 5 U.S.C. § 553 (listing the specific procedure for rulemaking). “The reason for requiring formal adoption of regulations, in part, is to ensure that they are written in a comprehensible manner, are authorized by statute, and are consistent with other law.” 73 C.J.S. *Pub. Admin. L. and Proc.* § 182 (2006). The primary goal of rulemaking is to gather information and make factual determinations in order to formulate a policy-type determination for a prospective regulation. Charles H. Koch Jr., 1 *Admin. L. & Prac.* § 2.11 (2d ed., West 2006). This procedure usually occurs through a notice-and-comment scheme, which basically involves a notice of proposed rulemaking issued by the agency, an opportunity for the public to comment, and publication of the final rule along with a statement justifying the basis and purpose of the rule. *Id.* at § 2.13; see also 5 U.S.C. § 553 (outlining the specific requirements for the notice-and-comment procedure).

18. 5 U.S.C. § 553(c).

19. Koch, *supra* n. 17, at § 4.41 (quoting *St. James Hosp. v. Heckler*, 760 F.2d 1460, 1467 n. 5 (7th Cir. 1985)). For more on rulemaking authority, see David Shapiro, *The Choice of Rulemaking or Adjudication in the Development of Administrative Policy*, 78 Harv. L. Rev. 921 (1965) and Koch, *supra* note 17, at ch. 4.

20. For an explanation of many of the issues associated with single-sex education programs, see e.g. Isabelle Katz Pinzler, *Separate but Equal Education in the Context of Gender*, 49 N.Y. L. Sch. L. Rev. 785 (2004); Rosemary C. Salomone, *Feminist Voices in the Debate over Single-Sex Schooling: Finding Common Ground*, 11 Mich. J. Gender & L. 63

search—some of which supports single-sex education, some of which refutes single-sex education, and almost all of which is inconclusive for a variety of reasons. Despite the inadequacies of this data, the DOE relied on it as supporting evidence to legalize public single-sex education. While much has been written on the constitutionality and advisability of public single-sex education,<sup>21</sup> there has been almost no analysis of the types of evidence that the DOE should consider when promulgating regulations such as this one.

This Article will examine the social-science evidence that the DOE reviewed to amend Title IX and will discuss whether contested statistical data should be a foundation for regulations. Part II of this Article gives a brief overview of the history of public education, as a backdrop to Title IX, and provides a sketch of the constitutional framework within which public schools operate. Part III dissects the amended Title IX and explains in detail the new allowances and requirements for single-sex programs. Part IV examines the social-science evidence used to promulgate the Amendments to Title IX and presents conflicting data that call into question the efficacy of single-sex education. In light of this disputed evidence, Part V addresses the problems with using contested evidence to substantiate and promulgate a regulation, and Part VI proposes a guideline that the DOE should implement to evaluate the credibility of social-science evidence when using it to substantiate future regulations.

## II. DEVELOPMENT OF PUBLIC SINGLE-SEX EDUCATION

### A. History of Public and Single-Sex Education in the United States

To better understand the Amendments to Title IX, it is necessary to know the history of public education and single-sex education in the United States. Single-sex education began as a benefit for males.<sup>22</sup> In its origins, single-sex education was the method

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(2004); Gary J. Simson, *Separate but Equal and Single-Sex Schools*, 90 Cornell L. Rev. 443 (2005).

21. *E.g.* Susan G. Clark, *Public Single-Sex Schools: Are They Lawful?* 213 Ed. Law Rep. 319, 319 (Nov. 30, 2006); David S. Cohen, *Title IX: Beyond Equal Protection*, 28 Harv. J.L. & Gender 217 (2005); Jenkins, *supra* n. 8.

22. *See* Amy H. Nemko, *Single-Sex Public Education after VMI: The Case for Women's*

used to instruct the males in society and to keep females out of the males' classrooms; as a result, females had to have their own classes.<sup>23</sup> When the government mandated compulsory public education, schools became coeducational because local governments could not afford one school for each gender.<sup>24</sup>

In higher education, coeducation evolved more slowly. With the dawn of the feminist movement, women fought to enter Ivy League schools and other male-only institutions.<sup>25</sup> In the late twentieth century, coeducation was the American preference;<sup>26</sup> in fact, a DOE conference about single-sex schooling in 1993 found that far fewer single-sex schools existed in both the private and public sectors than in the 1950s.<sup>27</sup>

In recent years, there has been a renewed interest in single-sex education. This movement is due in large part to a book published by Carol Gilligan in 1982 entitled *In a Different Voice*<sup>28</sup> and

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*Schools*, 21 Harv. Women's L.J. 19, 68 (1998) (describing the history of public single-sex education).

23. See *id.* (noting that even when girls could attend public schools, their education was scheduled around the hours that boys were in school); Jill Elaine Hasday, *The Principle and Practice of Women's "Full Citizenship": A Case Study of Sex-Segregated Public Education*, 101 Mich. L. Rev. 755, 793 (2002) (explaining the function of historical public single-sex education). Hasday stated the following:

One common feature of the practice of sex-segregated public education through at least the mid-part of the twentieth century, . . . deny[ing] equal status to even the elite white women most privileged by the system, was by steering women toward marriage, motherhood, and a small number of poorly compensated jobs, and leaving them without the resources to make any other choices.

*Id.*

24. Hasday, *supra* n. 23, at 802–803.

25. This history of sex segregation within higher education is outside the scope of this Article. This Article deals with primary and secondary public education since the amended Title IX affects only those levels of education. For an in-depth examination of the history of sex segregation in higher education, see Nancy Levit, *Separating Equals: Educational Research and the Long-Term Consequences of Sex Segregation*, 67 Geo. Wash. L. Rev. 451, 514–517 (1999).

26. Nemko, *supra* n. 22, at 72.

27. Denise C. Morgan, *Anti-Subordination Analysis After United States v. Virginia: Evaluating the Constitutionality of K-12 Single-Sex Public Schools*, 1999 U. Chi. Leg. Forum 381, 387 (1999) (citing Mary Moore, Conference Summary, in *Single-Sex Schooling: Proponents Speak* 69 (Off. Educ. Research & Improvement, U.S. Dept. Educ. 1993)).

28. Carol Gilligan, *In a Different Voice: Psychological Theory and Women's Development* (Harv. U. Press 1982). *In a Different Voice* offered a controversial thesis that men and women deal distinctively different with moral dilemmas; particularly, more women equate goodness with self-sacrifice. *Id.* at 131–132; Christina Hoff Sommers, *The War against Boys*, The Atlantic Online (May 2000), <http://www.theatlantic.com/doc/200005/war-against-boys>. Gilligan based this thesis on three studies she did, none of which she ever submitted for peer review or publication. Sommers, *supra* n. 28. Ironically, Gilligan

a report published in 1992 by the American Association of University Women (AAUW) entitled *How Schools Shortchange Girls*.<sup>29</sup> This report claimed that coeducation was failing girls because girls were lagging behind boys in academic achievement, were receiving less attention from teachers, and were experiencing increased sexual harassment by boys.<sup>30</sup> This data renewed the interest in single-sex education for females “as a means to redress the daily inequities” faced by them.<sup>31</sup> Even though there was an increase in single-sex education during the 1990s, most educators and school boards feared creating single-sex programs because of the legal uncertainty of single-sex education and the great risk of legal action.<sup>32</sup> Thus, until recently, the number of single-sex schools remained low.<sup>33</sup>

Along with the renewed interest in single-sex education, schools, students, experts, and parents began to use studies and statistics in the debate over whether to implement single-sex programs. Proponents of single-sex education argued that these schools, especially all-girls schools, outperformed coeducational schools and asserted that girls were more self-confident, achieved higher learning, developed leadership skills, and were more likely to enter male-dominated fields.<sup>34</sup> Proponents cited research that named the following deficiencies in coeducational classes: less attention was paid to females than males; the coeducational classroom climate was male-centered; the presence of the “opposite” sex served as a distraction; and other performance indicators

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never meant for her ideas to support gender segregation; “[n]evertheless, her conclusions on difference lent theoretical support to the empirical findings of educational researchers examining gender equity over the next decade.” Rosemary Salomone, *Rich Kids, Poor Kids, and the Single-Sex Education Debate*, 34 Akron L. Rev. 209, 212 (2000).

29. Am. Assn. U. Women (AAUW), *How Schools Shortchange Girls Executive Summary 2* (AAUW 1992) (available at <http://www.aauw.org/research/upload/hssg.pdf>).

30. Sommers, *supra* n. 28; AAUW, *supra* n. 29. The AAUW modified these findings in 1998 when it released a new report stating that girls were doing better but still needed help and that boys were also failing. AAUW, *Gender Gaps: Where Schools Still Fail Our Children Executive Summary 1–2* (AAUW 1998) (available at <http://www.aauw.org/research/upload/GGES.pdf>).

31. Levit, *supra* n. 25, at 472.

32. Lisa A. Gerson, *Single-Sex Education*, 6 Geo. J. Gender & L. 547, 548 (2005); see also AP, *Detroit Plans to Aid Blacks with All-Boys Schools Abandoned*, L.A. Times (Nov. 8, 1991) (stating that “the legal battles involved [to create an all-boys single-sex school] were too costly and probably could not be won”).

33. Gerson, *supra* n. 32, at 548.

34. Levit, *supra* n. 25, at 472.

which showed that males outperform females in mathematics and science.<sup>35</sup>

On the other hand, opponents of single-sex education responded that it reinforced gender stereotypes and insufficiently prepared students for a “coeducational world.”<sup>36</sup> Additionally, opponents contended that single-sex programs would result in disproportionate funding and resources and are “inherently unequal . . . because segregation itself stigmatizes.”<sup>37</sup> Opponents attacked the pro-single-sex research as unreliable, pointing out that it lacked adequate controls, was conducted by supporters of single-sex education, and was based on “self-selected study populations.”<sup>38</sup>

Historically, the American tradition of public education connects single-sex education to the women’s exclusion from public and professional life.<sup>39</sup> Modern supporters contend that single-sex education can have a new meaning apart from its historical meaning; however, opponents argue that such simplicity overlooks “the cultural significance that attaches to the relentless sex segregation in all other areas of life.”<sup>40</sup>

### B. Constitutionality of Public Single-Sex Education

When examining the constitutionality of single-sex education, the discourse begins with *Brown v. Board of Education*.<sup>41</sup> The rhetoric regarding gender segregation in education is inextricably linked to that of racial segregation in education, even though courts examine them differently. In *Brown*, the Court established the famous premise that “in the field of public education the doc-

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35. *Id.* at 472–473.

36. *Id.* at 473.

37. *Id.*

38. *See id.* (finding that inconclusive results within pro-single-sex research were often manifested by the fact that the research lacked adequate controls and was conducted by biased supporters of single-sex education).

39. *Id.* at 454.

40. *Id.*

The consequences of sex segregation in education and the professions persist today. The legacy of the historic exclusion of women from educational and occupational channels of power lives on in continued deliberate employment discrimination against women, sexual harassment, undervaluation of “women’s work,” and the persistent gender gap in wages.

*Id.* at 516.

41. 347 U.S. 483 (1954).

trine of separate but equal . . . [is] inherently unequal.”<sup>42</sup> Although *Brown* occurred in the context of racial segregation, this case was a landmark decision on separate educational facilities.<sup>43</sup> It is worth noting that *Brown*’s rationale failed to rely on any true legal authority, but it instead used modern psychology, which confirmed that race segregation has negative effects on the education of black children.<sup>44</sup> Many scholars condemn Chief Justice Warren’s use of psychology because the Court strayed beyond its area of competence to interpret statistical data—and by doing so, it “implicitly suggested that if the teachings of modern psychology were different, so would be the legal outcome.”<sup>45</sup> Interestingly, the modern proponents of single-sex education rely on “modern psychology” that claims students of one gender will achieve better when taught separately from the other gender.<sup>46</sup>

While dealing with race classification, Chief Justice Warren wrote that “[s]eparate educational facilities are inherently unequal.”<sup>47</sup> If one substitutes the words “sex” for “race,” “male” for “white,” and “female” for “colored,” then obviously one could conclude that separate single-sex schools are also inherently unequal.<sup>48</sup> However, this principle has never been applied to gender-based educational discrimination cases; in fact, the Court has refused to apply a strict-scrutiny standard to gender segregation because gender is not a suspect class.<sup>49</sup>

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42. 347 U.S. at 495.

43. Orley Ashenfelter et al., *Evaluating the Role of Brown v. Board of Education in School Equalization, Desegregation, and the Income of African Americans*, 8 Am. L. & Econ. Rev. 213, 214 (Summer 2006).

44. 347 U.S. at 494 n. 11; Laura Fortney, Student Author, *Public Single-Sex Elementary Schools: “Separate but Equal” in Gender Fifty Years following Brown v. Board of Education*, 35 U. Toledo L. Rev. 857, 872 (2004).

45. Fortney, *supra* n. 44, at 878. “[B]y casting equal education in empirical terms, the Court simultaneously narrowed the doctrine, diluted the influence of broader notions of justice, and risked privileging social science evidence over background constitutional values.” Michael Heise, *Equal Educational Opportunity by the Numbers: The Warren Court’s Empirical Legacy*, 59 Wash. & Lee L. Rev. 1309, 1311 (2002). For more on *Brown*’s use of “modern authority,” see Fortney, *supra* note 44, at 870–872.

46. *Infra* pt. VI.

47. 347 U.S. at 495.

48. The Supreme Court evaluates racial classifications under the standard of strict scrutiny and has ruled that race-segregated education is per se unconstitutional. *Brown*, 347 U.S. 483.

49. See *Craig v. Boren*, 429 U.S. 190 (1976) (adopting intermediate scrutiny as the standard for gender classifications). Under this standard, the government must prove it has an important government objective and that its means (the sex-based classification)

Few cases have reached the highest court regarding the constitutionality of public single-sex education. Even fewer cases deal with primary and secondary public education. There are two cases cited most often by scholars of single-sex education involving public primary and secondary single-sex schools: *Vorchheimer v. School District of Philadelphia*<sup>50</sup> and *Garrett v. Board of Education*.<sup>51</sup> Neither of these cases are very helpful today.<sup>52</sup> The single-sex education cases for which the Supreme Court has issued an opinion all dealt with higher education, specifically public post-secondary undergraduate institutions.<sup>53</sup> The two landmark cases treating single-sex education in higher education are *Mississippi University for Women v. Hogan*<sup>54</sup> and *United States v. Virginia*.<sup>55</sup>

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are “substantially related” to that objective. *Id.* at 197–198. This language will become familiar in Part III of this Article. The DOE directly adopted the language of this standard in its amended Title IX regulations so that any forthcoming single-sex educational programs complied with constitutional requirements (and could better survive any forthcoming constitutional attacks). *Infra* pt. III.

50. 532 F.2d 880 (3rd Cir. 1976), *aff’d*, 430 U.S. 703 (1977). *Vorchheimer* dealt with two “comparable” public single-sex high schools and a female who petitioned to enter the all-male school, which was, in some ways, different. *Id.* at 880. Without issuing an opinion, the Supreme Court, in a 4–4 split, affirmed the appellate court ruling that denied the female’s entrance because she could attend another “comparable” all-girls school in the neighborhood. *Vorchheimer*, 430 U.S. at 703. Although no longer viable as precedent because the Supreme Court decided the case before intermediate scrutiny existed, *Vorchheimer* remains the only Supreme Court case to have truly treated “separate but equal” schools since there were two public single-sex high schools in the neighborhood. Fortney, *supra* n. 44, at 863–864.

51. 775 F. Supp. 1004 (E.D. Mich. 1991). In *Garrett*, the Detroit school district wanted to help urban male youths who were increasingly likely to be incarcerated and murdered and, thus, attempted to start an all-male primary school. *Id.* at 1006–1007. The females and their parents petitioned because no equal opportunity existed for females. *Id.* at 1005. The court ruled that the school district could not have an all-male school because while its objective was important, the purpose was “insufficient to override the rights of females to equal opportunities.” *Id.* at 1014. Additionally, the court found that the school district had no evidence showing that the boys’ problems were caused by coeducation, stating that “[e]ven more dangerous is the prospect that should the male academies proceed and succeed, success would be equated with the absence of girls rather than any of the educational factors that more probably caused the outcome.” *Id.* at 1007. *Garrett* never went to the Supreme Court, leaving open the issue of constitutionality, and the case did not involve “separate but equal” schools because there was only a boys’ school without an equal counterpart for the girls.

52. For reasons why these cases do not aid today’s discussion of public single-sex education in primary and secondary schools, see *supra* notes 50–51.

53. While this Article limits its scope to primary and secondary public schools, the two landmark cases treating single-sex education in higher education create additional, recent precedent that may be relied upon if the Supreme Court revisits single-sex education in public primary and secondary schools.

54. 458 U.S. 718 (1982). In *Hogan*, a state-sponsored nursing school denied enrollment

Most notably, the *Virginia* Court recognized that “single-sex education affords pedagogical benefits to at least some students” and that “diversity among public educational institutions can serve the public good.”<sup>56</sup> The Supreme Court indicated that to justify single-sex education, the public entity must demonstrate that the segregation is based on an important governmental objective and that the exclusion of one gender is substantially related to achieving that objective.<sup>57</sup> Specifically, the Court ruled that the justification for the sex segregation “must be genuine, not hypothesized or invented *post hoc* in response to litigation. And it must not rely on overbroad generalizations about the different talents, capacities, or preferences of males and females.”<sup>58</sup>

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to men, reasoning that women must be compensated for historical discrimination in education. *Id.* at 727. The Supreme Court, however, failed to see the connection since women already dominated the nursing field and decided that this “compensation” was actually perpetuating gender stereotypes and roles. *Id.* at 729–730. The Court indicated that gender classifications cannot be based upon “archaic and overbroad generalizations about women,” *id.* at 730 n. 6, and “if the statutory objective is to exclude or ‘protect’ members of one gender because they are presumed to suffer from an inherent handicap or to be innately inferior, the objective itself is illegitimate.” *Id.* at 725. The DOE again used this language in its new amendments. *See infra* pt. III (detailing the amendments to Title IX). *Hogan* was the first case in which the Supreme Court issued an opinion on gender classification; the 5–4 majority opinion held that the Equal Protection Clause of the Fourteenth Amendment had been violated. 458 U.S. at 733.

55. 518 U.S. 515 (1996). One scholar claims that *Virginia* is the “most comprehensive decision on single-sex education to date, and thus any discussion of the legality of single-sex educational programs must include an analysis of its holding.” Fortney, *supra* n. 44, at 867 (quoting Pherabe Kolb, *Reaching for the Silver Lining: Constructing a Nonremedial yet “Exceedingly Persuasive” Rationale for Single-Sex Education Programs in Public Schools*, 96 Nw. U. L. Rev. 367, 371–372 (2001)). The most recent (and last) single-sex education case to reach the Supreme Court was *Virginia*. In this decision, the Virginia Military Institute (VMI) was required to admit women because it was unable to prove that the exclusion of women was to provide educational diversity as it claimed. *Va.*, 518 U.S. at 515. In noting that it did not address “separate but equal” institutions, the Court avoided the question of whether perfectly comparable institutions could constitutionally separate the sexes. *Id.* at 534 n. 7. This explicit delineation provides support, or at least creates a possibility, for the new Amendments to Title IX, which permit “separate but *substantially* equal” programs for single-sex education.

56. *Id.* at 535. Many scholars agree that this language suggests that the Court would uphold an evenhanded provision of public single-sex education as an opportunity among diverse educational programs. Fortney, *supra* n. 44, at 867. On the other hand, Justice Scalia disagreed with the majority and in his dissent declared that “single-sex public education is functionally dead” due to the Court’s decision. *Id.* at 596 (Scalia, J., dissenting).

57. *Va.*, 518 U.S. at 533 (internal citation omitted). Once again, the DOE adopted this exact language in its Amendments to Title IX in an effort to comply with constitutional requirements and defend against any attacks. *Infra* pt. III.

58. *Va.*, 518 U.S. at 533.

Of the cases in existence, none examine truly “separate but equal” schools, and the Supreme Court has given little guidance on the constitutionality of public single-sex schools. In fact, it is important to note that the Supreme Court has not explicitly ruled on the constitutionality of public elementary and secondary single-sex education and “separate but equal” programs.<sup>59</sup> Consequently, a heated debate surrounds the issue,<sup>60</sup> and the “constitutional foundation supporting single-sex schools is hardly firm.”<sup>61</sup> Now that the 2006 Amendments to Title IX have legalized single-sex education, the courts may be forced to decide whether it is also constitutional. It remains to be seen if the constitutional issue will be resolved using statistical data as the *Brown* Court did.<sup>62</sup> Regardless, social sciences have already been used to promulgate regulations allowing single-sex education.<sup>63</sup>

### III. TITLE IX AND THE 2006 AMENDMENTS

#### A. Enactment of Title IX

The original limitations upon single-sex education were derived from the Equal Protection Clause of the Fourteenth Amendment.<sup>64</sup> The Equal Protection Clause states, in pertinent part, that “[n]o State shall . . . deny to any person within its jurisdiction equal protection of the laws.”<sup>65</sup> In 1972, Congress passed Ti-

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59. There are no United States Supreme Court opinions about single-sex education in public primary and secondary schools.

60. Needless to say, many commentators attack the newly amended Title IX as unconstitutional as well; however, the DOE defends its regulation as constitutional and invites those who wish to offer single-sex classes or schools to consult legal counsel. 71 Fed. Reg. at 62532–62533.

61. Galen Sherwin, *Single-Sex Schools and the Antisegregation Principle*, 30 N.Y.U. Rev. L. & Soc. Change 35, 64 (2005). “The best evidence of this disparity is that while education was one of the first areas in which racial segregation was abandoned as a matter of policy, it remains a last holdout for sex segregation.” *Id.* at 65.

62. *Supra* nn. 43–45 and accompanying text. Scholars debate whether it will: One scholar argues that “[t]he scientific method simply cannot be used to determine protection afforded under the Constitution. If it were allowed, the Court would be putting the power to determine constitutional rights in the hands of researchers, scientists, and standardized test creators.” Fortney, *supra* n. 44, at 886. Another scholar contends that “[w]hether single-sex classes and schools ultimately are upheld as constitutional probably will turn on the social science evidence justifying their efficacy.” Levit, *supra* n. 25, at 454.

63. *Infra* pts. III(c), IV.

64. Gerson, *supra* n. 32, at 548.

65. U.S. Const. amend. XIV § 1. Moreover, “[s]ection [Five] of the Fourteenth Amendment, which gave Congress authority to promulgate Title IX, does not allow Congress to

tle IX,<sup>66</sup> which prohibited discrimination on the basis of sex in any federally funded activity or program.<sup>67</sup> The original regulations were issued by the Department of Health, Education, and Welfare—the predecessor to the DOE—and became effective July 21, 1975.<sup>68</sup>

When Congress enacted Title IX in 1972, discrimination against females was rampant at all levels of education.<sup>69</sup> Fearing that this discrimination would continue, Congress did not permit any single-sex educational options except in very limited circumstances.<sup>70</sup> While the Equal Protection Clause only limited government actors from acting discriminatorily, Title IX substantially expanded the protection against sex discrimination to private actors who rely on federal funding through a provision that tied nondiscrimination to funding.<sup>71</sup>

Thirty years after the creation of Title IX, Congress took its first steps towards allowing single-sex education.<sup>72</sup> In 2001, President George W. Bush announced his plan to promote excellence and achievement in education with the No Child Left Behind Act (NCLBA).<sup>73</sup> Within this plan, President Bush stated that

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‘restrict, abrogate, or dilute’ constitutional Equal Protection guarantees, for ‘neither Congress nor a State can validate a law that denies the rights guaranteed by the Fourteenth Amendment.’” Sherwin, *supra* n. 61, at 56.

66. 20 U.S.C. § 1681.

67. Gerson, *supra* n. 32, at 548. Another statutory provision that governs discrimination in education is the Equal Education Opportunity Act (EEOA), which is explicitly aimed at ending discrimination based on sex, color, race, or nationality in public school by prohibiting assignments to segregated schools. 20 U.S.C. §§ 1701–1702. The EEOA applies only to situations in which students are assigned to segregated schools; it does not apply to voluntary enrollment. 20 U.S.C. § 1703. While its application is limited, the EEOA confines permissible single-sex education to a voluntary basis.

68. 67 Fed. Reg. 31098, 31098 (May 8, 2002). Before becoming effective, the regulations underwent an extensive public-comment process and six days of Congressional review before Congress decided they were consistent with the statute. *Id.* at n. 1.

69. 69 Fed. Reg. 11276, 11276 (Mar. 9, 2004).

70. *Id.* Title IX originally permitted sex segregation for the four following programs: human-sexuality classes, choruses based on vocal range, contact sports in physical-education classes, and physical-education classes grouped by objectively assessed abilities. *Id.* at 11277 n. 11.

71. 20 U.S.C. § 1681(b)–(c); Gerson, *supra* n. 32, at 553.

72. Gerson, *supra* n. 32, at 555.

73. 20 U.S.C. § 6301 (2006). President Bush signed the NCLBA, which amended the Elementary and Secondary Education Act of 1965, into law on January 8, 2002. Clark, *supra* n. 21, at 319. Coverage of the NCLBA includes the following: improving the academic achievement of the disadvantaged (20 U.S.C. § 6301(b)); preparing, training, and recruiting high quality teachers and principals (20 U.S.C. § 6601); language instruction for

parents should have an opportunity to choose the educational program that best fits the needs of their children and that school districts should have the ability to offer diverse programs, namely single-sex education.<sup>74</sup> The NCLBA required the DOE to issue guidelines to educators about single-sex education and propose compliant regulations.<sup>75</sup>

On May 8, 2002, the DOE Office for Civil Rights (OCR) responded with a “Notice of Intent to Regulate,” soliciting comments about a proposal to “provide more flexibility for educators to establish single-sex classes and schools at the elementary and secondary levels.”<sup>76</sup> On March 9, 2004, the DOE issued a “Notice of Proposed Rulemaking,” enumerating the proposed changes to the implementing regulations of Title IX and again soliciting more comments.<sup>77</sup> On October 25, 2006, after receiving approximately 5,860 comments, the DOE announced its revisions to the implementing regulations of Title IX.<sup>78</sup> These Amendments established new standards by which a recipient of federal funds may operate single-sex programs consistent with the original Title IX obligation not to discriminate on the basis of sex.<sup>79</sup>

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limited English proficient and immigrant students (20 U.S.C. § 6301(b)); safety of twenty-first century schools (20 U.S.C. § 7102); and promotion of informed parental choice and innovative programs (20 U.S.C. § 7201).

74. A brief but highly important amendment to the NCLBA allows federal funds to be used for innovative programs, such as “[p]rograms to provide same-gender schools and classrooms (consistent with applicable law).” 20 U.S.C. § 7215(a)(23). It is this provision that gave the DOE authority to amend its regulations to allow single-sex education. Senators Kay Bailey Hutchison, Susan Collins, Hillary Clinton, and Barbara Mikulski cosponsored this amendment, which the Senate approved by a unanimous vote. *Senate Passes Education Bill: Senator Hutchison’s Single-Sex Education Amendment Included*, Press Release, [http://www.bc.edu/schools/law/lawreviews/bclawreview/meta-elements/pdf/49\\_1/04\\_kiselewich%20source%20pkg.pdf](http://www.bc.edu/schools/law/lawreviews/bclawreview/meta-elements/pdf/49_1/04_kiselewich%20source%20pkg.pdf) (June 14, 2001).

75. 20 U.S.C. § 6571.

76. 67 Fed. Reg. at 31098.

77. 69 Fed. Reg. at 11276.

78. 71 Fed. Reg. at 62530, 62532. The DOE said it received approximately 5,860 comments to the proposed regulations; however, National Women’s Law Center (NWLC) said that 96% of these comments from the public and experts opposed any changes to the former regulations. *Compare* 71 Fed. Reg. at 62532 (stating that the Department received 5,860 comments) *with* NWLC, *Administration’s Single-Sex Regulations Violate Constitution & Title IX* (Oct. 24, 2006) (press release available at <http://www.nwlc.org/details.cfm?id=2866&section=newsroom>) (noting that 96% of the comments received by the Department opposed any changes as unnecessary).

79. 71 Fed. Reg. at 62530.

## B. Major Amendments to Title IX

The 2006 Amendments created an exception to the general prohibition within Title IX against single-sex classes and extracurricular activities in primary and secondary schools. Under this new exception, a recipient of federal funds that operates a non-vocational elementary or secondary school<sup>80</sup> may offer non-vocational single-sex classes or extracurricular activities if the recipient meets the following conditions:

- (1) The recipient has an important governmental or educational objective for each class or activity;<sup>81</sup>
- (2) The recipient implements the objective in an evenhanded manner;<sup>82</sup>
- (3) Student enrollment in the single-sex program is completely voluntary;<sup>83</sup> *and*

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80. These Amendments apply to public and federally funded private non-vocational coeducational elementary or secondary schools. *Id.*; 34 C.F.R. at § 106.34(b)(1). Additionally, they apply to classes and extracurricular activities provided by the recipient directly or indirectly through another entity unless otherwise exempted. 71 Fed. Reg. at 62530 n. 7. A specific amendment applies to public (not private) non-vocational elementary or secondary single-sex schools. 34 C.F.R. at § 106.34(c)(1). These amendments do not apply to private schools that do not receive federal funds, non-vocational public charter schools, and local educational agencies (LEAs). 71 Fed. Reg. at 62530 n. 7. While this Article may occasionally note them, charter schools, LEAs, and private schools are outside the scope of this Article.

81. 34 C.F.R. at § 106.34(b)(1)(i). Recipients who are public entities must have important *governmental* objectives, while recipients who are private entities must have important *educational* objectives because public entities are governmental agencies and subject to the Equal Protection clause, while private entities are not. 71 Fed. Reg. at 62534. Nevertheless, the same standard applies to both entities under Title IX, so the Amendments impose a requirement on private entities—"important educational objective"—that is analogous to the requirement for public entities—"important governmental objective"—under the Equal Protection Clause. *Id.*

82. 34 C.F.R. at § 106.34(b)(1)(ii). Evenhanded implementation means that a recipient who offers single-sex educational programs in order to achieve its important objective "must provide equal educational opportunity to students regardless of their sex, with the end result that it must provide substantially equal classes." 71 Fed. Reg. at 62536. If a recipient's important objective is diverse educational opportunities, then the choice of those opportunities must be offered evenhandedly to male and female students. *Id.* If, on the other hand, a recipient's important objective is meeting particular, identified educational needs of students, evenhanded implementation "requires the recipient's unbiased assessment, *based on evidence*, of the educational needs of students of both sexes within a particular setting" and a determination of how to meet those on an evenhanded basis. *Id.* (emphasis added).

83. 34 C.F.R. at § 106.34(b)(1)(iii). "Unless a recipient offers enrollment in a coeduca-

- (4) The recipient provides to all other students, including the students of the excluded sex, a substantially equal coeducational class in the same subject or a substantially equal coeducational activity.<sup>84</sup>

The Amendments specify that the recipient's important objective may be one of the two following things: first, to improve educational achievements of the students through an "overall established policy to provide diverse educational opportunities" as long as the sex segregation is "substantially related to achieving that objective";<sup>85</sup> or second, to "meet the particular, identified educational needs" of the students as long as the sex segregation is "substantially related to achieving that objective."<sup>86</sup> In either option, a recipient must show that the purpose of the single-sex class or activity is to achieve an important objective and that the exclusion of one gender is substantially related to achieving the objective.<sup>87</sup>

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tional class in the same subject, enrollment in a single-sex class is not voluntary." 71 Fed. Reg. at 62537. To ensure voluntary participation, a recipient should notify parents, guardians, and students, inform them of their options, and receive authorization to enroll students in single-sex programs. *Id.*

84. 34 C.F.R. at § 106.34(b)(1)(iv). A substantially equal class is not required to be identical in every respect. 71 Fed. Reg. at 62538. A substantially equal school must have tangible and intangible features substantially equal to the single-sex school although not identical in every respect. *Id.* at 62540. In addition to the requirement for a substantially equal coeducational class or activity, a recipient may have to provide a substantially equal single-sex class or activity for the excluded sex in order to ensure nondiscriminatory implementation. *Id.* at 62530; 34 C.F.R. at § 106.34(b)(2).

85. 34 C.F.R. at § 106.34(b)(1)(i)(A). This objective is called the diversity objective. The purpose of the diversity objective is to provide parents and students the opportunity to choose single-sex education as one of various opportunities. 71 Fed. Reg. at 62534. Some recipients may determine that the diversity of educational opportunities they provide to students would include single-sex programs in addition to coeducational programs. *Id.* at 62535. A recipient must have an established policy to provide diverse educational opportunities before offering single-sex programs. *Id.*

86. 34 C.F.R. at § 106.34(b)(1)(i)(B). This option is known as the needs objective. The regulation requires a recipient to evenhandedly identify the particular educational needs of both its female and male students. 71 Fed. Reg. at 62535. Educational needs may be limited or deficient educational achievement or social needs created by issues, such as pregnancy, discipline problems, drugs or alcohol abuse, and criminal activity, but not administrative convenience. *Id.* at 62536. After identifying the needs of the students, a recipient must determine how to evenhandedly implement programs to meet those needs. *Id.* at 62535.

87. This burden of proof on the recipient comes directly from the constitutional cases about single-sex education, such as *Virginia*, discussed *supra* Part II. The DOE adopted the language in the 2006 Amendments almost verbatim from the constitutional cases. For

In addition to the aforementioned conditions, the Amendments require the recipient to conduct evaluations every two years.<sup>88</sup> These evaluations ensure that the single-sex programs are “based upon genuine justifications and do not rely on overly broad generalizations about the different talents, capacities, or preferences of either sex” as well as verify that the programs are still “substantially related to the achievement of the important objective.”<sup>89</sup>

In order to determine if classes or activities are substantially equal, the Amendments include a non-exhaustive list of factors the DOE will consider either individually or in the aggregate.<sup>90</sup> These factors include the following: the policies and criteria of admission; the educational benefits; the quality, range, and content of the curriculum and services; the quality and availability of books, materials, and technology; the qualifications of faculty and staff; the geographic accessibility; the quality and accessibility of the facilities and resources; and other intangible factors, such as the reputation of the faculty.<sup>91</sup>

In a separate section,<sup>92</sup> the 2006 Amendments permit a public non-vocational elementary or secondary school to operate as a single-sex school as long as the school provides a substantially equal single-sex or coeducational school for the students of the excluded gender.<sup>93</sup> This provision is a change from prior interpretation of Title IX, which required a recipient operating a single-sex school to offer only a corresponding single-sex school for the excluded gender.<sup>94</sup> The Amendments now require that the recipi-

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more examples of constitutional tests and standards adopted in the Amendments, see *supra* notes 49, 54–57 and accompanying text.

88. Single-sex classes and activities must be evaluated every two years; however, there is no mandatory periodic evaluation for single-sex schools although recipients are encouraged to voluntarily monitor their schools for compliance. 71 Fed. Reg. at 62538–62539, 62540.

89. 34 C.F.R. at § 106.34(b)(4).

90. *Id.* at § 106.34(b)(3).

91. *Id.*

92. It is important to note that there are different requirements for classes or activities and schools under the 2006 Amendments to Title IX.

93. 34 C.F.R. at § 106.34(c)(1). This provision does not include single-sex charter schools that are also non-vocational and public, which are exempt from requirement to provide a substantially equal school for excluded students. *Id.* at § 106.34(c)(2). As previously mentioned, charter schools, private schools, and LEAs are outside the scope of this Article.

94. 71 Fed. Reg. at 62540.

ent must provide a substantially equal school, but it can be coeducational or single-sex.<sup>95</sup> Within this section, there is no requirement for an important government objective; however, there is a similar non-exhaustive list of factors that the DOE will evaluate to determine if the schools are substantially equal.<sup>96</sup>

As previously discussed, the OCR proposed these Amendments to Title IX to provide the recipients of federal funds more flexibility to offer single-sex schools, classes, and extracurricular activities in primary and secondary schools, and it received thousands of comments to the proposal.<sup>97</sup> In an effort to respond to comments and further explain the Amendments, the amended regulation contains an analysis section that discusses the major changes to Title IX.<sup>98</sup>

### C. Commentary and Analysis of the 2006 Amendments

While the DOE received thousands of comments on various topics relating to the Amendments, many of the comments questioned the DOE's research and asked the DOE to account for the research that corroborates the Amendments.<sup>99</sup> In a brief response, the OCR explained the research upon which it based these Amendments in three sentences, notably stating that “[e]xisting educational research suggests that single-sex education *may* provide benefits to *some* students under *certain* circumstances.”<sup>100</sup> Other than referencing a year-old report,<sup>101</sup> the OCR did not in any way indicate what this research is, what benefits it may provide, or to which students it may provide benefits and under what circumstances.<sup>102</sup> In fact, the DOE puts the burden on the educa-

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95. 34 C.F.R. at § 106.34(c)(1).

96. *Id.* at § 106.34(c)(3).

97. 71 Fed. Reg. at 62530; *supra* nn. 76–79 and accompanying text.

98. 71 Fed. Reg. at 62532.

99. *Id.* Many commentators recommended that the DOE wait to amend Title IX until it could do more research and verify “that single-sex education is beneficial to students.” *Id.*

100. *Id.* (emphasis added to highlight the equivocal language used by the DOE to support its Amendments).

101. For a discussion of this 2005 report and its data, see *infra* notes 111–121 and accompanying text.

102. The DOE gives some direction about the type of admissible evidence a recipient can use in other parts of the regulation as follows: Single-sex offerings must be based on “genuine justifications” and not on “overly broad generalizations about the different talents[,] [preferences,] or capacities of either sex.” See *id.* at 62531 (describing the evalua-

tors and school districts to develop the data or evidence to support each individualized decision to implement single-sex education by requiring recipients to adhere to procedural safeguards.<sup>103</sup>

### 1. Procedural Safeguards

To implement single-sex educational programs while refraining from discrimination based upon sex, the Amendments create both substantive and procedural safeguards. First, the recipients must gather specific data indicating that single-sex education will benefit their students.<sup>104</sup> In fact, the DOE refuses to require a particular data set because it contends that recipients who “implement single-sex education will have differing objectives addressing differing student populations.”<sup>105</sup> Second, the amended regulation states that a recipient must have a justification—in other words, an important objective that is substantially related to the sex segregation to achieve the objective.<sup>106</sup> If the recipient lacks a genuine justification, then the sex segregation is outright sex discrimination and violates Title IX.<sup>107</sup> Similarly, the use of overbroad sex-based generalizations about the different talents, capacities, or preferences of either sex as justification for single-sex education also constitutes illegal sex discrimination.<sup>108</sup> Third, the new regulation does not require recipients to provide single-sex education but permits it if a recipient has the requisite data and justification, indicating that a single-sex educational program

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tions to be made during periodic reviews of single-sex classes and activities).

103. *Id.* at 62532. “[E]ach recipient [must] make an individualized decision about whether single-sex educational opportunities will achieve the recipient’s important objective and whether the single-sex nature of those opportunities is substantially related to achievement of that important objective consistent with the nondiscrimination requirements of these regulations.” *Id.* This Article argues that the DOE placed the burden to produce evidence on individual schools because the DOE has no universal evidence indisputably supporting single-sex education.

104. *Id.* at 62533–62534.

105. *Id.* at 62533. As previously mentioned, this Article asserts that the DOE requires recipients to gather their own data and evidence partially because the DOE lacks conclusive data.

106. *See id.* at 62534 (stating that “for public recipients [this standard is] the same important governmental objective that would satisfy the requirements of the Equal Protection Clause”).

107. *See id.* at 62534 (finding that the Supreme Court requires that the “justification be genuine, not hypothesized or invented post hoc in response to litigation”).

108. *Id.* at 62533–62534.

will benefit the students.<sup>109</sup> Finally, the Amendments do not change the prohibition on sex discrimination in employment; therefore, schools still cannot assign teachers to single-sex classes based upon their sex.<sup>110</sup>

## 2. *Research*

In its abbreviated discussion of single-sex-education research, the OCR referenced a report from 2005 as an “overview of the literature assessing single-sex schools.”<sup>111</sup> In 2005, the DOE contracted with a research corporation to perform a systematic review of the research regarding the efficacy of single-sex education.<sup>112</sup> This systematic approach involved obtaining all the quantitative and qualitative studies that have thus far been conducted, fettering out the non-scientific studies and summarizing the total effects of single-sex education.<sup>113</sup> An exhaustive search yielded 2221 studies.<sup>114</sup> After an initial screening for subject matter, 379 studies remained.<sup>115</sup> A secondary screening excluded studies with questionable methodologies, leaving only 102 studies.<sup>116</sup> In the third and final evaluation, all studies that were not “randomized controlled trials, quasi-experimental designs with matching (QED), or regression discontinuity designs” would have been excluded as not truly scientific.<sup>117</sup> However, because these criteria

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109. *Id.* at 62534. The DOE does not provide this data. *See infra* nn. 111–121 and accompanying text (revealing the DOE’s lack of informative research for these Amendments).

110. *Id.* at 62534.

111. *Id.* at 62532. While the Commentary does not explicitly state that this report is the “research” that the DOE used to promulgate the 2006 Amendments, the reference to this report, as well as the report itself, appear to be such research.

112. U.S. Dept. of Educ., Off. of Plan., Evaluation & Policy Dev., Policy & Program Stud. Serv., *Single-Sex Versus Coeducational Schooling: A Systematic Review* (Am. Insts. Research 2005) (available at <http://www.ed.gov/rschstat/eval/other/single-sex/index.html>) (hereinafter DOE Research).

113. *Id.* at 1–2.

114. *Id.* at 3–4. This search included both quantitative and qualitative studies regarding single-sex education. *Id.*

115. *Id.* at 4. This initial screening used the following three criteria: (1) subject matter; (2) population, including only studies pertaining to full-time students at primary and secondary schools domestically or internationally; and (3) intervention, including only studies regarding single-sex schools and *not* single-sex classes within coeducational schools. *Id.* at 4–5.

116. *Id.* at 5. Studies that lacked any statistical controls for variables were excluded. *Id.*

117. *Id.* Normally, researchers require that studies are one of these types in order to be

would have eliminated almost all the single-sex research, the research corporation consciously decided to relax its standards and “include all correlational studies that employed statistical controls,” which greatly increased the number of included studies in this review.<sup>118</sup> In the end, forty quantitative studies and four qualitative studies met the criteria, and these forty-four studies are the basis of the research reviewed and summarized for the DOE.<sup>119</sup> The vast majority of these studies sampled high-school students and a few sampled elementary-school students; however, none of the studies sampled middle-school students.<sup>120</sup>

After identifying six major research areas, the systematic review of the forty-four studies summarized the results as “equivocal,” stating that there is some support that single-sex schooling is beneficial for academic achievement, but there is also much support that in other areas there is no benefit or harm from single-sex schooling—essentially, it is neutral when compared to co-education.<sup>121</sup> Using this research, the DOE legalized single-sex education for public primary and secondary schools.

#### IV. MIXED RESEARCH RESULTS

In order to determine the efficacy of the Amendments, it is necessary to examine the data that the DOE relied on to overturn a long-standing general prohibition on single-sex education. There are two main categories of data used to reinstitute single-sex education. The first type focuses on discrimination and achievement statistics, especially concerning females, in coeducational schools; the second type recognizes supposed benefits of single-sex education. Proponents of single-sex education claim that students, particularly females, in single-sex-education programs outperform those in coeducational programs;<sup>122</sup> however, the validity of both

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considered “experimental” scientific research. *Id.*

118. *Id.* Typically, correlational studies do not adequately address unobservable differences or selection bias, so including these studies in this review may overstate or understate the effects of single-sex education. *Id.*

119. *Id.* at x, 6.

120. *Id.* at 86.

121. *Id.* at x. These findings will be discussed in detail throughout Part IV. For a summary of the findings from this systematic review as well as a breakdown of the major research areas, see Appendices 1–3.

122. Levit, *supra* n. 25, at 472.

the statistics claiming discrimination in coeducational schools and those claiming benefits from single-sex education is highly disputable.

#### A. Discrimination and Achievement Statistics in Coeducational Schools

In the early 1990s, when researcher Carol Gilligan and the AAUW declared that the public-education system discriminated against girls and was, in essence, failing them, Congress passed the Gender Equity in Education Act in 1994, awarding millions of dollars in grants to study the plight of girls and to learn how to counter bias against them.<sup>123</sup>

While focusing on girls, these studies ignored the plight of boys, assuming that the boys received all the benefits of education and none of the discrimination. Recently, authors and social scientists have noted that boys are the ones underperforming overall in schools, which constitutes evidence that girls are not as widely discriminated against as certain proponents of single-sex education have claimed.<sup>124</sup>

A renowned scholar in the field describes a modern school-boy's dilemma as the following:

A boy today, through no fault of his own, finds himself implicated in the social crime of shortchanging girls . . . . He may believe that teachers prefer to be around girls and pay more attention to them. At the same time, he is uncomfortably

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123. Sommers, *supra* n. 28; *supra* pt. II(A). Some of these studies found that gender gaps persist in enrollment and achievement in mathematics and science courses for girls; that girls are not as computer savvy as boys; and that girls are more likely to experience depression and sexual abuse than boys. AAUW, *Gender Gaps*, *supra* n. 29, at 3–4, 6.

124. See e.g. Tamar Lewin, *At Colleges, Women Are Leaving Men in the Dust*, N.Y. Times 11 (July 9, 2006) (documenting that women outperform men in high school and colleges); Marshall Poe, *The Other Gender Gap*, The Atlantic Online (Jan./Feb. 2004), <http://www.theatlantic.com/doc/200401/poe> (finding that boys have stagnated in education); Sommers, *supra* n. 28 (referencing Judith Kleinfield's article entitled *The Myth That Schools Shortchange Girls: Social Science in the Service of Deceptions*, which exposed numerous errors in the AAUW's study and also referencing Public Education Network's survey entitled *The American Teacher 1997: Examining Gender Issues in Public Schools*, which found that boys had less opportunities in school than girls in areas of future goals, teachers' expectations, and classroom interactions).

aware that he is considered to be a member of the favored and dominant gender.<sup>125</sup>

It is clear that boys suffer a distinct set of problems. While boys may volunteer more in class and teachers may show them more attention, the attention is far from positive as boys receive more frequent discipline than do girls.<sup>126</sup> Boys are much more susceptible to the following problems and dangers than are females:

[H]igh school boys are four times more likely than girls to be murdered; they are more prone to abuse alcohol or drugs; boys 12 to 15 run double the risk faced by girls of becoming victims of a violent crime[;] and 82% of the nation's incarcerated youths 18 and under are male—a percentage that increase[d] to an estimated 95% for adult men. . . . Girls attempt suicide at a rate six times that of boys, but the rates reverse for successful suicides, with boys accounting for approximately [86%] of adolescent suicides. Boys are much more likely than girls to be truant, have disciplinary problems, repeat grades, drop out, flunk out, or be suspended. They are twice as likely to be labeled as “learning disabled,” and they account for seventy to ninety percent of attention deficit diagnoses, although no biological basis exists for this disparity.<sup>127</sup>

In almost all areas but mathematics and science, boys are trailing girls in achievement and scores.<sup>128</sup> Not only are girls nationwide earning higher grades than boys throughout their academic careers, but more females are also entering and finishing undergraduate and graduate schools than males, and the margin is projected to increase.<sup>129</sup> Furthermore, recent studies indicate

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125. Sommers, *supra* n. 28.

126. Levit, *supra* n. 25, at 469. “The expectation seems to be that boys can tolerate harsher emotional and physical discipline.” *Id.* at 469–470.

127. Levit, *supra* n. 25, at 470; *accord* Sommers, *supra* n. 28 (describing similar startling statistics).

128. Levit, *supra* n. 25, at 471. DOE statistics show that girls outscore boys in reading proficiency since 1971 and in writing proficiency since 1988. *Id.* at 471–472. In 1997, the Educational Testing Service studied fifteen million students' scores on standardized tests in fourth, eighth, and twelfth grades as well as college-placement exams and found no evidence of one gender outperforming the other. *Id.* at 471.

129. *Id.* at 472; *accord* Sommers, *supra* n. 28 (noting that girls outshine boys in almost

that coeducational schools are failing poor and minority boys, who are more likely to be incarcerated and murdered.<sup>130</sup> Many researchers say that it is this group that would benefit the most from single-sex education, not girls, and certainly not girls or boys from middle- and upper-class socioeconomic backgrounds.<sup>131</sup>

Nevertheless, people are less likely to believe that opportunities should be provided to elevate boys.<sup>132</sup> Additionally, a state can *never* have an important government interest to improve the education of one gender at the expense of the other.<sup>133</sup>

Ultimately, discrimination can occur in both coeducational and single-sex environments.<sup>134</sup> Single-sex education does not guarantee a lack of discrimination. For this reason, many scholars argue that even if coeducational schools do indeed discriminate against females (or for that matter, boys), we must fix schools, rather than take one gender out of them.<sup>135</sup>

Even if we accept the discrimination and achievement statistics as correct, that still does not mean that single-sex education will resolve these problems. Thus far, the statistical evidence used in the single-sex-education debate consists of each side choosing one or two studies to support its position, rather than reviewing all the studies comprehensively.<sup>136</sup> Below are the major studies and findings grouped by category and an analysis of their shortcomings.<sup>137</sup>

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all areas but sports).

130. Levit, *supra* n. 25, at 470. A study conducted by the Florida Department of Education found that 78% of the students expelled for misbehavior were boys and that males who are low-income racial minorities are particularly likely to be disciplined. *Id.*

131. *Id.* at n. 351.

132. Ashley E. Johnson, Student Author, *Single-Sex Classes in Public Secondary Schools: Maximizing the Value of a Public Education for the Nation's Students*, 57 Vand. L. Rev. 629, 682 (2004). For instance, one scholar argued that "boys are still not on the agenda" of either the government or the educational establishment, and another scholar noted that boys fall behind girls in many ways in schools, but boys do not benefit from single-sex education. Sommers, *supra* n. 28.

133. Johnson, *supra* n. 132, at 673. The Court in *Hogan* said that it will not tolerate discrimination against males just as it will not tolerate it against females. *Hogan*, 458 U.S. at 729–730.

134. Johnson, *supra* n. 132, at 658.

135. *Id.* After a girl is raped, society makes the streets safer but does not take the girl off them; similarly, if coeducational schools indeed discriminate against females, then society must fix the schools and not take girls out of them. *Id.* at n. 194.

136. Levit, *supra* n. 25, at 473.

137. The studies analyzed in the following Section are not an exhaustive list of all the studies conducted about single-sex education; to do such would be exhausting. Neverthe-

## B. Studies Professing the Benefits of Single-Sex Education

### 1. Academic Achievement and Performance

In the 1970s and 1980s, early studies in both this country and internationally professed academic advantages for girls in single-sex educational programs; however, beginning in the late 1990s, researchers revisited these studies and found that once variables are appropriately controlled, any significant performance differences between boys and girls disappear.<sup>138</sup>

An early study concluding that single-sex education benefited girls compared private, single-sex Catholic high schools to private, coeducational Catholic high schools.<sup>139</sup> That first study found that the single-sex Catholic high schools were nearly twice as effective as the coeducational high school.<sup>140</sup> In the 1980s, two scholars repeated the study but also controlled for certain student background factors, such as ethnicity, socioeconomic status, college plans, religion, and the school's overall ethnic composition.<sup>141</sup> This second study revealed that girls at the single-sex Catholic schools outperformed those in coeducational Catholic schools in academic achievement, educational aspirations, and gender-role stereotypes; however, the scholars cautioned that "the advantages might be attributable to lower student-to-teacher ratios and better educated, less transient faculties" at the single-sex schools as well as family involvement.<sup>142</sup> One of the scholars stated that

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less, the Section contains a few of the primary studies regarding elementary and secondary education around which most of the debate centers.

138. Levit, *supra* n. 25, at 485–486.

139. *Id.* at 486. Cornelius Riordan performed this first study in which he "compared SAT and cognitive test scores for a set of 899 Catholic school students" in both single-sex and coeducational schools as well as 9526 public coeducational students. *Id.* (citing Cornelius Riordan, *Public & Catholic Schooling: The Effects of Gender Context Policy*, 93 *Am. J. Educ.* 518, 525–526 (1985)). Riordan found generally a stronger academic performance and cognitive test scores in the Catholic single-sex schools although the females in those schools did not necessarily turn that advantage into "greater educational attainment," such as SAT scores. *Id.*

140. *Id.*

141. *Id.* Valerie Lee and Anthony Bryk used a random sample of 1807 high-school students from seventy-five single-sex and coeducational Catholic schools. *Id.* (citing Valerie E. Lee & Anthony S. Bryk, *Effects of Single-Sex Secondary Schools on Student Achievement and Attitudes*, 78 *J. Educ. Psychol.* 381, 382 (1986)).

142. *Id.* at 487. Lee and Bryk particularly noted that families with higher academic expectations might choose single-sex schools for their children because of the "presumed benefits." *Id.*

while there were positive effects for girls, there were none for boys, and her follow-up research indicated these positive effects did not occur outside the Catholic-school context.<sup>143</sup> In 1996, another set of scholars redid the Catholic-school study, but this time they controlled for pre-enrollment differences among students.<sup>144</sup> After accounting for these differences, they found “no advantages to Catholic single-sex schooling.”<sup>145</sup>

Proponents of single-sex education also point to various international studies that have found differences favoring all-girl schools. However, upon reexamination, many of these studies have had conclusions similar to the Catholic-school studies—once other variables are controlled, the significant differences between performance and achievement based upon gender disappear.<sup>146</sup> For example, a nationwide study of students in Great Britain examined their academic achievement in coeducational and single-sex schools and found “a very small advantage to girls in girls’ schools overall” but no disadvantage to girls in coeducational schools.<sup>147</sup> However, once the individual ability differences were controlled, the advantages disappeared, indicating that “very little in these examination results is explained by whether schools are [coeducational] or single sex once allowance has been made for differences at intake.”<sup>148</sup> Moreover, a study of Nigerian students in both coeducational and single-sex classes concluded that

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143. *Id.* Lee also noted that Catholic schools serve more minorities and economically disadvantaged students who are the types of students for which single-sex education may be the most effective. *Id.* Other scholars agree that the Catholic-school studies may not be indicative of public schools because at private schools “students are typically brighter, come from higher socioeconomic backgrounds, may be more highly motivated, and differ from coed[ucational] students on a variety of other preexisting variables that probably invalidate the interpretation of single-sex/coed[ucational] comparisons.” *Id.* at 488 (quoting Herbert W. Marsh, *Public, Catholic Single-Sex, and Catholic Coeducational High Schools: Their Effects on Achievement, Affect, and Behaviors*, 99 *Am. J. Educ.* 320, 328 (1991)). Ultimately, Lee opined that separating sexes will not solve gender inequity in education, either in the short or long term. *Id.*

144. *Id.* (citing Paul C. LePore & John Robert Warren, *A Comparison of Single-Sex and Coeducational Catholic Secondary Schooling: Evidence from the National Educational Longitudinal Study of 1988*, 34 *Am. J. Educ. Research J.* 485, 486 (1997)).

145. *Id.*

146. *Id.* at 489.

147. *Id.* at 489–490 (citing Jane Steedman, *Examination Results in Mixed and Single-Sex Secondary Schools*, in *Studying School Effectiveness* 87, 89–90 (David Reynolds ed. 1985)).

148. *Id.* at 490.

while the single-sex schooling was beneficial for girls, it was detrimental to boys—boys who attended the single-sex schools performed significantly worse than their male coeducational counterparts.<sup>149</sup>

Although some of the international studies profess benefits for single-sex education for females, many of them also conclude that once researchers control for background factors, such as intelligence, prior academic achievement, motivation, and social class, their findings are no longer statistically significant.<sup>150</sup> In fact, research from Australia has indicated that “a student’s prior socioeconomic status was a more important predictor of a student’s later performance in science than was the gender composition of the school.”<sup>151</sup> Even in the United States, the National Center for Educational Statistics collected research that initially found patterns of school-type differences favoring single-sex school, but those patterns vanished once background variables, including pre-existing social and academic influences, were controlled.<sup>152</sup> In addition, the 2005 systematic review performed for the DOE concluded that there are no apparent positive effects of single-sex schooling on long-term academic achievement.<sup>153</sup> These

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149. *Id.* (citing Valerie E. Lee & Marlaine E. Lockheed, *The Effects of Single-Sex Schooling on Achievement and Attitudes in Nigeria*, 34 *Comp. Educ. Rev.* 209, 211, 216 (1990)). Valerie E. Lee and Marlaine Lockheed studied 1012 ninth-grade Nigerian students from forty classes to compare their educational aspirations, self-perception, motivation, parental support, and achievement. *Id.*

150. *Id.* at 491. For instance, a longitudinal study conducted by Richard Harker and Roy Nash in New Zealand studied more than 5000 students in thirty-seven coeducational and single-sex schools to determine if school type had any affect on academic achievement. *Id.* (citing Richard Harker & Roy Nash, *School Type and the Educ. of Girls: Co-ed or Girls Only?* 7–8 (Mar. 1997) (available at [http://eric.ed.gov/ERICdocs/data/ericdocs2sql/content\\_storage\\_01/0000019b/80/14/ec/d8.pdf](http://eric.ed.gov/ERICdocs/data/ericdocs2sql/content_storage_01/0000019b/80/14/ec/d8.pdf))). They found that the girls from single-sex schools scored higher than did girls at coeducational schools until they introduced controls for different ability levels and the social and ethnic composition of the schools at which point initial significant differences dissipated. *Id.*

151. *Id.* (citing Deidra J. Young & Barry J. Fraser, *Sex Differences in Science Achievement: A Multilevel Analysis* 3, 7–8 (1992) (available at [http://eric.ed.gov/ERICdocs/data/ericdocs2sql/content\\_storage\\_01/0000019b/80/29/a6/48.pdf](http://eric.ed.gov/ERICdocs/data/ericdocs2sql/content_storage_01/0000019b/80/29/a6/48.pdf))).

152. *Id.* at 491–492. Herbert Marsh used this data to “[assess] seventy-five outcome variables (measures of academic performance, course choices, and attitudes) for 2332 Catholic high school students who attended twenty-one single-sex boys’ schools, twenty-six single-sex girls’ schools, and thirty-three coeducational schools,” and he controlled for nineteen background variables. *Id.* (citing Herbert W. Marsh, *Effects of Attending Single-Sex and Coeducational High Schools on Achievement, Attitudes, Behaviors, and Sex Differences*, 81 *J. Educ. Psychol.* 70, 74, 78, 80 (1989)).

153. DOE Research, *supra* n. 112, at 83.

findings are consistent with other research that shows that school types (single-sex or coeducational) probably do not cause the gender differences in performance and achievement, which are more likely attributable to other variables, including “students’ prior abilities, their economic and cultural backgrounds, and the traditions and reputations of their schools.”<sup>154</sup> In comparison to these variables, the type of school is insignificant.<sup>155</sup>

## *2. Attitude, Participation, and Sexism*

Supporters of single-sex education argue that single-sex educational programs offer girls more opportunities to ask questions, volunteer answers, and take on leadership positions; these proponents perceive that single-sex education has a “heavier academic emphasis,” which will benefit its students.<sup>156</sup> Although these findings are disputed, much of the research in single-sex education focuses on sexism—whether students stereotype based on gender, retain fixed gender roles, and have general self-esteem issues more or less than their coeducational counterparts.<sup>157</sup> Early studies on these issues found that females in single-sex schools and classes had a more positive attitude or preferred typically masculine subjects and had less attachment to stereotypical gender roles; more recent studies doubt these prior conclusions.<sup>158</sup> The DOE’s own research states that even though more studies report positive effects on self-concept at single-sex schools, coeducational schools received more reports of positive effects on self-esteem.<sup>159</sup> Regardless, self-esteem is a poor indicator of the efficacy of a type of school because no evidence proves that schools can successfully boost students’ self-esteem.<sup>160</sup>

While studies have found that single-sex environments tend to encourage females to pursue traditionally masculine subjects, the opposite occurs in all-male environments, where boys tend to

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154. Levit, *supra* n. 25, at 492.

155. *Id.*

156. *Id.* at 492–493. Some studies and anecdotal reports declare that students in single-sex schools and classes focus more on academics and less “free play,” while students at coeducational schools have a “more satisfying social environment.” *Id.* at 492.

157. *Id.* at 493.

158. *Id.* at 493–494.

159. DOE Research, *supra* n. 112, at 84.

160. *Id.*

assume more stereotypical perspectives that mathematics is a masculine subject.<sup>161</sup> Other studies disagree that all-female environments increase girls' interest in "masculine subjects."<sup>162</sup> Regardless, any correlation between single-sex education and an openness to study a certain subject does not necessarily equal more flexible gender roles and less sex stereotyping.<sup>163</sup> In fact, incidents of sexism occur in both coeducational *and* single-sex environments, indicating that single-sex education does not necessarily translate into gender equity.<sup>164</sup>

On the other hand, the majority of research demonstrates that coeducational environments may prepare students better than single-sex environments for adult life—how to interact and maintain relationships with the opposite sex as well as how to avoid stereotypical gender roles.<sup>165</sup> One study that followed a coeducational mathematics class and two single-sex mathematics classes found that the students in the coeducational class "changed their attitudes more in the direction of gender equality . . . where they were forced to confront their preconceptions" unlike the single-sex classes.<sup>166</sup> Similarly, another study discovered that girls in the single-sex classes actually tended to be more stereotypical in their views about coeducational classes than the girls in those coeducational classes.<sup>167</sup>

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161. Levit, *supra* n. 25, at 494.

162. *Id.* at 493. A Canadian study segregated tenth- through twelfth-grade students into single-sex mathematic classes, which resulted in "very little evidence that segregated classes have had a beneficial effect on female students' attitudes toward mathematics." *Id.* at 494 (citing Sandra Sangster, *Effect of Sex-Segregated Mathematics Classes on Student Attitudes, Achievement and Enrollment in Mathematics: A.Y. Jackson Secondary School, Year III 1-4* (unpublished ms., Mar. 1988).

163. *Id.*

164. *See id.* at 494-495 (finding that the forms of sexism varied by the type of school). Valerie E. Lee gathered data to determine the frequency of sexism at different types of schools and found that in boys' schools, sexism occurred in 37% of classrooms; in girls' schools, sexism occurred in 45% of classrooms; and in coeducational schools, sexism occurred in 54% of classrooms. *Id.* (citing Valerie E. Lee et al., *Sexism in Single-Sex and Coeducational Independent Secondary School Classrooms*, 67 *Soc. Educ.* 92, 99-100 (1994)). In all three types of schools, teachers initiated mainly all of the sexism. *Id.*

165. *Id.* at 495.

166. *Id.* at 496.

167. *Id.* Margaret Signorella, Irene Frieze, and Susanne Hershey conducted this longitudinal study by comparing sex-role stereotyping in single-sex and coeducational classes and discovered "no consistent tendency for students in single-sex classrooms to display less gender stereotyping." *Id.* (citing Margaret Signorella et al., *Single-Sex Versus Mixed-Sex Classes & Gender Schemata in Children & Adolescents: A Longitudinal Comparison*, 20

Despite proponents' claims, single-sex education may or may not encourage girls to study traditionally masculine subjects and abandon gender roles, but, either way, sexism still occurs and stereotypic gender views remain in both coeducational and single-sex environments.

### 3. *Effects on Males*

As apparent from the discussion thus far, most of the research analyzes females in single-sex educational environments, while very little focuses on males' academic achievement or experiences in single-sex environments.<sup>168</sup> The few studies that have been conducted almost consistently conclude that "for white males, single-sex educational programs demonstrate either no statistically significant benefits or some small, but significant, *negative* effects."<sup>169</sup> When interviewed, most boys did not want to attend single-sex classes, while many girls did.<sup>170</sup> The majority of research concludes that boys benefit from girls' presence in the classrooms.<sup>171</sup> The following drawbacks occur when boys are in single-sex environments: (1) teachers may have more difficulty controlling all-male classes; (2) all-male schools contain the "severest form of sexism," including "explicitly sexual and demeaning references to females"; (3) students in all-male schools may "hold more stereotypic views" about the natural abilities of men

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Psychol. Women Q. 599, 599, 606 (1996)). Kenneth Rowe, an Australian researcher, attempted to create a truly scientific experimental study for single-sex mathematics classes and discovered that shifting populations and missing data about background variables confound the study. *Id.* at 502. His original study found benefits for both girls and boys in single-sex environments. *Id.* at 501. When he revisited the study two years later, he found no benefits for girls at all but benefits for boys in mathematics. *Id.* Eight years later, when he and Herbert Marsh revisited the study and "accounted for students shifting from one class type to another," they found no data to support any benefit to girls or boys in single-sex mathematics classes. *Id.* at 502. "In fact, the only outcome variable that remained statistically significant was 'belief in the equality of sexes . . . and this outcome was negatively influenced by attending single-sex classes.'" *Id.* (quoting Herbert W. Marsh & Kenneth J. Rowe, *The Effects of Single-Sex and Mixed-Sex Mathematics Classes Within a Co-educational School: A Reanalysis and Comments*, 40 *Austral. J. Educ.* 147, 149 (1996)).

168. *Id.* at 497.

169. *Id.* at 498 (emphasis added). The evidence claiming benefits to boys in all-male classes and schools is mainly anecdotal; however, there is evidence that single-sex education may benefit minority and economically disadvantaged boys. *Id.*

170. *Id.* at 499. These findings demonstrate that while most women value their single-sex education, most men do not. *Id.*

171. *Id.* "[G]irls in the classroom exert a positive influence on the behavior of boys." *Id.*

and women; and (4) all-male schools may unintentionally promote male exclusivity and dominance.<sup>172</sup> On the whole, single-sex education for boys is “at best, neutral, and at worst, negative.”<sup>173</sup>

### C. Problems with the Current Single-Sex Research

There are two resounding conclusions that can be drawn from the entirety of single-sex research: (1) the effects of single-sex education for boys are less conclusive (and seemingly more detrimental) than they are for girls; and (2) the studies assessing performance and achievement as well as the studies assessing attitudes and sexism have conflicting results.<sup>174</sup> These disputed findings beg the question, “Why?” Why are all the results contested from one study to the next? To answer this question, it is necessary to examine the research methodology.

As previously mentioned, it is crucial to control for background variables in these studies, including socioeconomic status, prior academic achievement and intelligence, pre-existing academic and career aspirations, as well as the reputations, traditions, and resources of the individual schools.<sup>175</sup> Early studies from the 1970s and 1980s favoring single-sex education and finding benefits in students’ performance and attitudes have recently been called into question by more sophisticated studies in the late 1990s that contained controls for background variables.<sup>176</sup> While earlier studies found positive correlations between single-sex education for girls and academic achievement, later studies concluded that variables about students’ and schools’ backgrounds “matter much more to student satisfaction and performance” than the type of school.<sup>177</sup> For instance, studies that attempted to control for parental education and family socialization found that “par-

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172. *Id.* at 499–500. “Observational studies of other all-male groups, such as sports teams and fraternities, suggest that when male identities are constructed in a process that excludes women, masculinity becomes defined by misogyny and male supremacy.” *Id.* at 500.

173. *Id.*

174. *Id.*

175. *Id.*

176. *See id.* (stating specifically that single-sex studies from the late 1970s and early 1980s are disputed by more modern studies as lacking controls for confounding variables).

177. *See id.* at 500–501 (stating that this conclusion is more likely because the modern studies use sophisticated methodology and control for conflating variables to reach this conclusion).

ents tend to encourage mathematical achievements in boys more than they do in girls and accept lesser levels of performance in girls,” indicating that parental involvement and expectations influence students as much as or more than the type of school.<sup>178</sup> Accordingly, these later studies more likely favor coeducational schools rather than single-sex schools, or at the very least, find no statistically significant differences between the two.<sup>179</sup>

Another problem with single-sex research that skews the results emanates from the sample population. Since it is illegal to force any student to attend a single-sex school or class,<sup>180</sup> a truly scientific, random study cannot be conducted.<sup>181</sup> Additionally, prior to the NCBLA approving public single-sex education, most public-school districts refused to offer single-sex classes or schools for fear of legal liability; thus, most single-sex research used private and international schools.<sup>182</sup> Both private and international schools possess features that make them unrepresentative of American public education.<sup>183</sup> Consequently, to create a truly scientific experimental population of American public-school students is almost impossible.<sup>184</sup>

Additionally, proponents of single-sex research rely on anecdotal evidence that single-sex education is “better” than coeducation.<sup>185</sup> This anecdotal evidence derives from “self-reporting,” which also creates a host of problems. The two well-accepted ad-

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178. *Id.* at 502.

179. *Id.* at 501.

180. 20 U.S.C. § 1703; *supra* n. 67.

181. DOE Research, *supra* n. 112, at 88. The most scientifically accurate study would consist of taking a random sample of public-school students and randomly assigning them to a boys’ school or class, a girls’ school or class, and a coeducational school or class. This would alleviate any “self-selection” that occurs in almost all the current single-sex research. The current “self-selection” process results in more academically focused students (or their parents) choosing to attend single-sex schools or classes and, thus, skewing the results to indicate that students in single-sex environments academically outperform their coeducational counterparts when, in reality, these students probably would have performed just as well in a coeducational setting.

182. *See supra* nn. 32, 64–79 and accompanying text (describing the NCLBA and the history of single-sex education); *supra* nn. 146–151 (describing the international single-sex research).

183. Needless to say, private schools are not the most accurate comparison to public schools because of their innate differences. The same can be said for comparisons drawn from international schools.

184. Levit, *supra* n. 25, at 501–502.

185. *Id.* at 503.

vantages of single-sex education that come from anecdotal evidence are that female students have higher self-esteem and more academic satisfaction in single-sex environments.<sup>186</sup> The problem with these “self-reports” from female students is that their perceptions have not translated into actual measured success in either academic achievement or career prominence.<sup>187</sup> Researchers worry that this inconsistency between perception and actual performance may lead to a “false sense of security.”<sup>188</sup> Another problem with this type of evidence is that it often embraces gender stereotypes.<sup>189</sup>

Ironically, all the research on single-sex education, of which there is a multitude, might be its own worst enemy and skew the results. Because single-sex education is a controversial subject, studies that attain statistically significant results have more publication opportunities than the ones that do not find statistically significant benefits to single-sex education.<sup>190</sup> Thus, there may be an enormous imbalance between the amount of published “significant” results for single-sex education and the amount of unpublished studies finding no benefits from single-sex education.<sup>191</sup>

Overall, there is no “general consensus” about the alleged benefits of single-sex education.<sup>192</sup> In fact, there are serious defects in the research because many of the researchers are advocates on one side or the other of the single-sex-education debate

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186. *Id.*

187. *Id.* at 488–489. The AAUW observed the following paradox in the studies of students’ perceptions of single-sex classes compared with their actual achievements: While girls perceived the classrooms as superior and, thus, had increased confidence, these perceptions did not translate into actual improved achievement. *Id.*

188. *Id.* at 489 (quoting Gilah C. Leder & Helen J. Forgasz, *Single-Sex Mathematics Classes in a Co-educational Setting: A Case Study* 20, 22 (1994) (available at [http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content\\_storage\\_01/0000019b/80/16/1c/a1.pdf](http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/16/1c/a1.pdf))).

The researchers found that both the Australian high-school boys and girls thought they had benefitted from single-sex classes, but in reality the test results showed their performance levels were not significantly different. *Id.*

189. *Id.* at 521. For examples of these gender stereotypes, see *infra* notes 204–211 and accompanying text.

190. *Id.* at 504. Valerie Lee calls this the “file drawer problem” because insignificant results are placed in file drawers and never discussed. *Id.*

191. *Id.* “The journals are filled with the [5%] of studies that show Type I errors [in which differences are statistically significant at probabilities below .05], while the file drawers back at the lab are filled with the [95%] of the studies that show nonsignificant ( $p > .05$ ) results.” *Id.* (quoting Robert Rosenthal & Ralph L. Rosnow, *Essentials of Behavioral Research: Methods and Data Analysis* 379 (McGraw-Hill 1984)).

192. *Id.* at 503.

and fail to control for influential variables.<sup>193</sup> In general, educational research is difficult because “the multiple dimensions of classroom learning can defy efforts to focus on any one dimension.”<sup>194</sup> Variables, such as curriculum, teacher expertise, resources, size of the student body and classes, educational environment, and school mission, as well as parental education and socioeconomic backgrounds, each matter so much that they may trump the contributions of school type and gender composition to student achievement and experience.<sup>195</sup> The inability to control for these variables contaminates almost all of the single-sex research.<sup>196</sup> Even the systematic review that the DOE cited as “research” supporting the 2006 Amendments states that there is a “dearth of quality studies” about single-sex research and, thus, due to multiple variables with differing definitions in each study, the “real limits of resolving debate through systematic review are evident.”<sup>197</sup>

Assuming that there are certain advantages to single-sex education, it is theorized that because there are so few single-sex educational opportunities in the United States, they receive the most academically focused students, which may explain the appearance of “advantages” in single-sex education.<sup>198</sup> Thus, if single-sex educational opportunities increase and are no longer “rare,” they will become less selective, “depriving those schools of any measurable academic or reputational advantages.”<sup>199</sup> This

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193. Martha Minow, *Fostering Capacity, Equality, and Responsibility (and Single-Sex Education): In Honor of Linda McClain*, 33 Hofstra L. Rev 815, 827 (2005).

194. *Id.*

195. Levit, *supra* n. 25, at 504; Minow, *supra* n. 193, at 827.

196. Levit, *supra* n. 25, at 503.

197. DOE Research, *supra* n. 112, at 87, 89. In other words, the systematic review performed for the DOE recognized the review’s limitations as well as its equivocal results, yet the DOE used this review as part of the research in support of single-sex education and the 2006 Amendments. 71 Fed. Reg. at 62532.

198. Levit, *supra* n. 25, at 505. This theory is called the “rarity effect.” It exists because single-sex educational programs are rare in this country and because people believe they are more beneficial to students, academically oriented students voluntarily choose, or “self-select,” to attend these schools. For more discussion on the phenomenon known as “self-selection,” see *supra* note 181.

199. *Id.* In 1995, David Baker, Cornelius Riordan, and Mary Ellen Schaub tested the rarity effect by comparing four countries, two of which have commonplace single-sex schools and two of which have few single-sex schools. *Id.* at 505–506 (citing David P. Baker et al., *The Effects of Sex-Grouped Schooling on Achievement: The Role of National Context*, 39 Comp. Educ. Rev. 468 (1995)). They found that in New Zealand and Belgium, where

theory may reconcile the different findings in studies that find advantages for girls in single-sex settings but no disadvantages for girls in coeducational settings, and these differences may disappear as single-sex schools become more prevalent.<sup>200</sup> Nevertheless, the single-sex research is hardly all-inclusive because it not only lacks studies regarding American public education but also lacks data concerning the effects of single-sex education on male and female minorities, different socioeconomic backgrounds, religions, and sexual orientations.<sup>201</sup>

Perhaps the best summation of all the research regarding single-sex education comes from the systematic review performed for the DOE, which concluded as follows:

The preponderance of studies in areas such as academic accomplishment (both concurrent and long term) and adaptation or socioemotional development (both concurrent and long term) yields results ranging from supporting [single-sex] schooling to no differences between [single-sex] and [co-educational] schooling.<sup>202</sup>

The extent to which single-sex education improves the quality of education and students' experiences is a matter of debate and is clearly not established in the research.

## V. PROPOSAL

As seen above, statistics can lie,<sup>203</sup> but it is necessary to examine why regulations based upon contested statistics are also

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single-sex education is commonplace, there were no differences in students' academic achievement between single-sex and coeducational schools; however, in Japan and Thailand, where single-sex education is rare, they "discovered significantly different achievement levels in single-sex schools." *Id.* at 506.

200. *Id.* Single-sex classes and schools are now more prevalent than ever, and while it is still too early to know if this prediction is true, it will be interesting to see if the "advantages" to single-sex education diminish. This diminution could also occur from underfunding, overcrowding, and diminished popularity once single-sex schools have existed for a while.

201. Levit, *supra* n. 25, at 504; DOE Research, *supra* n. 112, at 89.

202. DOE Research, *supra* n. 112, at 86.

203. "There are three kinds of lies: lies, damned lies, and statistics." This is a famous quote usually attributed to Mark Twain. See Joel Best, *More Damned Lies and Statistics: How Numbers Confuse Public Issues* 5 (Univ. of Cal. Press 2004) (describing how people use numbers to illustrate whatever they want and how other people rely on these numbers without any critical thought, explaining why different people come to different conclusions

problematic. After proving that such regulations are problematic, this Article proposes that to solve this problem the DOE as an administrative agency use only data that meets specific criteria, thereby assuring its scientific value.

#### A. Problems with the Use of Disputed Evidence to Create a Regulation

Considering the Supreme Court has consistently held that gender stereotypes are constitutionally impermissible<sup>204</sup> and the amended Title IX prohibits single-sex education based upon “overly broad generalizations” about gender capabilities,<sup>205</sup> the use of research based on gender stereotypes should also be impermissible. For example, if the DOE used anecdotal data, which relies on notions of gender stereotypes to “prove” the benefits of single-sex education, to pass the 2006 Amendments, this newly amended regulation inherently incorporates gender stereotypes. The anecdotal quotes given by students in single-sex classes and schools already show antagonistic feelings towards the opposite sex, indicating that gender stereotypes indeed exist in single-sex environments.<sup>206</sup> Additionally, the research contains gender stereotypes when it concludes, or at least argues, that girls learn differently from boys, which much of the research does.<sup>207</sup> While some of the evidence shows that *some girls sometimes* learn better in certain ways and *some boys sometimes* learn better in different

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using the same statistics).

204. *Hogan*, 458 U.S. at 725 (stating that “care must be taken in ascertaining whether the statutory objective itself reflects archaic and stereotypic notions”). “Thus, if the statutory objective is to exclude or ‘protect’ one gender because they are presumed to suffer from an inherent handicap or to be innately inferior, the objective itself is illegitimate.” *Id.* The *Virginia* Court feared this as well—that overbroad generalizations could create or perpetuate myths concerning inferiority of women. 518 U.S. at 533–534.

205. 71 Fed. Reg. at 62531.

206. The following are various quotes given by students put in single-sex environments: “Yes, it was great not to have the boys hogging the equipment”; “Boys are loud, and they get all the attention”; and “Girls get you in trouble and make fun of you if you get the answer wrong.” Levit, *supra* n. 25, at 521 (quoting Leslie H. Parker & Leonie J. Rennie, *Teachers’ Perceptions of the Implementation of Single-Sex Classes in Coeducational Schools*, 41 *Austral. J. Educ.* 119, 124–125 (1997) and Ellen Goodman, *Single-Sex Classes: Latest Education Fad Fails to Live Up to Billing*, *Dallas Morn. News* 29A (Mar. 18, 1998)). All of these anecdotal quotes demonstrate the gender stereotyping that exists in this type of statistical data. *Id.*

207. For an examination of these studies, see *supra* note 206 and *infra* notes 210–211 and accompanying text.

ways, these are tendencies that have “clear and numerous exceptions.”<sup>208</sup> Even the amended Title IX states that a school’s justification for single-sex education can never be “boys and girls just learn differently.”<sup>209</sup> Nevertheless, newly created single-sex classes and schools are catering to these gender stereotypes in decorum and curriculum.<sup>210</sup> The research that “tests” for these gender stereotypes and finds that girls suffer in mathematics and prefer quiet environments while boys fail reading and writing classes but need undisciplined atmospheres<sup>211</sup> encourages the DOE to allow schools and teachers to implement stereotypical methods, even if subconsciously, undermining both the Court’s and the original Title IX’s opposition to overbroad generalizations about gender capabilities and preferences.

Secondly, the unfettered use of unsupported or weak evidence implies that researchers need only “to conduct the right experiments and reach the desired conclusions to change [certain] legal rights [or laws] of large groups of people, whether African-Americans, Hispanics, Caucasians, [Jews, Muslims,] homosexuals, females, males, or any other discernable class of citizens.”<sup>212</sup> Hypothetically speaking, under this analysis, an administrative agency could specifically regulate Muslims if researchers find that a third of Muslims are terrorists and the agency disregards the inadequacies of the data. For this reason, the effects of statistics-based regulations are quite substantial as well as potentially dangerous.<sup>213</sup>

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208. Johnson, *supra* n. 132, at 686.

209. See 71 Fed. Reg. at 62531 (stating that “Title IX also does not permit single-sex classes . . . to rely on overly broad generalizations about the preferences of either sex”).

210. See Sherwin, *supra* n. 61, at 81 (describing the pink walls and classical music playing in the hallways at the Young Women’s Leadership School in Harlem, reminiscent of a “ladies’ finishing school”).

211. See Winchester, *supra* n. 1 (contrasting the quiet reading time that girls have in their classrooms with the loud classroom environment where the boys are allowed to shout out answers).

212. Fortney, *supra* n. 44, at 879 (citing Christine Gorman, *Are Gay Men Born that Way?* Time 60–61 (Sept. 9, 1991) (available at <http://www.time.com/time/magazine/article/0,9171,973763-1,00.html>) (revealing a new study that suggests that there is structural difference between the brains of homosexual and heterosexual men)). Based on that research, New York considered starting a public sexual-diversity high school for homosexual teenagers. *Id.*

213. When a court reviews an agency’s decision involving questions of fact, it may use a substantial evidence test, in which a court examines the entire record for evidence that both bolsters and subtracts from the agency’s action. *In re Zurko*, 258 F.3d 1379, 1384

Although many people are suspicious of certain statistics, they are usually only suspicious of statistics presented by their ideological opponents, not realizing that both sides use statistics—sometimes the same statistics—to promote their own particular agenda.<sup>214</sup> Not only do “[s]ocial statistics describe [our] society, but they are also products of our social arrangements.”<sup>215</sup> People, regardless of ideology, use statistics as a tool for a particular purpose, raising our awareness because they want something—whether they are journalists, politicians, corporations, advocates for the powerless, or government agencies.<sup>216</sup> Distressingly, these entities use bad or inaccurate statistics “to stir up public outrage or fear; [to] distort our understanding of our world; and [to] lead us to make poor policy choices.”<sup>217</sup>

In essence, “bad statistics not only take on lives of their own, but they do increasing damage as they persist.”<sup>218</sup> Using disputed statistical data to promulgate regulations will render those regulations inconclusive and inconsistent. If regulations change every time a new study arrives with a contrary finding, the regulations will become arbitrary and meaningless. Moreover, it creates a problem regarding past regulations: should we simply nullify them or slowly remove their authority over time? Would new regulations based on newer studies quickly overrule older ones? Such uncertainty neither aids nor protects anyone. Exacerbating this problem is the subjectivity that the DOE seemingly employs when using data. Its own systematic review of single-sex-education research concludes that many of the studies have conceptual or interpretative flaws, lack well-developed hypotheses,

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(Fed. Cir. 2001). This standard is also more deferential than a clearly erroneous standard. *Id.* Under an arbitrary and capricious standard, an agency’s action receives the “presumption of regularity” and must be upheld as long as there is an articulated rational basis and a consideration of relevant factors. *Emery Worldwide Airlines, Inc. v. U.S.*, 264 F.3d 1071, 1085 (Fed. Cir. 2001). Both of these deferential standards illustrate the power that administrative agencies wield—not absolute but quite substantial.

214. Best, *supra* n. 203, at 7. “Bad statistics come from conservatives on the political right and liberals on the left, from wealthy corporations and powerful government agencies, and from advocates of the poor and the powerless.” *Id.*

215. *Id.*

216. *Id.* at 7, 167–168.

217. *Id.* at 5.

218. *Id.* at 65 (explaining that bad statistics begin as incorrect generalizations that transform into complete misunderstanding when someone uses the statistics that mean one thing and interpret them to mean something completely different).

and do not link those hypotheses to the outcomes being studied,<sup>219</sup> yet the DOE cites that same review as part of the research in support of single-sex education.<sup>220</sup>

If administrative agencies have controls for the type of statistical data that can be considered, then these controls would exclude many unempirical studies, lacking scientific merit, and prevent the aforementioned problems. Currently, the judiciary has controls for unscientific data<sup>221</sup> and refuses to accept contested statistical data as validation for an important government objective.<sup>222</sup>

The solution to the problem of “bad statistics” creating problematic regulations is not to disregard statistics altogether or to assume that they are all false.<sup>223</sup> Some statistics are inaccurate and disputed, but others are scientifically valid, and legitimate statistics are necessary to realistically discuss social problems.<sup>224</sup> Accordingly, the solution is not to reject statistics but for administrative agencies like the DOE to better judge the numbers and the methodologies used to acquire the data. In order to implement the most scientifically valid statistics, the DOE needs a paradigm that it can apply to this type of data. For this reason, this Article proposes a list of criteria that statistics must meet in order for the DOE to rely on the data as evidence for a regulation.

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219. DOE Research, *supra* n. 112, at 87. “[N]ot one of the outcomes of interest would yield generalizable findings . . .” *Id.*

220. 71 Fed. Reg. at 62534.

221. See *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579 (1993) (establishing guidelines for courts to follow when accepting scientific expert testimony).

222. In *Craig v. Boren*, the Supreme Court invalidated Oklahoma’s gender-based alcohol-sales statute, which prohibited males under twenty-one years old and females under eighteen years old to purchase 3.2% beer. 429 U.S. at 192. The state of Oklahoma offered statistics demonstrating that young males drink and drive more than young females to establish that the gender-based distinction was substantially related to achievement of their important government objective (traffic safety). *Id.* at 199–200. Rebuking that argument, the Court declared that the relied upon “statistics exhibit a variety of other shortcomings that seriously impugn their value to equal protection analysis.” *Id.* at 202.

223. See Best, *supra* n. 203, at 6 (arguing that the solution is to critically analyze statistics).

224. *Id.*

## B. Criteria to Evaluate Statistical Data

In general, courts are wary of using purely mathematical evidence due to the risk of misleading juries.<sup>225</sup> Nevertheless, courts will allow statistical evidence that qualifies as “scientific [ ] knowledge.”<sup>226</sup> In order to qualify as scientific knowledge, the evidence must derive from the “scientific method.”<sup>227</sup> This requirement establishes the reliability of the evidence.<sup>228</sup>

In *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,<sup>229</sup> the United States Supreme Court discarded the former per se “general acceptance” standard<sup>230</sup> for scientific expert testimony and created five nonexclusive guidelines for federal judges to follow when acting as gatekeeper and assessing the validity of scientific evidence in trial.<sup>231</sup> These five guidelines include the following: (1) the theory or technique can be or has been tested; (2) it has been subjected to peer review or publication; (3) its known or potential rate of error; (4) the existence and maintenance of standards controlling its operation; and (5) its general acceptance in the relevant scientific community.<sup>232</sup>

This Article proposes that the DOE adopt these five criteria as specific factors that the statistical data and studies must meet before it relies upon them to promulgate regulations. As courts have used these five items to weed out evidence and testimony lacking scientific reliability, the DOE as an administrative agency should similarly use this list to guarantee that it is relying upon only scientifically valid, and therefore more accurate, data, which consequently will minimize harms to the regulations.

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225. This mathematical or statistical evidence is generally categorized as probalistic evidence; that is, the mathematical likelihood of the existence or nonexistence of a fact.

226. See *Daubert*, 509 U.S. at 590 (discussing the need to accept scientifically based evidence that is well grounded).

227. *Id.*

228. *Id.* (internal citation omitted).

229. 509 U.S. 579.

230. This standard had been established in *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923).

231. *Daubert*, 509 U.S. at 589, 592–594.

232. *Id.*

### 1. Testing

The first of the five criteria that the DOE should employ is whether the study or finding can be or has been tested, or in other words, if the study can be or has been reproduced.<sup>233</sup> It is necessary to articulate and test scientific hypotheses to determine if they are accurate or false.<sup>234</sup> Nevertheless, in many of the studies regarding single-sex education, researchers did not have hypotheses but just began researching, looking for whatever they could find.<sup>235</sup> Ideally, a researcher should disclose “how subjects were chosen, how interviews were recorded, and the method by which meaning was derived from the data,” so that other researchers can test the initial study.<sup>236</sup>

### 2. Peer Review or Publication

The second criterion is whether the study or data has been subjected to peer review or publication.<sup>237</sup> Submitting a study and its findings to the scientific community helps establish the reliability and validity of the data.<sup>238</sup> If other researchers have an opportunity to examine the study, its methodology, and its findings, the study is more likely to be accurate and reliable or else the public will point out its flaws.<sup>239</sup> In addition, publication is one avenue of peer review, demonstrating both the journal’s and the researcher’s belief in the credibility of the study and in the reliability of its findings.<sup>240</sup> On the other hand, refusal to submit one’s research for peer review raises doubts about the study’s integrity.<sup>241</sup> One of the forerunners in single-sex-education re-

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233. See *id.* at 593 (discussing this guideline as it applies to scientific evidence in trials).

234. *Id.*

235. See DOE Research, *supra* n. 112, at 87 (noting this problem in so many studies that the review had to relax its criteria to accept the problematic studies anyway). Conducting research without a specifically stated goal, purpose, or hypothesized finding is like stumbling around in the dark until you eventually bump into something.

236. Sommers, *supra* n. 28.

237. See *Daubert*, 509 U.S. at 593 (discussing the importance of peer review to qualify as scientific evidence).

238. *Id.*

239. *Id.*

240. *Id.* at 594.

241. See Sommers, *supra* n. 28 (describing her multiple attempts to obtain Carol Gilligan’s research from 1982).

search, who is credited with discovering the girls' crisis in coeducation, refuses to share her research or publish her methodology more than twenty years after her "findings."<sup>242</sup>

### 3. *Error Rate*

As the third criterion, the DOE should determine a study's known or potential rate of error.<sup>243</sup> This information is important so that someone reviewing the study and its findings can know how accurate the data is (and how often errors occur) because science never consistently produces the same result.<sup>244</sup> Error rates are especially important when evaluating statistical evidence because every statistic has flaws.<sup>245</sup> It is important to find a statistic with the least amount of flaws to remain accurate and useful.<sup>246</sup> Statistics, by their very nature, are a summary of complex information into relatively simple numbers.<sup>247</sup> This summary inevitably oversimplifies some of the information, which is the inherent limitation of statistics.<sup>248</sup> Additionally, statistics are the product of choices, such as the following: choosing to measure this certain variable and ignore others; choosing to define categories narrowly or broadly; choosing a certain population or sample; choosing to emphasize a particular aspect of the problem; et cetera.<sup>249</sup> Due to these choices, every statistic has additional limitations that can be criticized.<sup>250</sup> For these reasons, it is important to know the error rate to determine the reliability of the evidence.

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242. *Id.* Carol Gilligan refuses to share her research data from the three studies she used to write the book *In a Different Voice*, claiming that they are confidential; however, there are standard methods for publishing confidential research, such as removing names. *Id.*

243. *See Daubert*, 509 U.S. at 594 (establishing the importance of error rate in scientific evidence).

244. Donald Kenney & Richard A. Merrill, *Assessing Forensic Science*, Issues in Sci. & Tech. (Fall 2003) (available at <http://www.issues.org/20.1/kennedy.html>).

245. *See Best*, *supra* n. 203, at 166–167 (explaining that every statistic has limitations for which it can be criticized because “every statistic is [a] product of choice[ ]”).

246. *See id.* at 167 (discussing the need to analyze the flaws to determine if the statistic is still useful).

247. *Id.* at 166.

248. *Id.*

249. *Id.*

250. *Id.* at 166–167.

#### 4. Standards

The fourth criterion is whether the study used and maintained standards to control its operations.<sup>251</sup> It is important to determine the existence and maintenance of standards so that the DOE may rely solely on studies that employed set standards to regulate the methodology, collection of data, and analysis. The systematic review of single-sex-education research performed for the DOE noted that most studies differ in the criteria used, the criterion measures used, and the statistical controls used to compare single-sex and coeducational schools.<sup>252</sup> It is difficult to analyze and compare data and to proclaim one universal finding, such as that single-sex education is more advantageous than coeducation, when studies utilize different measures and standards, if any. Therefore, it is imperative that administrative agencies rely only upon research that employed standards throughout the experiment and analysis.<sup>253</sup>

#### 5. General Acceptance

The fifth and final criterion employed to ensure the reliability of evidence is whether the study, technique, or theory is generally accepted in the relevant scientific community.<sup>254</sup> If a study, technique, or theory is widely accepted throughout the relevant scientific community, the more potential reliability it has.<sup>255</sup> While it is difficult to have an entire scientific community agree on any scientific question, a study, technique, or theory that could not garner any support, or barely any support, should be considered unreliable as evidence to promulgate a regulation.<sup>256</sup> As evident throughout this Article, the research thus far conducted about

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251. See *Daubert*, 509 U.S. at 594 (enumerating this particular factor as one of the five for scientific expert testimony); see also *U.S. v. Williams*, 583 F.2d 1194, 1198 (2d. Cir. 1978) (finding that the professional organization concerned with spectrographs had standards controlling its operations by requiring that ten voice matches be made before finding a positive identification).

252. DOE Research, *supra* n. 112, at 87.

253. The systematic review performed for the DOE stated that using the standard rule of thumb, none of the research reviewed would produce any “generalizable findings.” *Id.*

254. See *Daubert*, 509 U.S. at 594 (indicating the importance of widespread acceptance).

255. *Id.*

256. See *Williams*, 583 F.2d at 1198 (stating that a court would find a technique unreliable if it could not gain any, or barely any, support from its relevant scientific community).

single-sex education and its supposed benefits is highly debated, and its relevant scientific community is tenaciously divided over it.<sup>257</sup>

However, it is unwise, as well as impossible, to ignore statistics altogether; they are a descriptive indicator of society. Without statistics, analytical ability is impaired; without statistics, there are “no accurate ways of judging how big a problem may be, whether it is getting worse, or how well the policies designed to address that problem actually work.”<sup>258</sup> Statistics are too prevalent and too useful to be automatically discounted;<sup>259</sup> thus, it is imperative that the DOE uses specific criteria when evaluating statistics and creating policies and regulations based upon them.

## VI. CONCLUSION

The achievement of equality in education has eluded society thus far. Regarding gender segregation, there is neither social consensus nor doctrinal clarity; in fact, even statistical observations are equivocal and, at times, unreliable. While the Supreme Court has refused to take a stand on the constitutionality of single-sex education for elementary and secondary public schools,<sup>260</sup> the current administration and the DOE have gone forward and amended Title IX provisions to allow single-sex education in public elementary and secondary schools despite conflicting research, disputed findings, and different interpretations of the data.

Interpretation of existing research is highly debated. The research examined is often only a slice of sociological data specific to single-sex schools, their actual or perceived academic efficacy, and reported measures of student satisfaction. Assessments of single-sex education usually limit their focus to simple comparisons of single-sex with coeducational environments, while ignoring the broader array of evidence regarding institutions, resources, familial involvement, and processes that construct views on gender,

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257. For a discussion of the conflicting research and debated findings, see Part IV.

258. Best, *supra* n. 203, at 168.

259. *See id.* at 168, 170 (arguing that one must be critical, not dismissive, of statistics and evaluate their strengths and weaknesses).

260. It is clear, however, that the Court will not yet apply strict scrutiny or generally prohibit “separate but equal” as it applied to single-sex education. *See supra* nn. 41–63 and accompanying text (summarizing the cases treating the constitutionality of single-sex education of which there are few).

academic achievement, attitudes, and equality. In addition, the sample populations are not often representative of American elementary and secondary public schools and their students. Omitted from the majority of the research is the question of the effect of single-sex education on minorities, religions, and different socioeconomic backgrounds. The stereotyping and shortcomings present in many of the studies confirm that the research must be handled with great care; in the same vein, regulations based upon contested evidence must also be handled delicately.

Consequently, the DOE should assess disputed statistical data against five specific criteria before using such data as evidence for future regulations. Similar to the evidentiary guidelines for scientific evidence presented in court, the DOE should not rely on any statistical data until it comports with the following five criteria: (1) the theory or finding can be or has been tested; (2) the study or data has been subjected to peer review or publication; (3) the study has a known or potential error rate; (4) the study employed and maintained standards to control its operations; and (5) the study, technique, or finding is generally accepted by its relevant scientific community. In short, the requirement that the Agency's statistical evidence meets these standards attests to its reliability and scientific validity and establishes a solid foundation for regulations based upon statistical data.

It is claimed that “[t]here are three kinds of lies: lies, damned lies, and statistics.”<sup>261</sup> People are suspicious of statistics, fearing that statistics are used to manipulate and distort the truth.<sup>262</sup> Yet, statistics can be beneficial by summarizing and clarifying the nature of society, which is particularly helpful with social problems.<sup>263</sup> Social problems often require statistical answers to determine how prevalent the problem is, whom it affects, and whether it is worsening.<sup>264</sup> For this reason, it is important that the DOE carefully chooses the statistical data with which it solves the problems. After all, people are already suspicious of statistics; they should not also fear regulations.

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261. Best, *supra* n. 203, at 5.

262. *Id.*

263. *Id.*

264. *Id.*