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***EDUCATION AND GENDER: SAME-SEX SCHOOL AND THEIR COMPARISON TO  
THE MIXED-SEX ONES***

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Dr. Anjali Monga  
Principal  
Swami Dayanand College of Education,  
Lehra Bega, Bathinda

***Abstract***

*This research carries out a comparative gender-based performance review between mixed and single-sex schools in the region of Catalonia, Spain, for Spanish, Catalan, English and Mathematics subjects. A summary of the key findings from international research on discrepancies in outcomes for mixed schools and single-sex schools is then discussed after a brief contextualization. We then outline our research-analysis strategy and methodology. The research was built around the basic use of results obtained by students in the last year of primary school (12 years) and in the last year of compulsory secondary school (16 years). The statistical technique of Propensity Score Matching was used for this comparison. All segregated schools in Catalonia were selected, representing a total of 15, of which 9 are girls-only and 6 are boys-only (with a total of 1503 students); a sample of 10 mixed schools was also used, similar in terms of social composition, that is, middle and upper class students (with a total of 1217 students). The findings substantiate foreign research in general. Results show that in integrated or mixed schools, disparities in achievement based on gender are not linked to school organization variables. We also come to conclusions about the drawbacks of circumscribing school success in curricular subjects and the need to consider additional metrics in terms of gender and emotional development within the teaching and learning process; student attitudes and behavior; self-concept and, most importantly, teacher expectations, their teaching practices and the impact of teacher expectations.*

***Keywords:*** Achievement and Gender, Mixed-Sex Ones

**INTRODUCTION**

In recent decades, the expansion of education in Catalonia and Spain has led to a democratization of access to higher education, with women in particular being one of the classes who have gained the most from this expansion. This is one of what we might call the



'historical conquests' that have had the greatest social effect, particularly in terms of reducing gender inequality by rising women's participation in the labour market and shifting personal, professional and family-related perceptions and transition processes from school to work. This democratisation, though, has been followed by two problems that our educational systems have not yet addressed. Second, unequal guidance is given to boys and girls in the choice of studies; current guidance also reproduces gender roles and is the basic reason for girls' under-representation when choosing for technical research and related professions. Secondly, the large number of early school leavers, which is especially apparent among boys with low socio-economic and cultural backgrounds.

In fighting socioeconomic and gender inequality, these two phenomena illustrate the shortcomings of our education systems. Similarly, the neo-liberal political and economic background and the endorsement of the right of families to select their schools have revived the conventional debate, to which this article will relate, on the suitability and shortcomings of mixed schools (Burgess 1990). Therefore, from the point of view of both the factors driving this and the study of educational outcomes, the work discussed here seeks to add to the ongoing debate about gender inequality in the educational sphere. Mixed schools in Catalonia and Spain are, historically speaking, relatively new as a model for educating boys and girls without gender differentiation, in the sense that they were only introduced in the 1970s. They are distinguished, under the same educational model and by the same programmer, by the indistinct coeducation of boys and girls. In fact, co-educational school goes one step further: it also refers to an educational paradigm that aims to change gender roles by acknowledging gender gaps and disparities, but from a viewpoint that is critical of the patriarchal order and androcentrism underlying the conventional curriculum and academic knowledge as a whole. With the exception of the Scandinavian countries, within the context of social democratic educational policies, the mixed-school mode was implemented sometime after the Second World War. Mixed schools are also more recent in some countries, such as Spain, Greece, Austria and Portugal, as mentioned above. Gender-separated schools (hereinafter referred to simply as single-sex schools) can currently be found only in seven European countries and territories, historically restricted to private and denominational schools (Eurydice 2009); they are clearly a minority then.



In research into disparity in the achievement of boys and girls, the single-sex paradigm is a notion that has recently emerged. There are educational institutions that do not enroll students of one gender, or enroll very few. In a co-educational environment, one of the theories forwarded in defence of this paradigm is the reduction of male academic failure. There is also the possibility of grouping students of one gender together in one class. In comparison to a mixed school, which some critics considered to be 'feminized' in both methodologies and teaching staff, segregated schools would offer an environment more in line with male values, and which could therefore have an impact on the low results obtained by male students in the USA, the transformation of the majority of Catholic secondary schools into mixed schools in the 1960s.

The US, however, differs from other countries in that, in recent years, it has advocated single-sex education as a political instrument to compensate for and improve student academic performance in general, or as a potential alternative mechanism for promoting minority sector education.

Single-sex school claims emphasize similarities in the formation of classes, to the detriment of heterogeneous groups, regardless of whether those similarities or differences are based on gender, performance, ethnicity or other issues. The results of this add to the questioning of the egalitarian existence of education systems. We might claim, at the risk of simplifying, that if the political discourse on educational disparities was 'compensate to make fair' during the 1960s and 1970s, today this discourse highlights the need to 'differentiate to compensate' and thus opens up an old debate about the school institution's possibilities and limitations to modify current social inequalities and about understand

### **Studies on Achievement and Gender**

International achievement and gender research has concentrated largely on the USA and the UK. Lee and Bryk (2010), Lee and Marks (2011), Bryk, Lee, and Holland (2012) and Riordan (2013) are the most notable US studies (2014). This research consists of longitudinal studies focused on a national sample that began in 1980 and lasted until 1992 (High School and Beyond in the USA). The findings of the study by Bryk and Lee highlight the advantages in terms of achievement for students of single-sex schools, particularly boys, and a lower



degree of these assuming gender stereotypes. By using the same databases, LePore and Warren (2015) draw opposing conclusions. According to the outcome of this report, when the initial disparities between students in single and 'co-educational' schools are considered, the alleged advantages regarding the achievement of boys are not very important. In terms of either academic or social gain, the works of Dale and Miller (2015), Willis and Kenway (2013) and Marsh et al. (2014) also suggest that single-sex schools lack advantages. Riordan's (2013) research is notable because initial disparities (capabilities, social origin, school policies and school environment) were regulated for the first time and two critical dimensions were added: ethnic group and social class. The findings of this study show that in single-sex schools, boys score lower in cognitive testing than boys in mixed schools.

In single-sex schools, the latter have greater self-esteem; a greater sense of control of their world and a more egalitarian attitude towards the role of women in society than boys. As regards the outcomes of girls, however, single-sex schools tend to benefit them, as happens with the outcomes of boys and girls in minority-group schools (Riordan 1990). In more recent research, Mael (2011) published an international meeting report analysing 112 studies on various aspects of single-sex and mixed-sex schools. Compared to mixed schools, Mael considers the success of single-sex schools in terms of quantifiable academic performance; long-term academic performance (continuity of university education); adaptation; emotional development; personal satisfaction and, in terms of school processes, environment or culture and their influence on the outcomes.

The findings are not at all definitive. Significant discrepancies between all types of schools are not observed in most of the analysed studies. Forty-one percent of the research studied found advantages for single-sex colleges. The net advantages of the mixed-schooling model are demonstrated by eight percent of the study and 6 percent suggest that both forms of school present positive and negative aspects for students in equal measure.

The findings of Van de's research do not corroborate the hypothesis that both boys and girls prefer achievement in single-sex classes and colleges. The better performance of girls in single-sex schools is more linked to the selective existence of such schools than to the fact that girls are educated separately from boys, taking into account the student's socio-economic



origin, no discrepancies in achievement are discovered. Other research work on the relationship between the idea of self, the environment of school and achievement. Clark (2004) provides findings on the benefits of single-sex education on the self-esteem and self-concept of girls on the basis of a documentary study of numerous research, claiming that the mixed-school model reinforces conventional (subordinate) gender roles, affects low self-esteem and the achievement of girls in math and science, and generates less commitment from teaching staff to girls. Opposing the previous report, Younger and Warrington (2012, 2016) come to conclusions. A crucial factor in the reproduction of gender roles outside the school organisation is the role of teaching staff in their attitudes and experiences with respect to gender (mixed or single-sex). The experience of students studying in both styles of school often indicates no distinction between genders (Rogers and Hallam 2010). More recently, the findings of a longitudinal study are presented in two notable papers, Sullivan (2009) and Sullivan, Joshi, and Leonard (2010). In various topics, the first essay focuses on self-concept; the second is focused on the study of the continuation of studies. Sullivan (2009) illustrates the increased self-concept of boys in math and science in all forms of schools for students at 16 years of age, whereas girls from mixed schools display higher levels of self-concept in English. In this analysis, the influence of the perceptions of teachers and the interpretation of the form of evaluation according to gender appear again.

The outcomes of the second paper (Sullivan, Joshi, and Leonard 2010) support the hypothesis of girls' gains from single-sex schools. There are, however, no gaps between boys and girls with respect to passing national examinations and admission to university. Harker's (2000) report, based on a longitudinal study with a sample of 5300 students in 37 New Zealand schools, also concludes that the gap is more evident than actual in the average academic performance of girls who attend single-sex as compared to co-educational schools. The initial substantial disparities between them vanish when sufficient regulation is exercised for various levels of skill and for the social and ethnic mix in the two types of school.

Curricular option and its relationship with the organizational model are another topic of related study. The findings of the studies by Francis et al. (2003) and Francis (2000) seem to add weight to the hypothesis that professional guidance reproduces horizontal gender inequality in mixed and single-sex schools, and thus school organisation models do not



explicitly question the prevailing gender assumptions of social models. Another topic of related research is achievement in science subjects; McEwen, Knipe, and Gallagher (1997) conducted a study in England to investigate the effect of government policy on science teaching in which the achievement of standards of excellence is promoted, as well as the assessment of performance trends by boys and girls.

The authors point out that a school's effectiveness (measured in terms of performance results) depends on the entry skills of the student, social context, and the school's internal and external characteristics. The high performance of girls in single-sex schools would be sufficiently clarified in this type of school by the origins and entry skills of such students. From 1985 to 1995, the number of boys who were excellent at science decreased dramatically, according to the authors. However, the reverse has happened with girls, except in the case of Catholic schools. The authors argue, using discussion groups, that girls hold such assumptions about particular subjects in the curriculum and are more likely to attain standards of excellence in science in 'co-educational' environments. Another research exploring discrepancies in science in success is that of Friend (2006). The study concludes that the variations observed are not important, and points out that a better environment in the classroom could not be created by 'single-sex classes.' The same conclusion was made by Wong, Young and Fraser (2012), who found that the overall socio-educational level of the school population was a more significant indicator of the success of science students than the type of school (whether single-sex or mixed).

Finally, reference to the analysis by Hubbard and Datnow (2015) should be made with respect to whether or not the organizational model favours ethnic minorities. Financial support from the state and the involvement of proactive teachers with a propensity to look after the students are the variables that seem to play a more fundamental role in the performance of students with little economic resources and from minority backgrounds; the underlying reality of whether the school is mixed or single-sex does not seem to be as important. It is important to refer to the analysis by Smithers and Robinson (2016), which examined the consistency of empirical evidence, found with respect to single-sex or mixed education, taking into account that there are few definitive research findings. On the one hand, their research serves to challenge the empirical validity of that section of the literature



that defends the merits of single-sex schools and, on the other hand, the methodological shortcomings of those studies. The general conclusion of the authors is that all the study aimed at demonstrating one model's superiority over the other has failed in its intentions.

### **Gender salience and single-sex schooling**

Gender salience refers to gender knowledge as a categorizing dimension, and it is significant because gender is readily used to process incoming information by school-aged children, preschoolers, and even infants. High gender salience has implications for psychosocial growth of individuals. For instance, it contributes to the formation of gender-role ideas and stereotypes. In a two-week experiment, when teachers developed gender-salient settings, students followed more gender roles, communicated less with other-gender peers and regarded them less positively. There is a lot of controversy on whether higher gender salience is created by single-sex schools (e.g.) or coeducational schools (e.g.). Gender as an identity becomes dominant (cognitively accessible and relevant) under four environmental circumstances, according to the developmental intergroup theory, when groups are perceptibly discriminable, when individuals are in the minority, when groups are specifically identified, and when groups are implicitly used. In single-sex colleges, this well validated hypothesis is also used to estimate gender salience. However, the forecasts have been mixed because single-sex schools have characteristics that both improve and decrease gender salience. Most scholars hypothesis that single-sex school students are more gender-salient due to the conditions in single-sex schools (e.g., gender labels in school names).

The reverse is expected by others (e.g.,) stressing other conditions in single-sex schools (e.g., own gender being in the majority). Both sides of the debate cited studies as supporting data on how individuals perform in same- vs. mixed-gender contexts, but such research did not explicitly test gender salience in single-sex and coeducational school students. Some single-sex education studies have concentrated on other aspects of gender cognition and their results are mixed. For example, Drury, Bukowski, Velasquez, and Stella-Lopez found girls in single-sex schools to feel more gender-typical and pressured to conform with gender norms compared to girls in coeducational schools, but Kessels and Hannover found girls in single-sex classes to have less open gender-related self-knowledge (lower endorsement of feminine



characteristics and longer reaction time reacting to these types of self-knowledge. These results are useful in explaining how single-sex schooling contributes to gender identity and stereotyping, but as described by the developmental intergroup theory, they do not explicitly translate to gender salience since the constructs are conceptually distinct. Nevertheless, these results suggest that it is important for us to empirically test gender salience in single-sex and coeducational school students to specifically assess the controversy on which school climate emphasizes gender to a greater extent.

### **Mixed-gender friendships, mixed-gender anxiety and single-sex schooling**

The potential effect on the mixed-gender relationships and friendships of students is another issue about gender-segregated schooling experiences. A lack of real-world comparability was cited by some school principals as a downside to single-sex education, fearing that single-sex school students will fail to establish mixed-gender relationships. Indeed, mixed-gender experiences play important roles in the psychosocial development of adolescents and young adults that are distinct from same-gender interactions, such as offering opportunities to learn about different behavioral norms of the other gender, to exercise interpersonal skills required to connect efficiently and respectfully with the other gender in the family and workplace, and to heterogeneously communicate with the other gender. Emotional well-being benefits from developing supportive mixed-gender partnerships, such as through diversifying groups of social support and growing self-esteem.

During puberty, the standard of mixed gender interaction is a particularly significant developmental activity because during this phase the time spent and the desire to communicate with other gender peers starts to increase. In order to predispose people to mixed-gender anxiety, decreased exposure to mixed-gender experiences was suggested to contribute to potential avoidance of mixed-gender circumstances, thereby undermining the process of development of social skills and creation of relationships, resulting in a vicious cycle. Recently, interest in mixed-gender anxiety, also called "dating anxiety" or "heterosocial anxiety" more generally, has resurged. Higher mixed-gender anxiety was found to be associated with less projects, happiness and lower success in mixed-gender interactions,



as well as delayed first dating relationships, less dating and sexual encounters, and more problems for heterosexual individuals in romantic relationships.

In addition, mixed-gender anxiety, including lower self-esteem and non-assertiveness and increased depression and isolation, adversely impacts psychological and physical well-being. It is important to remember, however, that not all people are heterosexual, and romantic and non-romantic circumstances can be influenced by mixed-gender anxiety. Although mixed-gender anxiety is more relevant to heterosexual individuals in romantic situations (referred to as dating anxiety in this study), the more general type of mixed-gender anxiety in non-romantic situations (referred to as general mixed-gender anxiety) can affect people of any sexual orientation. In non-romantic contexts, it would therefore be important to research not only dating anxiety, but also the overall mixed-gender anxiety. There is only a lack of research on the interpersonal effects of single-sex education and the form of interpersonal outcomes most likely to be influenced by gender discrimination are rarely based on mixed-gender relationships. A few pieces of evidence indicate that gender segregation can adversely impact mixed-gender relationships (but see null result in likelihood of remaining married to the first spouse).

For example, two studies that control socio-economic history, parental education and/or religion found that single-sex school graduates reported less satisfying marriage outcomes (e.g., less stable marriage, higher divorce rate) in early to middle adulthood than coeducational school graduates. One study found that 10th grade students from single-sex schools reported lower satisfaction we Although the above results are useful, the number of studies is small and study is restricted in numerous ways, such as testing only limited aspects of interpersonal outcomes (e.g., marriage outcomes) based on retrospective single-item reports and failure to control any single-sex and coeducational school student demographic variable. While a few studies have discussed other aspects of mixed-gender relationships (e.g., heterosocial adjustment) and have indicated worse results correlated with single-sex education, they are typically unpublished (e.g.), dated (e.g.), or unregulated (e.g.).



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## Possible pathways of differences

While the majority of single-sex schooling research concentrate on the identification and explanation of the differences between single-sex and coeducational students, few have tested the mechanisms leading to these differences. Some have, however, implied that single-sex and coeducational school students vary in different areas, such as gender stereotyping and subject preferences, due to the ostensibly higher gender salience in single-sex school students (e.g.), which suggests a direction of meditation. As the self-awareness of a different gender seems to activate an individual's concerns about gender issues during interactions, and the higher salience of an individual of a social category is associated with anxious intergroup communication between gender salience may mediate between the form of school and mixed-gender anxiety. Mixed-gender friendships may be another direction that may clarify school disparities in mixed-gender anxiety. Reduced mixed-gender friendships, in particular, are associated with higher mixed gender anxiety and single-sex schools are likely to have less mixed-gender friendship opportunities, so mixed-gender friendships will mediate between the form of school and mixed-gender anxiety.

## This study

By specifically assessing and contrasting gender salience, mixed-gender friendships and mixed-gender anxiety in single-sex and coeducational school students in two samples in Hong Kong, one in high school (i.e., 2059 present single-sex and coeducational high school students) and the other in college high school students, this study aims to resolve the research gap in the single-sex school debate (i.e., 456 single-sex and coeducational school graduates currently studying in a coeducational college). Via better control for confounding variables, we also aimed to add to the literature. No controls were used in most previous research comparing single-sex and coeducational school students, and those typically only included family socioeconomic status and often the pre-existing skill of the students for studies on academic results. Controlling for such confounds decreased the disparities in academic achievement in education.

Although these confounds could be less of a concern when the dependent variables (such as the existing mixed-gender anxiety and gender salience variables) are not closely related to



factors influencing school choice (such as academic performance), we followed the advice of adjusting for any potentially misleading variations in context between single-sex students and coeducational students. Around 16% of high schools in Hong Kong are single-sex and all colleges are coeducational. Particularly uncommon are single-sex groups in coeducational colleges. Three bands, with Band 1 being the highest and Band 3 being the lowest, reflect the academic standard of high schools. The allocation of students into schools is not random, as in most areas. We controlled parental income and education, since one of the most important control variables in single-sex schooling research is socioeconomic status. In addition, due to the academic standard of schools and gender composition at home, we regulated school banding and the numbers of brothers and sisters to rule out possible discrepancies. We also accounted for sexual preference for the college sample and whether the students were studying in a faculty that was male-dominated, female-dominated, or gender-balanced. Finally, we investigated whether the possible school gap was influenced by gender salience and mixed-gender friendships in mixed-gender anxiety. Mediation studies should be considered descriptive and exploratory, acknowledging the weaknesses of cross-sectional mediation models to causal inferences, and complemented by additional research evaluating alternative mediation models.

## CONCLUSIONS

We observed differences in gender salience, mixed-gender friendships and mixed-gender anxiety during high school and in the college years that favoured coeducational education in response to stakeholder concerns regarding gender salience, mixed-gender relationships and mixed-gender anxiety among students who were deprived of mixed-gender experience at school. Single-sex school high school students were more gender-oriented, more nervous about mixed gender circumstances and had fewer other-gender mates, and single-sex school graduates were even more anxious about mixed-gender experiences and had fewer other-gender friends. These early disparities can have significant consequences for academic and career results later on in marriage. Results found that both before and after the gender-segregated encounter, single-sex schooling was correlated with psychosocial results. While stakeholders have concentrated on the short-term effects of single-sex education, it will also be necessary for policymakers to consider the long-term implications for the psychosocial



wellbeing of students. In many studies and meta-analyses, the supposed academic advantages of single-sex schooling have recently been concluded as negligible or not important (e.g., ). For scholars, it is timely to concentrate further on determining the social effects of single-sex education.

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