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GIRLS' DAY SCHOOL TRUST

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Why (and how) girls thrive in girls-only schools

The GDST Perspective

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CONTENTS

The argument in brief:

- Gender affects the way that students experience education
- Girls face pressures to conform to gender stereotypes – pressures which are stronger in the presence of boys
- Girls need and deserve space in which to develop their full potential, and to make informed and unconstrained choices about interests, subjects and careers
- In girls-only schools their needs and preferences can be fully accommodated within a dedicated learning environment
- Successful girls' schools are those in which a dedication to girls' education is reflected in their physical design, curriculum and co-curriculum offer, teaching and learning approaches, and in their whole-school culture
- Today's girls' schools serve to subvert, rather than support, gender stereotypes and a priori assumptions, by offering an education designed for and dedicated to the development and empowerment of successful, happy, confident and adventurous young women.

EXECUTIVE SUMMARY

Excellent schools encourage and assist pupils to realise their potential, and are designed to equip them for success and fulfilment in the world beyond. Girls' schools are founded on the principle that these aims are best achieved by educating girls separately.

There is strong evidence that girls-only education leads to higher academic achievement, greater diversity of subject choice, stronger self-confidence and resilience, and enhanced career progression.

Girls differ from boys not on any intellectual or cognitive dimension, but in attributes and dispositions that have their greatest impact in childhood and adolescence, and which mean that while girls don't necessarily learn differently from boys, their learning needs and preferences, and indeed their experiences of school, are different from those of boys.

Typically, girls prefer cooperative, discussion-led learning environments; adapt better to coursework tasks and collaborative, project-based activities; and respond to different forms of curriculum content.

Girls often also adapt their behaviour in the presence of boys – to their own disadvantage, for instance in adopting supporting or moderating roles in discussion, avoiding risk-taking in inquiry, in their choice of subjects for study, and in their propensity to disengage from co-ed PE and sports activities.

Gender stereotyping and differences in expectations and self-image tend to affect girls' behaviour, attitudes and choices, unless they are checked and challenged at school. Girls should have the opportunity to be educated separately not because they need protection, but because they deserve a level playing field.

This is not to suggest that all girls are different to all boys, or that all girls are the same. But typical attributes, behaviours and needs differ. Single-sex settings allow teachers and schools to focus more effectively on the needs of individual girls.

There is evidence that girls achieve more when they are given their own dedicated space in which to develop. In single-sex schools, girls:

- are less likely to conform to a priori gender stereotypes,
- are less constrained in their choice of subjects,
- show a greater propensity to take risks and innovate,
- perform better in examinations,
- have more opportunities to show leadership, and
- are more successful in the job market.

These effects do not follow inevitably from the separation of the sexes in education. Single-sex education, to be successful, must be more than an organisational device – it needs to be underpinned by a set of principles, and articulated in a set of practices, whereby girls are nurtured, challenged and empowered.

GDST schools are able to offer an ideal learning environment designed for and dedicated to girls' learning needs and preferences, and free of gender-stereotyping and distraction.

In coeducational classrooms, boys tend to monopolise discussion, and take more domineering roles in group work and in practical exercises. There is pressure on girls to conform to prejudicial gender roles. Teachers tend to adopt styles and use content that seek to maximise boys' engagement and regulate their behaviour. Girls are assumed to be less problematic: in particular, teachers tend to ignore the strong correlation between high motivation and high anxiety in many high-achieving girls. In girls-only environments, girls' needs and preferences come to the fore.

Teachers in all-girl classrooms can focus on working with, but also challenging, girls' propensities to seek security in structures and schedules. Teachers find that younger girls are particularly keen on explicit agendas (for example clarity in learning objectives, and for young pupils a clear schedule for the day), and gain confidence from the rehearsal of past understanding at the start of lessons, and explicit links to next steps at the end. But girls-only classrooms also provide the opportunity to push at rather than simply police these boundaries – to challenge risk-aversion and encourage adventurousness, within an affirming environment.

In co-ed settings girls often adopt roles that reflect others' views of them, and which tend to narrow their choices, both academic and non-academic. Girls at GDST schools are empowered to reject gender stereotyping, for example in sports, subject and (later) career choices. In single-sex settings a high proportion of girls choose to continue with what are otherwise seen as 'masculine' subjects – like maths, physics and (later) engineering.

In coeducational contexts, girls are more likely than boys to participate, but less likely to assume leadership roles, in extra-curricular groups and activities. In GDST schools, girls show less reticence in adopting leadership roles, and respond well to the opportunity to explore a wider range of possible 'niches' within the school community.

Coeducation is nowadays the 'norm', insofar as a majority of students and schools are mixed. But that does not make single-sex schools 'abnormal'. Girls' secondary schools and colleges were originally established to equalise educational opportunities at a time when secondary and higher education were designed for and dominated by men. In a more equal world we still need single-sex schools because, while society and coeducational schools are more gender-blind, they are still far from gender-equal.

Some proponents of co-ed schooling have argued that schools should reflect society in their gender composition. But schools should be set up to challenge, not simply to reflect and reinforce, the gender asymmetries that still pervade the wider world.

GDST schools are designed to maximise opportunities for girls to realise their potential. They do this through:

- the design of the schools themselves, including not just the classrooms but also social spaces and informal learning areas,
- the timetable (length of lessons and structure of the school day),
- curriculum content and classroom interaction,
- the pedagogical practice of teachers,
- subject choice and co-curricular opportunities,
- girls-only sports and fitness activities, and
- a whole-school culture conducive to girls' education.

Single-sex education actually serves a subversive purpose: GDST schools seek to challenge traditional gender stereotypes, give girls space to develop a strong sense of themselves and their value, and nurture the confidence to make their own choices, free of any sense that the script has been written for them. As day schools, they offer a girls-only space to complement the rest of a girl's life-world – which by all accounts does not exclude boys.

GDST schools provide a learning environment specifically designed for and dedicated to the development of confident, courageous, creative and resilient young women.

The key ingredients of the learning environment in GDST schools can be summarised as:

1. Commitment to excellence as schools: the non-negotiable starting point
2. Design of purpose-built learning spaces with girls in mind
3. Every curriculum and co-curriculum opportunity available to girls as of right
4. Teaching and learning focused on girls' learning needs and preferences
5. A whole-school culture that respects, nurtures, challenges and empowers girls.

A GDST Girl:

- **Possesses a spirit of enquiry,** exploring and evaluating evidence, ideas and arguments in a generous, critical and constructive way. She is able to articulate and defend her own views, and is respectful of the views of others. She is equipped to make connections between concepts and to grapple with big ideas.
- **Collaborates** to create and share knowledge. She is receptive to new ideas and is keen to learn new things and new skills. She appreciates the power of working together to a common purpose. She seeks to participate critically, considerately and constructively in her community, her society and her environment.
- **Meets new challenges** with resourcefulness and resilience. She is enterprising and adventurous, willing to take the initiative, and not afraid to aim at tough targets. She is creative and can adapt to situations requiring the application of her knowledge and skills in new and unexpected ways.
- **Takes responsibility**, not least for her own learning. She appreciates the importance of mental, as well as physical, health. She values fairness and acts with integrity. She is aware of herself and her impact, and is respectful towards others. She is sensitive to and appreciative of culture, context and community.

INTRODUCTION:

Education, Excellence and Empowerment

For parents choosing schools, single-sex education is not always at the top of the agenda, and for parents who themselves most likely attended mixed schools, the concept of single-sex schooling might appear rather exotic (Lee and Marks, 1992). At every stage, the key criteria are academic excellence, pastoral care, co-curricular opportunities and prospects for progression. But dedication to the development of girls is a key to the success of GDST schools in delivering absolute excellence across all of these criteria. Parent surveys in GDST schools confirm that while parents do not necessarily consider single-sex the main factor in choosing the school, they increasingly value it once their daughters have begun.

The choice is not necessarily between single-sex and mixed schools: some coeducational schools now offer single-sex classes at particular stages (in a so-called 'diamond' pattern) and/or in particular subjects (usually science, technology and mathematics). But there is evidence that the effectiveness of single-sex education is considerably diminished when it is introduced within an otherwise coeducational context. Riordan (2015, p.7) refers to single-sex classrooms in co-ed schools as an 'aberrant strain', and argues that the full effects of single-sex education cannot be realised in 'small doses'.

The key criteria are academic excellence, pastoral care, co-curricular opportunities and prospects for progression

The argument developed here is that:

- Gender affects the way that students experience education,
- Girls face pressures to conform to gender stereotypes – pressures which are stronger in the presence of boys,
- Girls need and deserve space in which to develop their full potential and to make informed but unconstrained choices about interests, subjects and careers,
- In girls-only schools their needs and preferences can be fully accommodated, within a dedicated learning environment,
- Successful girls' schools are those in which a dedication to girls' education is reflected in their physical structure, curriculum and co-curriculum offer, teaching and learning approaches, and indeed in their whole-school culture,
- Today's girls' schools serve to subvert gender stereotypes and *a priori* assumptions, by offering an education designed for and dedicated to the development and empowerment of successful, confident and adventurous girls.

A century and a half ago, girls' schools were a response to the lack of educational provision for girls; and later concern focused on girls' academic under-performance compared to boys (Bryant, 1979; Purvis, 1991; Spencer, 2000; Lahelma, 2014). More recently, concern shifted back to boys' comparative underachievement (Weaver-Hightower, 2003). Indeed, there is a growing assumption that the school system now favours girls. Evidence reviewed here suggests that this is far from self-evident.

There is a prevailing sense that educating the sexes separately reflects a historical hangover from a period when boys and girls were destined for different occupations and roles, and that, by extension, co-ed settings reflect a more equal and more modern society. Across mainland Europe, certainly, legislation for coeducation was seen as part of a progressive social shift (Holz and

Shelton, 2013). But this is not the whole story. Girls' schools and colleges were established in late nineteenth century England to promote gender equity and equal educational opportunities. The move towards coeducation did not reflect any educational theory or evidence, far less an equity agenda. More often the decision to open doors to females reflected concern over failing finances and falling rolls (Riordan, 2015; Malkiel, 2018).

Riordan (2015) interrogates the assumption that coeducation offers greater gender equity and equality of opportunity, and observes that, 'Coeducation as a form of school organisation was institutionalised with little regard for educational research or educational theory' (p. 3).

Co-ed settings tend to be characterised by an agenda of 'gender-blindness'; this is not the same as gender-equality (Chadwell, 2010). In this respect, the title of the 2017 BBC documentary,'No More Boys and Girls: Can Our Kids Go Gender Free?' was misleading. Dr Javid Abdelmoneim was advocating treating boys differently but counterintuitively – teaching girls to be braver, and boys to be more in touch with their feelings.

The contemporary case for girls-only education is founded on the desire to offer every opportunity to girls by fashioning an environment that encourages development and realisation of their potential as individuals, by tailoring education to girls' learning needs and preferences; and by offering activities and academic opportunities free of constraints imposed by gender-stereotyping. For GDST schools, excellence in education means all of these things.

All schools seek to identify and develop the potential of individuals, and this usually involves grouping pupils according to a number of criteria – among which are age, ability and interest (e.g. subject choice). Gender is another dimension along which grouping occurs. Logically, in sorting pupils into groups in this way, teachers can concentrate on much more sharply focused differentiation in the classroom, tailoring teaching to the needs of individuals as individuals (Chadwell, 2010).

The dual emphasis on excellence in education and on the empowerment of girls comes together in GDST schools to ensure outstanding academic results; but it goes much further, in nurturing each pupil's potential and in developing her as an individual.

Successful single-sex schooling is that which prioritises girls' education in an environment that strives for excellence, and which puts equal value on academic achievement, co-curricular engagement, and the formation of character.

KEY CAVEATS

The argument for single-sex schooling does not rest on assumptions of gender differences in the brain's structure and function, or in cognition. It is generally accepted that such differences *among girls* are as important as those between boys and girls (Campbell and Sanders, 2002; Hyde, 2005).

Arguments for single-sex schooling are based on factors that affect empirical differences in perceptions, behaviour, needs, preferences and outcomes. The argument can be made for single-sex schooling independently of any position on whether these gender differences are due to biological hard-wiring or socio-cultural conditioning[1].

Debate over single-sex versus coeducational schooling is long-running and is unlikely to be conclusively determined (Gordillo, 2017), not least because the protagonists often differ on the criteria for measuring success, and the time-period over which they are measured.[2]

Although single-sex schools tend to dominate exam league tables, it is difficult to come to definitive conclusions regarding the impact of single-sex schooling on academic achievement, because of the sheer number of interconnected factors, such as prior achievement, family circumstances, socio-economic status, and school type and history – all of which have an influence on individual and aggregate educational outcomes (Smith, 1984). In the UK, most single-sex schools are selective or independent or both, and this inevitably skews the picture.

Not all girls' schools are found at the top of results league tables. But that does not mean that single-sex environments don't have an effect – it just means that not all of them do. But then, not all single-sex schools self-consciously seek to design and deliver a distinctive girls-only experience (in and out of the classroom); and certainly not all succeed.

The criteria for success in education go well beyond immediate test scores. Successful girls' schools address girls' whole education, and are built on distinctive values and principles, curriculum and pedagogy (in other words, the overall school environment, cultural and physical).

Past decades have seen a trend towards coeducation in countries like England and Australia where single-sex education has traditionally been strong in the independent sector. Guest (2014) argues that it would be wrong to conclude that this reflects the educational superiority of one model over the other. Indeed, he suggests that the main motive for the move has not been about quality of education at all: 'Opinion from studies and anecdotal evidence from heads … suggests that the majority of schools that have changed have done so to enhance enrolments, both in number and quality'. In setting out the case for his own school's transition, he states baldly that, 'The decision to be considered now for (the school) is whether to make structural adjustments for a lower enrolment future or to embrace growth through the introduction of coeducation.'

The growth of coeducation in the independent sector has indeed mostly been the result of schools needing to reinforce pupil numbers, and/or to cut off the 'tail' of academically weaker boys by introducing bright pupils of the opposite sex[3] (see Walford, 1983). Some boys' schools that have gone co-ed have acknowledged that the principal benefit is to the boys, who it is assumed will gain from the civilising influence of girls[4]. Loren Bridge, the chief executive of the Alliance of Girls Schools Australia, pointed out, with reference to a well-known boys' school that went co-ed: 'It's basically a boys' school with girls in it. And the girls are there to help socialise the boys.[5]

1. Discussions among natural and social scientists on brain differences and their significance for gender identity are fraught with difficulties in the interpretation of evidence, but also in the interpretation of each others' ideologies, as a review of a major new study (Jordan-Young, 2010) inadvertently demonstrates: Rose, H. and Rose, S. 'Never mind the bollocks', London Review of Books, 33 (9), 28 April 2011, 17-18

2. See Halpern, D., et al (2011) and see the subsequent discussion in Science 335, 165-168; see also http://www.theatlantic.com/education/archive/2014/03/the-never-ending-controversy-over-all-girls-education/284508/

3. 'Sex change', The Economist, 28/04/2018, page 25

4. https://www.thetimes.co.uk/article/guy-sanderson-why-im-taking-eltham-college-co-educational-l28mg9fw8

5. https://www.theguardian.com/australia-news/2019/oct/26/co-ed-versus-single-sex-schools-its-about-more-than-academic-outcomes

Nancy Weiss Malkiel (2018) studied the debates over the admission of women to Ivy League and Oxbridge colleges. The flip to coeducation from the mid-1960s coincided with the women's liberation movement, to be sure, but gender equality was not the principal driver. Yale's Kingman Brewster admitted, 'Our concern is not … what Yale can do for women, but what women can do for Yale'. A retired don at Hertford College, Oxford recalled that, 'at no time was anything approaching a feminist argument made'. The debate was all about the means of maintaining elite status.

Although co-ed settings now seem to be 'normal' (in the sense that they are in the majority), it would be a mistake to assume that they are therefore more 'natural' than single-sex settings. One argument often made by co-ed advocates is that since the 'real' world which pupils will enter is mixed and free of gender bias, so schools should reflect this.[6] What this argument ignores is the persistence of structural obstacles and stereotypes that females still face. Schools should not seek to be facsimiles of the 'real' world; they should prepare pupils of both sexes to navigate and subvert the obstacles that persist (Nuamah, 2019).

In the United States there has been a recent rejuvenation of single-sex education, not least in the 'public' (i.e. state) school sector, associated with a progressive agenda to educate and empower girls particularly in disadvantaged urban areas[7]. The number of single-sex 'public' schools in the US grew from just two in 1996 to more than a hundred by 2014 (Riordan, 2015). In that same year, there were reported to be 850 US public schools with single-sex programmes[8].

In the aftermath of the murder of Sarah Everard, and in light of the growing weight of testimony about sexual abuse through the Everyone's Invited movement, the discussion of single-sex schooling has changed its register. Natasha Walter, a feminist writer and human-rights activist, tweeted her change of mind on single-sex schools, saying that she believes they can liberate girls and boys from the 'boxes of feminine and masculine behaviour'.[9]

6. *https://eastoftheriverdcnews.com/2018/01/20/advantages-single-gender-schools/; https://www.care.com/c/stories/5373/single-sex-schools-the-pros-and-cons/en-gb/*

7. *https://www.studentleadershipnetwork.org/girls-education/overview/?fwp_school_program=ywln#program-tabs*

8. *https://www.theatlantic.com/education/archive/2015/12/the-resurgence-of-single-sex-education/421560/*

9. *https://www.theguardian.com/education/2021/apr/04/are-single-sex-schools-the-safe-option-after-abuse-scandal; see also https://www.standard.co.uk/comment/parents-educate-sons-wolf-whistling-everyones-invited-b926806.html*

GIRLS-ONLY EDUCATION:

Significant outcomes

The positive impact of single-sex education can be explored with reference to several sets of measurable outcomes:

1. Academic achievement: *girls perform better in single-sex schools*

The outstanding exam performance of girls in single-sex schools is reflected in the disproportionate share of top league table positions taken up by girls' schools – many of which are part of the GDST. These schools are dedicated to excellence in education, but they are also dedicated to girls.

It is often argued that where girls-only schools perform more strongly (for example in examination league tables) this can be explained by controlling for pupils' ability, social class and income (Elwood and Gipps, 1999; Leonard, 2006). Many studies across several countries have concluded that there is no clear superiority of either coeducational or single-sex schooling for girls once these other factors are controlled for (see for example Yates, 1993; Hattie, 2009). Girls' schools that are selective will tend to do well because they have able students, irrespective of gender. But in a sense, that is precisely the point: students do better where schools can adopt a more tailored approach to individual students, and where one size doesn't have to fit all.

The Alliance of Girls' Schools Australasia commissioned an analysis of PISA data from 2015 and 2018, which reported, 'in addition to confirming academic advantages, the data shows that girls at single-sex schools generally enjoy schools more, experience less bullying, have fewer disruptions in class, make friends more easily, and feel more like they belong at the schools compared to girls from co-educational schools.'[10] There tends to be a positive feedback link from these factors to academic success.

Since the relaxation of legal constraints on single-sex 'public' (i.e. state) schools in the USA since 2006, there has been a remarkable growth of girls' charter schools aimed at raising achievement and aspiration among girls from low-income families (Duru-Bellat, 2012). As of 2016, there were over a hundred stand-alone all-girls schools in the USA (Pustejovsky, 2019). The Young Women's Leadership Network sponsors five schools in New York City, and has affiliates in six states.[11] In 2016, the Girls Academic Leadership Academy (GALA) opened in Los Angeles as the first all-girls STEM public school in California[12]. The Young Women's Preparatory Network supports seven all-girls schools across Texas, focused on empowering students from disadvantaged backgrounds (Pustejovsky, 2019).

Salomone (2005; 2013) makes a strong case for single-sex schooling in raising academic attainment particularly among disadvantaged students in inner city schools. Other evidence shows that single-sex schooling has led to higher achievement for girls, and for low-income and ethnic minority boys (Datnow and Hubbard, 2002; Riordan, 2015; Pustejovsky, 2019). Studies have shown that single-sex settings increased attendance and improved behaviour (Ferrara and Ferrara, 2004). Research in Trinidad and Tobago shows positive educational and social effects from single-sex settings in previously low-performing schools (Jackson, 2017).

Chadwell (2010), noting the growth of single-gender programs within co-ed high schools, observes that, 'teachers, parents and community

10. *https://www.agsa.org.au/news/new-pisa-analysis-shows-girls-school-students-outscore-co-ed-girls-on-all-academic-measures/*
11. *http://www.ywln.org/all-girls-school*
12. *http://blog.cue.org/las-first-public-girls-stem-school-goes-global/*

members are slowly becoming more comfortable talking about gender-specific learning'

Riordan (2002; 2015) argued that, while single-sex schools are demonstrably effective in providing greater equality and greater achievement, there is little evidence that school type affects the academic achievement or development of middle-class pupils. However, a study of value-added between Key Stage 3 and GCSE results in England suggested that pupils in a selective environment do in fact record greater progress in single-sex schools (Malacova, 2007).

A study in Poland found that female adolescents attending all-girls schools scored higher on lower-secondary school exams in comparison to those who attended co-educational schools – significantly so in science. Since the examination results were the main criterion for admission to upper-secondary schools, attending an all-girls school was thought to significantly affect future educational career and job opportunities for young women (Koniewski and Hawrot, 2021).

In a study using a cohort in Seoul that was randomly assigned to co-ed and single-sex high schools, Park, Behrman and Choi (2013) found that the positive effects of single-sex schools were substantial, even after taking into account variables such as teacher quality, the student-teacher ratio, the proportion of students receiving lunch support, and whether the schools were public or private. They found that pupils from single-sex schools scored more highly on Korean and English tests and were more likely to progress to four-year colleges.

Subsequent research in South Korea (Dustmann et al, 2018) has confirmed that pupils in single-sex schools outperform their counterparts in co-ed schools. The effect is stronger for girls. Conversion of some schools to co-ed status resulted in declines in academic attainment for both sexes.

Diaconu (2012) investigated science achievement and attitudes towards science for eighth-grade students attending single-sex or coeducation schools in Hong Kong and New

Conversion of some schools to co-ed status resulted in declines in academic attainment for both sexes.

Zealand, using the Trends in Mathematics and Science Study (TIMSS) datasets from 1995, 1999, and 2003. The study showed that single-sex education contributed to girls' performance in and attitudes towards science. Leonard (2006), in a wide-ranging review, observes that studies tend to demonstrate that single-sex education has a positive overall effect on girls' attainment in examinations (see also Sullivan, Joshi and Leonard, 2010). The difference is usually small, but '... some studies in the UK show clear advantages for girls in maths in single-sex schools and to some extent in science'. (See also Warrington and Younger, 2003). A study of physics also suggested that single-sex instruction was associated with more positive outcomes (Jurik et al, 2013).

Eisenkopf et al (2011) looked at maths achievement of Swiss high school students who had been randomly assigned to mixed and single-sex classes; and they found that girls did substantially better in single-sex classes, were better able to judge their own abilities, and showed greater self-confidence. Link (2012) found that single-sex schooling is beneficial for girls, though not for boys, in mathematics.

Bohnet (2016) refers to studies that show that women tend to do better on maths tests when the proportion of men around them is small. Indeed, there is accumulating evidence that both sexes do better in tests when there are more girls in a class (Hoxby, 2010; Lavy and Schlosser, 2011; Ciccone and Garcia-Fontes, 2014; Hu, 2015). The 'girl effect' suggests the conclusion that on the whole girls benefit from single-sex settings, but boys don't.

A meta-analysis of research into school type and academic results (Pahlke, Shibley-Hyde and Allison, 2014) found only small differences between single-sex and coeducational settings, although most of the differences were in favour of single-sex schools.

Dix (2018) investigated the impact of school type in Australia on English and maths attainment (measured through international tests including PIRLS, PISA), and TIMSS), in the junior and lower secondary phases. Boys' schools tended to post higher results than girls' schools in numeracy, and girls' schools did better in reading. Single-sex schools outperformed co-ed schools throughout.

The academic influence of single-sex settings appears to extend beyond school. A study in the economics faculty of a UK university found that separating the sexes for one hour per week led to improved academic outcomes for females (Booth et al, 2013).

Even on the narrow ground of attainment in tests, there is thus a lot of debate but some evidence of a positive independent effect of single-sex schooling.

The problem with most studies in this area is that they use a relatively narrow definition of achievement, whereas the impact of education goes far beyond immediate point scores or grades. Some of these sorts of study also seek to prove or disprove something that few would want to claim anyway: that positive academic effects follow simply by separating boys from girls.

In a review of research, Riordan (2015, p.28) concluded that, 'Across a wide range of high-quality studies, students in single-sex schools, compared to their counterparts in coeducational schools, have been shown to have higher academic achievement and more favorable (sic) socioemotional outcomes'.

The balance of evidence is summarised by Laury, Lee and Schnier (2019): 'a growing body of evidence suggests single-sex education can improve student performance, be it math skills and self-confidence, test scores and college attendance, or grades and pass rates.'

2. Subject choice: *participation in maths, science and technology is greater among girls in single-sex schools*

Women are significantly under-represented in maths, science, and technology from upper secondary school onwards (Murphy and Whitelegg, 2006; Lynch and Feeley, 2009; Hicks, 2017). In 2015, women made up little more than 14% of the UK workforce in science, engineering and technology (Saini, 2017). A 2012 study showed that nearly half of all co-ed maintained schools in England did not have a single girl going on to study physics A level (Institute of Physics, 2012; see also ibid, 2013). This is a long-standing pattern in subject and career choices, one that is rooted, arguably, in gender-influenced subject experiences at school (Elwood, 1999; Riegle-Crumb et al, 2012). Even at GCSE, girls have lower odds of taking three or more STEM subjects (Henderson et al, 2017). Mujtaba and Reiss (2016) point also to the tendency for girls to find less encouragement to continue with maths post-16 from families and their own social circles.

Underlying this phenomenon is the paradox that although girls' achievement in school science is as good as (and in the case of GCSE science, better than) that of boys, comparatively few girls take these subjects beyond the compulsory phase, and this is especially true of mathematics, physics, engineering and computer science (Calabrese, Barton and Brickhouse, 2006; Boaler and Sengupta-Irving, 2006). Girls thus seem to be opting out of some subjects despite strong secondary school performances in them.

Given the tendency of boys to predominate in ICT and computing science in later school years, it is worth noting that girls have been shown to have better technical skills and higher order ICT competences than boys in the primary phase (Aesaert and van Braak, 2015). There is no logical reason why coding should be less attractive to girls (Saujani, 2017; Hicks, 2017; Dahn and DeLiema, 2020). Yet even among digitally-skilled young people, gender seems to interfere with career aspirations, with boys aspiring to more technical aspects, and girls looking to pursue more creative dimensions within digital occupations (Wong and Kemp, 2018).

The propensity for girls to drop STEM subjects should come as no surprise, given the gendered perceptions of particular subjects. Mathematics is widely perceived as a symbolically male domain (Brandell and Staberg, 2008), and among upper secondary school students, attitudes towards ICT differ markedly by gender (Logan, 2007)[13]. It is interesting that other studies have suggested that the impact of ICT on learning is stronger for boys than for girls (Hattie, 2009). This tendency towards gender-stereotyping by subject appears to be stronger in coeducational settings (Smyth, 2010).

There is evidence that the transmission of cultural attitudes towards STEM subjects starts very early, and that the underrepresentation of females reflects prevailing stereotypes around some subjects requiring brilliance and genius, compared to others that reward empathy and hard work (Leslie, et al, 2015; Bian, 2017).

Girls' views of particular subjects might in part be influenced by prevailing stereotypes and the perceptions of others, but they are also reflected in and reinforced by girls' own experiences within those subjects in coeducational contexts. A Dutch study looked at cooperative problem-solving among fifteen-year-olds in physics lessons, and at the influence of the partner's gender in students' learning outcomes, and concluded that females do better in all-female groups than in mixed-gender groups, when learning to solve physics problems (Harskamp, Ding and Suhre, 2008).

More positive experiences appear to be behind girls' greater take-up of and achievement in STEM subjects in single-sex schools (Leonard, 2006; Sullivan, Joshi and Leonard, 2010)[14]. A study of engineering graduates in New Zealand (Docherty et al, 2018) linked the strong girls-only school background to cultural differences at single sex girls' schools; but also to the parental

13. *'Tech's gender and race gap starts in high school', The Atlantic Magazine:* http://www.theatlantic.com/education/archive/2014/01/techs-gender-and-race-gap-starts-in-high-school/282966/

14. *Sullivan, A. (2006) Single-Sex and Coeducational Schooling: Life course consequences? Non-technical summary, Institute of Education, Centre for Longitudinal Studies:* http://www.cls.ioe.ac.uk/page.aspx?sitesectionid=363&sitesectiontitle=Single-sex+schools

A survey of more than ten thousand US high school students found that girls attending all girls schools reported having higher aspirations and greater motivation than their female peers at co-educational independent and public (i.e.state) schools

ambition that may correlate with selection of single sex education for their children.

Research is in progress at the University of Massachusetts on the influence of peers on student academic interest and aspirations in STEM[15]. Nilanjana Dasgupta has identified a 'stereotype inoculation model' whereby interaction with female teachers and other students tends to reinforce interest and engagement in science and mathematics.

Park et al (2018) cite the evidence that single-sex settings across the world encourage greater take-up of STEM subjects by girls. This is supported by an Australian survey that found significantly higher take-up of STEM subjects among students from all-girls' schools, which carried through to career choices (Forgasz

15. Research by Nilanjana Dasgupta, reported at the second Global Forum on Girls Education, Washington, DC, June 2018

and Leder, 2017). The German state of Baden-Württemberg funded single-sex educational programmes aimed to help reduce the drop-out rate of female students in STEM. An impact study concluded that such 'single-sex educational programmes help raise the rate of females in traditionally male-dominated STEM disciplines' (Busolt, et al, 2018).

Evidence from GDST schools tends to reinforce the finding that single-sex settings encourage greater diversity of subject choice. Of those studying A level in 2021 more than **47%** of GDST students took at least one science, and **39%** took mathematics. **9.9%** of all GDST A level entries were in chemistry, compared with **7.2%** for girls nationally. **12.6%** of GDST entries were in mathematics, compared with 8.4% for girls nationally. The figures for physics were **3.3%** and **2.1%** respectively.

These figures do not appear sui generis: they arise because there is nothing intrinsically odd about girls doing 'hard' science subjects. These sixth-formers were among the majority (**70%**) of GDST girls who opted to study the three separate science subjects at GCSE.

Horizons that are widened at school continue to be explored at university. Again, science and technological subjects are most definitely not off limits to GDST pupils, **9.2%** of whom went on in 2020 to read medicine or dentistry; **4.6%** to read the physical sciences (including physics and chemistry); **3.1%** to read engineering, **3.2%** maths or computer sciences. All of these figures are well above national girls' participation rates in these subjects.

Up to a point of course, the figures reflect the fact that GDST girls tend to be selected from among the more academically-orientated and high-achieving of the national cohort, and a higher proportion of these might be expected to follow routes into science. But the fact is that these curriculum choices are made in a context in which girls are given every opportunity, without prejudice, to explore and fulfil their potential – there are no such things as girls' or boys' subjects in GDST schools.

Research by the Institute of Physics (2017) on the effectiveness of interventions (such as appointing gender champions, training teachers, rethinking science clubs, and increasing students' awareness and engagement) makes clear that success depends on whole-school initiatives, striking at the heart of school culture, in remedying gender inequality in subject choice.

Studies have found that girls' participation in and enjoyment of physical education is enhanced when they have single-gender PE experiences (Timken et al, 2019; Wallace et al, 2020). An earlier Australian study had found that single-sex PE classroom settings allowed students to achieve higher levels of both participation and performance (Best et al, 2010). A meta-analysis of interventions aimed at increasing physical activity among pre-adolescents (aged 5-11) concluded that interventions that catered for girls only tended to be more effective (Biddle et al, 2014).

The subjects that young people choose to study from age 14 onwards have a potentially significant impact, in closing or opening doors to further study and employment prospects (Anders, 2018).

3. Progression to higher education

A major US study of the attitudes of students from independent schools as they entered college (Sax, Riggers and Eagan, 2013) found that female students from single-sex schools had significantly higher math self-confidence, academic engagement and aspirations. The research has been replicated more recently (Riggers-Piehl, 2018), and the results confirm the persistence of advantages for girls from single-sex schools[16]. The latter were more likely to take risks, seek alternative solutions, explore topics on their own, and take on a challenge that scares them. They were more likely to be engaged in tutoring other students, studying collaboratively, and spending time in clubs and societies. Girls from single-sex schools were also more career-orientated.

A survey of more than ten thousand US high school students found that girls attending all-girls schools reported having higher aspirations and greater motivation than their female peers at co-educational schools (Holmgren, 2014).

16. *Research by Tiffani Riggers-Piehl, reported at the second Global Forum on Girls Education, Washington, DC, June 2018*

4. Career progression: *girls from single-sex schools do better in the job market*

Girls achieve better educationally than boys at the age of sixteen, and a higher proportion of girls continue in education to degree level; yet this early success does not translate into career or salary advantages later in life (Institute of Leadership and Management, 2011). Ofsted (2011b) puts this down to the failure of many schools to challenge gender stereotypes in choices of courses and careers. They found that the most positive attitudes were to be found in all-girls schools – although girls in these schools did not always act to realise their wider aspirations.

A longitudinal study of UK individuals born in 1958 undertaken by the Institute of Education found that girls who attended all-girls' schools went on to earn higher wages than girls from mixed schools, even allowing for socio-economic origins and abilities as measured in childhood (Sullivan, Joshi and Leonard, 2011)17. The study also confirmed that single-sex schooling had an impact on subject choice, self-confidence in STEM subjects, and academic outcomes for women – though not for men (Sullivan and Joshi, 2014). In the view of the editors of a book on gender differences in aspiration and attainment, 'The findings support the assumption that single-sex schooling moderates the effect of gender-stereotyping in terms of self-concept and choice of field of study' (Schoon and Eccles, 2014, 19). A study in the United States found that attending a women's college even for a short time led to higher occupational success (Riordan, 1994).

Girls in single-sex schools are thus making less constrained choices based on genuine interest and ability, rather than on a priori gender stereotypes. Leonard (2006) argued that, 'Girls from mixed schools make more traditional career choices ... so in this respect ... coeducation appears to increase differentiation between the sexes'.

This refusal to conform to stereotypes goes beyond the classroom and the narrowly academic sphere. And it goes beyond merely participating in a wider range of activities. Crucially, leadership and character development opportunities for girls are more readily available in single-sex settings (Datnow and Hubbard, 2002).

These findings are supported by a University of Queensland study (Fitzsimmons et al, 2018) that found no difference in self-confidence between boys and girls who had been educated in single-sex contexts.

5. Wellbeing: *girls are not held back socially by single-sex secondary environments*

There is evidence that students attending single-sex schools develop more egalitarian attitudes towards family life roles than coeducational students (Erarslan and Rankin, 2013).

The longitudinal study of the 1958 birth cohort studied by Sullivan, Leonard and Joshi (2012) found a marginally significant positive association, in the case of women, between single-sex schooling and reported relationship quality. At the very least this suggests that it is not necessary to experience mixed schooling in order to prepare for a fully functional (and happy) life in later years.

17. The longitudinal study tracked the British Birth Cohort 1958 through to age 42, and found a positive premium (5%) on the wages of women (but not men), of having attended a single sex school. This was accounted for by the relatively good performance of girls only school students in post 16 qualifications. See Sullivan, A. (2006), op cit.

FACTORS UNDERPINNING GIRLS-ONLY EDUCATION

The evidence on academic outcomes, subject choice and career progression suggests that girls benefit from being educated separately. Girls and boys seem to differ in ways that make it desirable to design separate educational provision for them. This section explores the possible bases for, and subsequent manifestations of, gender differences in school settings.

Are girls' brains different?

Gurian (2011) and Sax (2005) have made the most of relatively small neurological and cognitive differences between genders. Sax reviewed the evidence for sex differences in sensation and perception, arguing the need for different teaching styles for boys and girls. He suggests, for example, that the ideal ambient classroom temperature is lower for boys than for girls (Sax, 2006).

Sax (2010) claims to find significant gender-based differences in the way adolescents behave, with boys more prone to ADHD and 'oppositional-defiant disorder', whereas girls are over-represented among those prone to anxiety and depression. Boys, he says, tend to 'act out' their problems, whereas girls turn inward, on themselves. His view is that the best defence for girls is the development of a strong sense of self, but warns that this is made more difficult when sexualisation occurs at an earlier age, and social media has created additional anxieties.

Concern that school settings somehow favour girls by default has led to calls to change the educational environment in order to bring out the best in boys – to create 'calmer, easier, happier boys' (Janis-Norton, 2015).

The developmental biologist Lewis Wolpert (2014, 173) asserts that, 'the evidence … is persuasive that there are some fundamental biological differences between men and women'. While intellectual differences are small, differences in emotions are more significant, and can be ascribed to evolution. Christine Skelton (in Francis and Skelton, 2005) accepts that there is some evidence of important differences in the way that cognitive abilities are organised in the brain, but stresses that gender differences are nevertheless largely socially constructed.

Biddulph (2018; 2019) has set out to challenge what he sees as decades of fashionable consensus that the sexes are essentially the same, highlighting differences in brain development. However, he stresses that these differences are relatively small, and indeed his main purpose is to insist that gendered behaviours are reinforced by the stereotyped ways in which boys and girls are brought up. Fine (2011; 2017), though, pours scorn on the idea that boys and girls have differently wired brains, and warns that differences between the sexes (and she doesn't deny their substance or their significance) should not be put down to neurological or cognitive differences. To be sure, much-publicised gender differences in national and international assessments (SATs, PISA, etc.) tend to be greater than any gender differences in IQ tests and tests of reasoning (Department for Education and Skills, 2007) –reinforcing the insistence that significant gender differences are socially constructed.

Gina Rippon (2019) considers that the persistence of the 'myth' that men and women's brains are different is based on bad science and amounts to 'neurosexism'. The brain, she asserts, is no more gendered than the liver, kidneys or heart. She considers that there is no strong evidence for brain sex differences in new-borns, and that differentiation occurs even before birth based on pink-versus-blue cultures.

Kane and Mertz (2012), in reviewing gender differences in performance in TIMSS and PISA tests, conclude that the gender gap in maths outcomes is largely the product of a complex variety of socio-cultural factors rather than intrinsic differences between genders.

The OECD (2015, 3) report on continuing gender disparities in achievement asserts that 'Gender disparities in performance do not stem from innate differences in aptitude, but rather from students' attitudes towards learning and their behaviour in school, from how they choose to spend their leisure time, and from the confidence they have – or do not have – in their own abilities as students'.

It is certainly the case that several areas of the brain exhibit sex differences in structure and size, and some typical behavioural differences between boys and girls seem to be neurologically-based (Galvan, 2017). The psychologist Linda Spear makes the point that even as babies and toddlers, boys and girls differ in interests, temperament and play behaviour. Later on, in adolescence, rates of depression are significantly higher among girls. These differences are at least partly related to sex differences in brain structure. However, she asserts that, 'the relationship between the often modest sex differences emerging during brain development and the often marked sex differences in behaviour, emotional expression, cognition, and sexual attitudes are still largely unknown' (Spear, 2010, p. 274).

Baron-Cohen (2004) argues against reverting to the view that all human behaviour is culturally determined. He does not dispute that culture is important in explaining sex differences, but he argues that it can't be the whole story, and asserts the need to recognise the interaction of social and biological factors. Although sex differences don't apply to all individuals of one sex, it is the case that in some traits (for example empathy) women do tend to be found towards one end of the spectrum, while men tend to gravitate towards the other.

The 'gender similarities hypothesis' proposes that males and females are similar on most, but not all, psychological variables, and they are more alike than they are different (Hyde, 2005). Hattie (2009) argues that this is reflected in educational studies. However, the research that he reviews does show gender differences in, for example, academic achievement in some subjects, motivational orientation, perceptions of particular subjects, self-concept, and the age at which certain developmental milestones are reached. The debate seems to be more about the size and significance of these differences. It is also clear from his review that the differences are greatest at secondary school age.

Wise counsel cautions against cherry-picking data to claim that girls and boys have differently-wired brains: 'There are many sound reasons to advocate single-sex schooling, but sex differences in children's brains or hormones are not among them ... the argument that boys and girls need different educational experiences because 'their brains are different' is patently absurd. The same goes for arguments based on cognitive abilities, which differ far more within groups of boys or girls than between the average boy and girl' (Eliot, 2009).

Steven Pinker summarises the overall situation thus: 'Many psychological traits relevant to the public sphere, such as general intelligence, are the same on average for men and women, and virtually all psychological traits may be found in varying degrees among the members of each sex. No sex difference yet discovered applies to every last man compared with every last woman, so generalisations about a sex will always be untrue of many individuals.' However, he argues, 'to ignore gender would be to ignore a major part of the human condition', and asserts that the minds of men and women are not identical, giving rise to some 'reliable differences' (Pinker, 2002; see also Blakemore and Frith, 2005; Blakemore, 2018).

In terms of academic ability as defined by test scores, there does seem to be a basic gender effect. There is plentiful evidence that, in general and across a range of tests at the secondary stage, boys are relatively over-represented at either extreme of the ability range. This is particularly marked in mathematics. Heim (1970) coined the phrase the 'mediocrity of women' to characterise the statistical tendency for females to show a lower standard deviation on intelligence tests (see also Mellanby and Theobald, 2014). The tendency for boys to dominate the top and bottom of ability distributions appears to be a characteristic of A level results in recent years, at least until 2021.[18]

GCSE results tend to show a more nuanced pattern: in 2014 boys' scores had a higher standard deviation, but girls' scores had a higher mean – reflecting an overall better female performance at GCSE. However, the lower mean and higher standard deviation for boys can largely be attributed to a higher proportion of low scores. In fact girls predominated at the extreme top end of the score distribution in the vast majority of subjects (Bramley, Vidal Rodeiro and Vitello, 2015).

18. 'Boys tend to either get top marks or fail in exams says new research', BBC news 3 August 2015: http://www.independent.co.uk/news/education/education-news/boys-tend-to-either-get-top-marks-or-fail-in-exams-says-new-research-10435842.html

Gilligan (1982, 1988, 1990) puts forward the idea of gender differences in self-definition and ethical evaluation. She argues that females tend to define themselves through their relationships with others, while males follow 'traditional masculine' lines of self-definition – according to their occupational selves.[19] On the basis of a study of girls at a selective single-sex school in New York state, Gilligan asserts that women speak in a different voice, but that that voice is often muted by gendered stereotypes in the dominant culture.

Wise counsel cautions against cherry-picking data to claim that girls and boys have differently wired brains

19. *'The new psychology of women', New York Review of Books, 38 (17), 24 October 1991, 25-32*

Psychologists at Warwick University have found marked gender differences in the way that people go about conceptual classifying or categorizing. They found that men tend to leap to black-or-white conclusions, whereas women tend to see shades of grey, or indeterminate categories.[20]

Manon Garcia (2021), investigates why women adopt behaviours that can be seen as submissive, including allowing men to do less than their share of housework and going on a starvation diet to reach size 0. Arguing that women are not submissive by nature, she follows Simone de Beauvoir in arguing that, 'women's decision to submit is not, strictly speaking, a choice' given the social, economic, and other realities of their 'situation' in life. Rachel Simmons[21] takes the view that gender differences become apparent and intensify during adolescence (see also Palmer, 2013). These differences relate to self-esteem, internalising behaviours (depression, anxiety, self-questioning), stress, interpretations of failure (receipt of negative feedback and propensity to take risks) and self-objectification (see also Whitham-Blackwell, 2017; Damour, 2019). Surveys show a substantial (and growing) incidence of depression and anxiety among girls.[22]

The central problem, then, is not whether there are gender differences, so much as whether these can be ascribed to nature or to nurture. O'Toole (2015, 3) concludes that '… there are small innate biological differences between men and women's psychologies, which our treatment of people in male bodies and female bodies conditions into significant and oftentimes worrying gaps'.

A further difficulty lies in mapping any gender differences in the brain or in behaviour to differences in attitudes to learning. Neuroscientist Stephanie Burnett Heyes[23] warns that while it is possible to show gender differences in the brain (some of which link to evident gender differences in cognitive performance, such as the tendency for men to be better at motor and spatial tasks), it is not at all clear, given current knowledge, what the educational implications of these differences might be. That said, Deak (2002) asserts a link between hormonal differences and girls' predisposition towards sequential, detailed, language-based factual tasks.

These approaches tend to reassert the biological basis of some cognitive and affective gender differences, mediated and magnified in a major way by social and cultural conditions. Claims for the efficacy of single-sex education do not stand or fall on this ground, but there is one cognitive area which is of direct relevance...

Girls and boys have different maturation rates

This might be one cause of evident motivational and interpersonal differences between the sexes at primary and secondary level, and the resulting need for protected time in the formative years, as advocated even by those otherwise sceptical of the more outré claims of single-sex schooling (cf. Eliot, 2009).

Young girls appear to be better prepared for the student 'role' than boys – they enter school with more school-relevant knowledge, and tend to be more conscientious, have higher cognitive competencies and possess a more positive social self-concept (Fabes et al, 2014; see also Kling et al, 2013). Indeed, this seems to persist – a UK government review concluded that girls and boys relate differently to schooling and learning, with girls finding it easier to succeed in school settings (Department of Education and Skills, 2007).

20. *'Men make quicker but more judgmental decisions', Daily Telegraph, 18 April, 2011: https://www.telegraph.co.uk/news/science/science-news/8458989/Men-make-quicker-but-more-judgmental-decisions.html*
21. *Comments by Rachel Simmons in a session on 'Effortless Perfectionism' at the annual conference of the National Coalition of Girls' Schools, New York City, February 2016*
22. *'Teenagers struck by depression epidemic', The Times, 22 August 2016; for Scotland, see https://www.thetimes.co.uk/article/teenagers-struck-by-depression-epidemic-gnc05fht8*
23. *Presentation by Stephanie Burnett Heyes, at IoP Opening Doors conference, London, October 2015: http://genderandset.open.ac.uk/index.php/genderandset/article/viewFile/443/729*

The relationship between biologically-based gender differences and single-sex education is not a straightforward one, and arguments for the latter do not rest on success in proving the former

A US study of gender differences in creative thinking abilities found a statistically significant difference in favour of girls, in both 8th and 11th grades (Bart et al, 2015).

PISA results for 15-year-olds in reading highlight significant gender gaps across OECD countries (Marks, 2008; Mateju and Smith, 2015). Burgess, et al (n.d.) examined gender differences in performance at age 16, both in terms of GCSE results and the value added between the ages of 14 and 16. The consistency of the difference – marked in English, less so in maths and science – regardless of context, in their view reflected the different cognitive demands and processes required by the subjects; and the authors suggest that the gender gap is rooted in the different pace of cognitive maturation between boys and girls. Cheema and Galluzzo (2013) argued that the gender gap in maths achievement in the 2003 PISA results disappear once self-efficacy and anxiety are controlled for – although this in itself begs the question.

Lenroot et al (2007) point out that nearly all of the disorders encountered in developmental neuropsychiatry have different ages of onset, prevalence, and symptomatology between boys and girls. In curriculum development, there is a chronic tension between age and stage when specifying appropriate content and attainment targets. 'Stage' might need to be defined at least partly in gender-specific terms.

The relationship between biologically-based gender differences and single-sex education is not a straightforward one, and arguments for the latter do not rest on success in proving the former. Indeed, if we accept that there are few, if any, psychological and related sex differences, then we are left having to explain the very obvious disparities in, for example, the take-up of particular subjects at school and later career

patterns. If there really is no difference between boys and girls in the propensity for engineering or enterprise (say), then the evidence would suggest that social and other factors are influencing girls' choices. The argument for single-sex education would then rest very firmly on the need to avoid prejudging girls' interests and trajectories, and to ensure a level playing field.

Whatever the exact balance between biology and society in gender differentiation, it is generally agreed that schools play a highly significant part:

'The interrelated influence of innate biological factors and socially influenced cultural factors affect us in everyday life … In school it affects the choices students make about what to read and which classes to take, what games to play, how they think about themselves and their abilities as learners, and what they imagine their futures will be' (Kuriloff et al, 2017, p.107).

Asymmetries abound in co-ed settings, even when teachers are not consciously seeking to reinforce them

Gender stereotyping appears to be culturally universal

Across cultures, gender-stereotyping appears to be near-universal, in its occurrence but also in its direction (Sternberg, 1999). Kate Manne (2018) insists that the 'logic of misogyny' persists and remains deeply-rooted even in otherwise 'enlightened' western societies. Stereotyping based on spurious science remains a major obstacle to securing equal opportunities (Saini, 2017).

Boys are typically described or perceived as adventurous, enterprising, individualistic, inventive and progressive. Girls on the other hand tend to be described as cautious, dependent, fault-finding, shy and submissive. This is important because socialisation tends to reinforce and reproduce perceptions, and there is a danger that, in co-ed contexts, girls will be rewarded for particular styles (categorised by Sternberg as judicial, external and conservative). The tendency for behaviour and practice (including by children themselves) to reflect, reinforce and in turn to reproduce structural asymmetries, has resonances with the theory of 'structuration' propounded by the sociologist Anthony Giddens (1984).

Research suggests that the way women see themselves differs depending on the gender-composition of particular interactions, and that furthermore, 'authentic interactions' have been found to relate positively to career aspirations and cognitive performance (Garcia et al, 2015).

The tendency of young people to police (often quite ruthlessly) assumed gender differences is very marked (Skelton and Francis, 2005), as some examples provided by Nicole Allen in The Atlantic magazine make clear: in 2006 students in two NYU classes read case studies about a technology entrepreneur who in some versions was named Heidi and in others, Howard. The students rated Heidi and Howard as equally competent, but liked Heidi less and didn't want to work with her.[24]

This tends to link to what has been called the competence/likeability dilemma (see Bohnet, 2016). Successful women find it more difficult to achieve recognition as both competent and warm (Cuddy, Fiske and Glick, 2008).[25]

Sieghart (2021) sees it even more starkly, arguing that when it comes to competence, there is a deep-rooted 'authority gap' that is as serious as the pay gap. In her view, it amounts to a pervasive often unconscious underestimation of women's competence.

There is evidence that peer policing of gender norms begins very early (Gill, Esson and Yuen, 2016; Xiao et al, 2019). Children start constructing gendered identities from the start, with gendered play being observable in pre-school and Early Years settings. Given the choice, pupils usually sit in same-gender groups and, typically, friendship groups are composed of pupils of the same gender (Skelton and Francis, 2003; Francis and Skelton, 2005; Paechter, 2007; Martin, 2010).

Asymmetries abound in co-ed settings, even when teachers are not consciously seeking to reinforce them. Reference has already been made to the gender bias in career aspirations and subject choices, evident in coeducational contexts. Studies reviewed by Murphy and Whitelegg (2006) suggest that teachers' a priori judgements about pupil ability are influenced by gender. Another study found that teachers tend to perceive boys as having greater ability in maths than girls (Upadyaya and Eccles, 2014; see also Gill, Esson and Yuen, 2016; Borg, 2015). A recent survey commissioned by Centrica found that almost a third of male teachers think STEM careers are more for boys than for girls[26].

Much the same could be said about gendered perceptions of behaviour, as Furedi makes clear[27]. Francis and Skelton (2005, p.113) observe that 'behaviour that teachers see as acceptable in one gender is sometimes problematised in the other'.

Students who do not fit the perceived norms tend to be the exceptions that prove the rule. With regard to engagement in reading, Scholes (2015) has characterised those who subvert perceived gender norms as 'clandestine readers'.

Jackson and Nystrom (2015) argue that boys are more likely to be positioned as 'effortless achievers', embodying a combination of nonchalance and natural brightness, compared with high-achieving girls who are more likely to be seen as diligent and hard-working: a diligent plodder who is careful, neat and lacking flair compared with someone who might be sloppy but has the necessary spark to 'pull it off'. As Gina Rippon (2019) puts it, talented women are regarded as work-horses, while talented men might be seen as 'feral geniuses'. (See also Francis, Skelton and Read, 2012; Bian et al, 2018a.)

According to Morrissette et al (2018), gendered stereotypes persist in US classrooms despite efforts to create equitable learning environments. They found continued gender bias among educators, with a tendency to attribute conflict styles based on gender, and expectations that boys and girls would prefer different kinds of feedback.

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24 'Karen vs. Kevin', The Atlantic Magazine, May 2013, page 16.

25. 'For women leaders, likability and success hardly go hand in hand', blog post, Harvard Business Review, 30 April 2013: https://hbr.org/2013/04/for-women-leaders-likability-a

26. https://www.tes.com/news/school-news/breaking-news/almost-a-third-male-teachers-think-stem-careers-are-more-boys-girls

27. http://www.frankfuredi.com/site/article/842 accessed August 2019

O'Toole (2015, 12) characterises gender as a kind of performance: 'I knew how to perform my female identity in the way my society deemed best. Other girls, from different nations, cultures, classes or races learn different, but intersecting, versions of this role.' Raby and Pomerantz (2015) show in a Canadian study that self-identified 'smart girls' strategically negotiate their academic identities within the 'gendered terrain' of the school; trying to balance the hazards of being seen as overly academic with the rewards of academic success. They argue that in responding to this tension, girls 'carefully and consciously perform "smart girlhood"'.

Datnow and Hubbard (2002) argue that gender bias is deeply embedded within wider systems of oppression, and that reform efforts in education therefore need to go beyond eliminating sex bias in language and curricula: educators need to strive to implement alternative pedagogies that challenge the unequal power relations inherent in traditional education and society.

Gender stereotyping appears to be deeply rooted, being reflected and reinforced by images projected in the media. Studies suggest that gendered stereotypes of STEM careers, for instance, are relatively easily triggered and sustained by exposure to one-off representations, but these are not easily undermined without sustained exposure to a more gender-neutral representation of scientists (Bond, 2016; see also Carnemolla, 2019).

Low-level but persistent harassment remains a problem in coeducational schools. Testifying in 2016 to the parliamentary Women and Equality Committee, the NUT's Rosamund McNeil argued that many incidents were simply not reported because the culture of sexual harassment is still acceptable – being interpreted as horseplay or banter in some schools[28] (see also Institute of Physics, 2015). Mary Bousted of the ATL also spoke out against the sexist school bullying that can prevent girls from participating fully in the classroom[29]. The columnist Laura Bates has argued that sexist bullying is part of a culture that puts girls under pressure to appear attractive and compliant rather than clever and forthright [30].

A poll by Plan International UK found that one in five girls and young women are teased or bullied about their periods; with two thirds of these reporting that abuse mainly happened at school[31]. Pinkett and Roberts (2019) refer to research evidence that more than a third of female students at mixed-sex schools have personally experienced some sort of sexual harassment at school. Bates (2015) argues that acts of sexism range from the 'the niggling and normalized to the outrageously offensive and violent.'

A survey by Girlguiding in the summer of 2021 drew attention to the 'huge scale of harassment girls and young women face' … 'When it comes to feeling and being safe in the world around them, we know girls and young women face harassment and abuse. This limits their freedom, opportunities and forces them to change their own behaviour.' A lot of it takes place in the street and on public transport, but schools are far from safe spaces. 83% of sixth formers said they'd suffered some form of harassment; but so too had more than half of girls aged 13 to 16. As one said, 'Teachers try to control it, but they struggle' (Girlguiding, 2021).

The Institute of Physics (2015) has pointed out that most teachers have had no training in gender issues and unconscious bias, and many are prone to treating sexist language as an aspect of banter. The IoP report referred to confusion over the difference between treating all students the same, and actively removing gender bias. Rosalyn George of Goldsmith's, University of London, has worked on the particularities of girls' friendships, and observes that she was surprised that teachers did not appear aware of the gender-specific issues around how friendships are created and mediated.[32]

28 *http://www.telegraph.co.uk/education/2016/06/14/teachers-ignoring-sexual-harassment-of-girls-mps-told/*

29. *https://www.tes.com/news/there-problem-sexism-schools-it-would-be-surprising-given-evidence-sexism-society-if-there*

30. *https://www.theguardian.com/commentisfree/2016/mar/31/sexism-schools-department-of-education-deny-sexist-bullying*

31. *The Guardian, 28 May 2019. Available at: https://www.theguardian.com/society/2019/may/28/one-in-five-girls-and-young-women-bullied-about-their-periods-study*

32. *'Schools must take account of girls' precarious friendships', The Guardian, 22 March, 2011: https://www.theguardian.com/education/2011/mar/22/schools-beware-girls-friendships-precarious#:~:text=%22Some%20friends%20are%20hard%20to,about%20you%20to%20other%20people.%22*

A girls-only environment might encourage more positive self-images, and a consequently higher uptake of science subjects, for example, as well as a more general willingness to take on and subvert gender stereotypes. Eliot (2009) asserts that, 'the strongest argument for single-sex education is that it can counteract the gender stereotyping that boys and girls impose on each other, especially during adolescence, when everyone's sorting out his or her sexual identity.'

Coeducational contexts tend to entrench culturally-universal gender stereotypes (Francis, Skelton and Read, 2012; Fuller, 2011). The crucial question is whether such stereotyping is likely to be underwritten or undermined by single-sex schools. It is worth rehearsing Leonard's (2006) observation that, 'Girls from mixed schools make more traditional career choices ... so in this respect ... coeducation appears to increase differentiation between the sexes.'

■ *Girls and boys have different needs and preferences*

Differences between girls and boys are evident in the classroom on a day to day, lesson by lesson basis. There is general agreement on this, but much less on explaining the causes of these differences (Francis and Skelton, 2005).

1. Assessment

A gender-specific response to forms of assessment is reflected in a variety of studies and at a variety of stages. At Cambridge in 2014, 19.7% of women gained a First in 2014, compared with 29.1% of male students (University of Cambridge, 2015). One reason appears to be the tendency for the examination system to reward particular (adversarial, assertive, generalising) styles adopted in answering questions (Leman, 1999). The imbalance in the award of Firsts is apparent in arts and science subjects, and in physics it is thought to be linked to the prevalence of open-ended, un-scaffolded questions (Gibson et al, 2015).[33]

There is evidence that boys and girls adopt different learning strategies, which influence both subject choice and attainment at A Level. Elwood (1999) points to research on differential performance at GCSE and A Level which has identified a connection between the ways in which assessments are structured, and gendered preferences for ways of working, knowing and communicating.

A UK government review found that 'reading assessments which focus on narrative may accentuate the gender gap compared to more factual-based assessment … (boys perform) significantly better on a reading comprehension task involving factual content compared to one based on narrative content. Girls' reading comprehension scores were less influenced by the content of the task' (Department for Education and Skills, 2007, 7).

A study of GCSE results has shown that girls had a higher mean score on 84% of written components, and scored more highly on 93% of coursework components. The gender gap was smaller on multiple-choice and short answer formats (Bramley, Vidal Rodeiro and Vitello, 2015).

Studies of the Scholastic Aptitude Test (SAT) in the United States found that female test-takers were more likely to skip questions rather than offer answers that might be wrong – reflecting an aversion to risk, given that within the test, candidates were penalised for wrong answers (Bohnet, 2016).

Machin and McNally (2005) identified differences in learning styles as explanatory factors in the emergence of gender gaps in pupil achievement, particularly at secondary school. They argue that boys' relative under-achievement is due to the impact of changes in the examination system. In particular, the introduction of criterion-referencing, an end to the rationing of top grades, and the establishment of coursework, all appeared to favour girls' learning styles (see also Northern Ireland Assembly, 2001).

It has been observed that girls are more likely to perform well on sustained tasks that are process-based and related to realistic situations, and that require pupils to think for themselves

33. *'Cambridge firsts: why the girls aren't making the grade', Cambridge Student, 12 May 2014: http://www.tcs.cam.ac.uk/news/0032431-cambridge-firsts-why-the-girls-aren-t-making-the-grade.html; 'Major gender gap in history tripos', ibid. 9 Feb 2015: http://www.tcs.cam.ac.uk/news/0033788-serious-gender-gap-in-history-tripos.html*

(Arnot et al, 1998). Gender differences in assessment structures were, ostensibly, behind the AQA Chief Executive's suggestion that GCSEs might in future be offered in two forms – with coursework orientated options more suited to girls[34].

Research predicted that boys were more likely to benefit from changes towards a modular assessment structure (Vidal Rodeiro and Nadas, 2010; McClune, 2001). However, the widespread view that girls prefer sequential assessment methods that reward consistent application rather than 'sudden death' exams relying on last-minute revision, has been challenged (Francis and Skelton, 2005). Girls appear to outperform boys in both coursework and terminal examinations.

Nevertheless, it is significant that when exams were cancelled in 2021 and replaced in England by Teacher Assessed Grades, girls extended their lead at top grades at A level, and overtook boys for the first time in maths.[35]

2. Curriculum content

Research suggests that 'A large part of women's progress in the educational and occupational sectors is in domains that do not violate gender roles; and even when they do enter male-typical domains, women are more likely to choose those subjects within them that seem consistent with their tacitly gendered notions of their interests and their "true selves"' (Riegle-Crumb, 2012; see also England, 2010).

Science subjects are typically perceived as 'masculine', and in policing behavioural norms peers tend to project particular characteristics onto girls who choose such subjects (Archer, 2013; Jurik et al, 2013; Watts, 2014; Danielsson and Lundin, 2014; see also Paechter, 2000). Mascret and Cury (2015) point to a deep perception that science ability is both innate, and masculine. Hadjar and Aeschlimann (2014) discuss the diverging career aspirations that arise from the 'gender associations of school subjects'.

An Australian study found that, '… whilst girls' achievement levels are comparable with those of the boys, for many chemistry is still perceived as a masculine subject. Hence the girls in the chemistry classrooms … construct themselves, and are constructed, as outsiders in the subject' (Cousins and Mills, 2015, 187).

The percentage of girls continuing with physics to A level has declined since the 1980s, despite the fact that girls do better on average in physics at GCSE, as in most other subjects (Bramley, Vidal Rodeiro and Vitello, 2015). The subject is dominated 80/20 by boys (Institute of Physics, 2013). The IoP study Closing Doors found that most schools are inadvertently reinforcing the stereotype. Girls appear to respond more positively to physics when the curriculum is context-based or humanistic, and anchored in relevant problems or case studies; whereas boys tend to prioritise the more abstract aspects of the subject (Murphy and Whitelegg, 2006; see also Kerger, Martin and Brunner, 2011).

An Ofsted (2011a) report on the teaching of design and technology pointed to the need to challenge gender stereotyping in pupils' choices of the subject and what they choose to design. At Key Stage 4, choices of design and technology options (for example electronics versus food technology and catering) were found to be markedly different for male and female students. The problem is that in teaching whole classes choices have to be made, and typically it will be boy-friendly content that is chosen, for reasons discussed below.

The Department for Education and Skills (2007, 3) commented on the 'gender stereotypical biases' underlying the tendency for girls to prefer arts, languages and humanities in their GCSE electives, compared to boys who tended to plump for geography, PE and IT. Gender differences in subject choice become more pronounced at A level. Among the subjects that tend to be new post-16, psychology tends to markedly more popular with girls; business studies with boys.

The perception of particular subjects as 'masculine' or 'feminine' might be related to the nature of their demands on learning (Francis and Skelton, 2005). Mathematics and science might appeal to boys because of the stress on memorisation of abstract facts and rules, and the need for responses that privilege episodic, factual detail. By contrast, English, languages

34. http://www.bbc.co.uk/news/mobile/education-11419483

35. https://www.tes.com/news/levels-2021-girls-outperform-boys-top-grades

and the humanities might be more appealing to girls because of their focus on open-ended tasks related to realistic situations, and their dependence on an elaborative, broader context in responses.

3. Learning preferences

Francis and Skelton (2005, p. 83) assert that '... there is a recognition of gendered tendencies in pupils' preferred ways of learning'.

To speak of 'preferences' begs the question of whether boys and girls learn differently. Reviewing the evidence, Kuriloff et al (2017, p.7) assert that, 'while boys and girls are different in many ways, there is little evidence that their … learning styles are meaningfully different'. They go on to argue that, 'while … there are few, if any, significant … differences in how boys and girls learn, they do have qualitatively different experiences navigating the classroom and the wider world due to their gender'. The idea of learning 'styles' has lost any previous popularity, but there is evidence that preferences and needs do differ, and that they have some link to gender.

Warrington and Younger, in a series of papers, looked at the effect of single-sex classes within coeducational comprehensive school environments (Warrington and Younger, 2001; 2003; Younger and Warrington, 2002). They found that girls and boys benefit from having their own learning spaces, and that single-sex modes of teaching are effective in contributing to higher achievement levels, but only where the teaching explicitly takes into account the sex-composition of the classroom.

A review of research into reading comprehension attainment identified gender differences in reading strategies and learning styles, concluding that the 'ideal learning environment' will be different for boys and girls (Logan and Johnston, 2010). A UK government review of the evidence concluded that girls and boys tend to use different styles of learning, with girls showing greater levels of motivation and responding differently to the materials and tasks given to them (Department for Education and Skills, 2007, 7).

A Swedish study (Samuelsson and Samuelsson, 2016) looked at the relationship between gendered perceptions of the learning environment and achievement in maths. Boys feel that they have more influence over the learning environment, feel greater involvement in lessons, and perceive maths to be more important. The authors observe that this might be due to girls getting less attention than boys, on account of assumptions that they are self-regulating and more likely to be on-task. The study found that girls' achievement tended to be more strongly associated with their perceptions about the level of participation, the communication of clear objectives, and the existence of a supportive group environment.

Jo Boaler studied approaches to maths education at two otherwise nearly-identical schools in England. One of the schools approached maths the traditional way—students copied down formulas from the board, completed worksheets, and were split up into ability groups. At this school, boys did better in maths than girls. At the second school students learned maths through collaboration, working together with their classmates to solve complex, multi-dimensional, open-ended problems. There, boys and girls performed equally well in maths.36 (See also James, 2009).

There is evidence of gender differences in 'ways of knowing'. In the mathematical sciences, for instance, boys more strongly identify with 'separate knowing' (logic, rigour, abstraction, deduction), while girls tend to identify with 'connected knowing' (intuition, creativity, hypothesising, induction) (for mathematics, see Bevan, 2004). These differences are closely connected with particular learning approaches: girls often prefer cooperative and discussion-based learning environments, rather than individualised or competitive environments (Boaler and Sengupta-Irving, 2006; Northern Ireland Assembly, 2001; see also Phoenix, 2004). In terms of learning objectives, it has been observed that boys typically appreciate 'big picture' introductions, whereas girls often prefer more disaggregated, stepwise instructions (Bevan, 2004).

36. *'Sugar and spice … and math underachievement? Why classrooms, not girls, need fixing', Clayman Institute for Gender Research, Stanford University, blog, 28 March 2012: http://gender.stanford.edu/news/2012/sugar-and-spice-and%E2%80%A6-math-under-achievement*

Girls often prefer cooperative and discussion based learning environments, rather than individualised or competitive environments

A Cambridge Assessment report analysed the evidence of gendered attitudes to learning to be found in the PISA 2012 data. 38% of boys reported playing online collaborative games every day, compared with 6% of girls. 20% of girls (and only 10% of boys) reported reading for pleasure an hour a day or more.[37]

Biddulph (2017) has written about some gender-specific issues related to the parenting of girls, pointing to the perhaps obvious fact that girls typically do not respond well to 'put-down' parenting.

As Elwood (1999) observes, the existence of gendered styles and preferences itself says nothing about whether they are 'hard-wired', or are themselves a response to gendered socialization. The fact is, though, that without doubt these differences affect and influence what and how girls learn.

4. Participation in sports and fitness activities

Two thirds of girls give up on exercise by the age of nine (Jago et al, 2017). Another survey reported that the fall-off in physical activity happens very early – around age seven, and is steeper among girls (Farooq et al, 2017).

Best et al (2010) reported that female students' participation and performance in PE was negatively influenced by such factors as distractions, uneven skill levels, uneven strength levels, harassment, self-consciousness, embarrassment, competitiveness, peer pressure, gaining respect and intimidation.

Girls show a tendency to disengage from sport as a consequence of negative experiences at school: 'Social norms related to being female and feminine are still affecting girls' attitudes and behaviour … being "sporty" is still widely seen as a masculine trait' (Women's Sport and Fitness Foundation, 2012). Girls, it is claimed,

37. *Benton, T. (2015) 'Attitudes to learning: questioning the PISA data', conference presentation: http://www.cambridgeassessment.org.uk/Images/gender-differences-tom-benton.pdf*

are put off by too much focus on traditional competitive sport, and by the tendency to reserve attention for the very sporty elite. The WSFF report recommends, inter alia, a greater choice of activities and the opportunity to take part in girls-only groups.

Paechter (2007) found that the way playing spaces are occupied and used tends to reinforce a stereotype of games being a male activity, with all but the self-identified 'tomboys' being relegated to inactivity and spatial marginality in the school playground.

5. Pedagogical practice

There is agreement lot of evidence for the existence of gendered learning preferences, with girls typically preferring collaborative group-work, reflection and discussion, and teaching in small groups; while boys typically prefer competitive situations and whole-class teaching (Francis and Skelton, 2005).

Teachers in co-ed classes generally agree that boys are more likely to dominate verbal interaction: 'In the classroom, boys quite simply take up more space than girls' (Francis and Skelton, 2005, p. 115; see also Francis, 2004). Bohnet (2016) observes that women are less likely to speak up or offer opinions. Even in primary school boys tend to adopt a more active, dynamic, assertive role, while girls are observed to adopt facilitating roles, like sorting out arguments or helping with homework. The challenge for teachers is to resist reinforcing this tendency by expecting and rewarding the behaviour of 'good, sensible girls' – behaviour which leads to girls deferring to boys in the classroom and beyond; and to avoid a self-fulfilling expectation of different behaviour of boys and girls (see Jackson and Nystrom, 2015).

Studies confirm that boys are more apt to cause disruption in the classroom, and that boys receive both more negative and more positive attention from teachers. Girls appear to be consistently under-represented in classroom interactions, a disproportionate amount of attention going to a small subset of more demanding boys (Beaman, Wheldall and Kemp, 2006; Kelly, 1988; see also Gherasim, Butnara and Mairean, 2013). This appears to continue into higher education, where the culture of 'laddism' has become a focus of concern (Jackson, Dempster and Pollard, 2015).

The evidence suggests that differentiated teaching approaches need to be systematically planned and explicitly implemented, monitored and evaluated, as Warrington and Younger's work makes very clear. But in a coeducational context, this is easier said than done. Whyte (1985) looked in detail at the 'Girls into Science and Technology' (GIST) project, pointing out that 'the GIST teachers managed to interact for equal amounts of time with girls and boys, but only with effort'.

Notwithstanding these genuine efforts, it is clear that asymmetries abound, rooted as they are in unconscious bias. Sieghart (2021) refers to a US study that found that elementary and middle-school boys were given eight times more attention by teachers. Boys were rewarded for pushing themselves forward and calling out, girls for being neat and quiet.

Boys' and girls' learning needs and preferences differ at any given age. Notwithstanding the success of girls in tests, it would also appear that the educational agenda in coeducational settings is set by the needs of boys, with teachers' pedagogical strategies necessarily being calibrated towards the learning approaches and curriculum preferences of boys.

■ *Girls behave differently in the presence of boys*

Anxieties over image

Skelton (2010) argues that the recent trend of girls doing better than boys in school is not a result of any change in girls' behaviour over time. Gendered classroom expectations and the performance of girls seem to have been translated from 'failure' to 'victory' without any actual change in behaviours on the part of girls. Amongst even the highest achieving pupils, girls remain anxious about doing well, and concerned about their relationships with other pupils.

Writers have variously pointed to the 'curse of the good girl', whereby girls are pressured to be nice, polite, modest and selfless – which tends to curtail girls' potential. Girls are encouraged to be compliant, accomplished and driven – to project a kind of 'effortless perfection'. Commonly, girls are expected to behave non-confrontationally

and to be sensitive to the needs of others. They don't like to be wrong or to make mistakes, and they avoid situations where they have to defend opinions. Many argue that at around age 12, girls go from being 'real' to being 'good' – giving up a connection with their full range of feelings in favour of fitting in (Simmons, 2009; Flanagan, 2012; Palmer, 2013; Balma, 2017).[38]

Professor Suniyar Luthar has pointed to the perceived 'need to be smart, maintain good grades while remaining well-rounded, pretty and desirable while well-liked … polite and nice … and to accomplish all this without any visible effort.'[39]

Girls' self-image is also subject, from potentially young ages, to influence from marketing and merchandising campaigns that perpetuate gender stereotypes, as suggested by U.S. author Peggy Orenstein in Cinderella ate my daughter (2011). Orenstein cites the ubiquitous pinkness of products targeted at girls and the roles given to Disney princesses in films as examples of the pervasive, unavoidable but ultimately undermining stereotypes with which girls have to contend (see also Walter, 2011; Biddulph, 2019).

Skelton (2010) argues that trying to balance academic achievement with being seen as a 'proper girl' presents girls with difficult challenges, particularly in terms of being accepted and approved of by classmates, and securing the attention of teachers. She explored the views of a group of high achieving 12- to 13-year-old girls, who implied that being regarded as 'clever' continues to be negotiated within acceptable frameworks of femininity.

Studies of girls who are both high-achieving and popular suggest that they tend to adopt stereotypically 'girl' behaviours, effectively underplaying their academic ability (Francis, Skelton and Read, 2012; Fuller, 2011). This leads Francis and Skelton (2005, 108) to assert that for girls, 'the route to "success" is less a path than a tight-rope'. O'Reilly (2013) speaks of girls 'giving up self for safety'.

The problematic performances required to navigate school have been highlighted by Rosalind Wiseman (2016) in the book that inspired the film Mean Girls.

Brutsaert (1999) found that co-ed school girls not only tended to identify themselves more strongly in terms of feminine traits than single-sex school girls, but also in terms of masculine traits, even though their classroom behaviour appeared to be much more inhibited.

There is evidence that girls are put off choosing science subjects because of the possible negative judgement of others: '… women in male-dominated environments are confronted with a double-bind dilemma because being identified as technically competent is contradictory to being identified as feminine or as a woman' (Saavedra, et al, 2014, 332; see also Erchick, 2013).

The digital environment provides challenges in the development of an individual's identity and self-image. There is plenty of evidence that some of these issues are gender-specific (Sales, 2016; Chen and Cheng, 2017). Males are more likely to be bullies and cyberbullies (Li, 2006). Research conducted by the Institute of Education has found that physical and digital harassment of girls as girls is routine in many co-ed schools.[40] Sue Palmer (2013) argues that the effects of 'toxic childhood' tend to hit girls harder. A survey by the Schools and Students Health Education Unit found that online activity has caused a significant drop in confidence among adolescent girls in particular.[41]

The proliferation of social networking means that individuals have less control over their social image. According to Paechter (2013, page 124), 'Schools do need to support young women to think more carefully about their self-representation online, and in particular, to find ways of resisting the pervasive sexualisation that seems to be the norm for girls in many SNS contexts.' The pressure to appear sexy and flirtatious on one's home page is felt by girls who continue to maintain a 'nice girl' image face to face. Laura Bates (2016) discusses the pressures and stereotypes faced by young women on social media. A recent study from UCL links time

38. *Robert, C. 'Little miss perfect', Sunday Times, 19 February 2012*

39. *Quoted by Rachel Simmons in a session at the annual conference of the National Coalition of Girls' Schools, New York City, February 2016f*

40. *Bloom, A. 'Shoved, groped and pestered for sex: a typical day for girls', TES, 18 May 2012, 10; see also http://www.telegraph.co.uk/education/2017/08/13/nearly-half-girls-have-blocked-social-media-users-sufferingabuse/*

41. *https://www.theguardian.com/society/2014/nov/09/teenage-girls-self-esteem-plunges*

spent on social media with the much higher incidence of depression among girls compared with boys[42] .

A study by Spears Brown (2019) made a direct link between the emergence of the felt need for girls in their early teens to prioritize their sexualized attractiveness for the attention and approval of boys, and diminished mastery goal orientation and lower perceptions of academic ability.

Self-concept *(relating to ability and strengths, and informing subject choice)*

Studies suggest that boys' and girls' aspirations, which are similar during the primary phase, tend to diverge between Year 6 and Year 11, with girls' aspirations falling below those of boys in comparable contexts (Richards and Posnett, 2012).

Students' views of their own abilities ('academic self-concept') are highly gendered (Sullivan, 2009). Parker et al (2018) observed persistent significant difference in self-concept between equally able boys and girls. Diaconu-Gherasim et al (2018) found significant gender differences among 7th graders in terms of intelligence beliefs and mastery goals, regardless of level of achievement.

Girls are more likely to see themselves as good at English, while boys see themselves as good at maths and science – even controlling for prior test scores. A recent survey of secondary school students revealed that boys are twice as likely as girls to call themselves a 'natural' at maths.[43] Villalon, Mateos and Cuevas (2015) report an interesting variant on this: in their study, they found no gender-difference in self-efficacy beliefs, despite the fact that female students had more sophisticated writing conceptions.

Bian et al (2017; see also Bian et al, 2018b), in a U.S. study of gender attitudes to intellectual ability, found that 5-year-old children tend to judge boys and girls equally in terms of aptitude, but from the age of six, gendered notions of 'brilliance' were already in evidence, and beginning to affect children's interests: girls being less likely than boys to believe that they are 'really, really smart', and more likely to avoid exercises said to be for the very smartest.

There is a tendency for boys consistently to over-estimate their ability and performance, while girls lack confidence and tend to underestimate their academic ability (Bevan, 2004; Plieninger and Dickhauser, 2015). This is marked among very able girls, on whom expectations are particularly pressing, and for whom the achievement of anything other than 'excellent' grades can be perceived as failure. This is associated with high levels of anxiety and self-doubt (Francis and Skelton, 2005). Gender differences in confidence in learning seem to appear as early as the first years of primary school (Gill, Esson and Yuen, 2016). The tendency for girls to underestimate their aptitude for STEM subjects seems to be one reason for their under-representation in STEM subjects and careers (Perez-Felkner, Nix and Thomas, 2017)[44].

Confidence appears to be one of the strong factors affecting the evident disparity found in PISA tests – where high-performing fifteen year old girls still under-achieve in maths, science and problem-solving when compared with high-performing boys (OECD, 2015). A Scottish study suggests that the gender gap in attainment is greatest among higher-achieving pupils (Corry, 2017).

In a study of girls' participation and achievement in American high school mathematics competitions, Ellison and Swanson (2010) found that not only were girls under-represented, but that their under-representation was most marked among the highest achievers. They concluded that almost all girls with the ability to reach high maths achievement levels were not doing so. Indeed, they found that the highest-achieving girls were concentrated in a very small number of elite schools.

Rachel Simmons (2009; 2018) points to the toxic message of the myth of 'effortless perfectionism' – the insidious self-doubt of you are not enough as you are; you can't keep it up; and there is always someone better. In Simmons's view, the highest-

42. *MailOnline: https://www.dailymail.co.uk/sciencetech/article-6555161/Girls-TWICE-likely-signs-depression-linked-social-media.html*

43. *https://www.tes.com/news/boys-twice-likely-girls-claim-be-maths-natural*

44. *See also https://www.tes.com/news/school-news/breaking-news/girls-downplay-their-maths-ability-even-when-theyre-good-boys*

achieving girls are the most debilitated by fear of failure.[45] There is a long-standing consensus that 'smart' girls tend to be more vulnerable and less confident than smart boys, and as a result tend to deal with challenge in a different way[46].

A gap exists between girls' own perceptions and those of their teachers. Girls tend to rank themselves lower in ability than do their teachers (Leonard, 2006). This tendency of boys to overestimate and girls to underestimate their respective abilities, has worrying implications for differentiation in co-ed classes. Bohnet (2016) refers to the 'stereotype threat', whereby situational factors lead people to confirm negative stereotypes about their particular groups: in studies where girls were reminded of their gender before a test, they tended to perform significantly worse (see also Davies et al, 2002). Stereotype threat has also been used to explain girls' underrepresentation in STEM subjects in co-ed schools and beyond (see Kuriloff et al, 2017).

Research suggests that female students tend to be more extrinsically motivated (undertaking tasks in order to obtain reward) and mastery-orientated (a desire to increase skill and competence, and master new material), compared with male students who tend to be more performance-orientated (desiring to surpass their peers and gain positive judgements) (D'Lima et al, 2014). Male first year college students were found to tend towards greater academic self-efficacy – rating themselves higher in terms of estimated capacity. A recent comparative study across eight countries found these gender differences to be common – if not universal – across cultures (Korpershoek et al, 2021).

Gendered bias in estimations of others' abilities persists. Grunspan et al (2016) found that in undergraduate level biology cohorts, males systematically under-estimated the academic performance of their female peers.

There is a complex relationship between attainment, self-concept and motivation. Logan and Medford's (2011) study of children aged 7-11 found that boys' beliefs about their own competence in reading and their motivation were found to be more closely associated with their actual level of skill. Less able boys are more likely to 'give up' when results don't follow, setting up a vicious circle of under-achievement. By implication, girls on the whole are more likely to be motivated to learn even when results are not encouraging (see also van de Gaer, et al, 2007). Korhonen et al (2016) have shown that interest in maths tends to predict girls' educational aspirations, while maths achievement tends to be more predictive of boys' aspirations.

Gendered self-concept partly explains the phenomenon known as the 'leaky pipeline', whereby girls tend to achieve more highly in school, yet males predominate in career progression. Hadjar et al (2014, 119) express it thus: 'Gendered interests and life plans – being related to socialised gender stereotypes – still reinforce workplace separation in terms of women more often becoming nurses, teachers or engaging in other service professions, and men being more likely to choose professions that are characterised by higher authority, prestige or status.'

An OECD analysis of the 2018 international PISA tests showed that fear of failure, unrelated to actual abilities, was significantly higher among female students in the cohort of 15-year-olds tested (OECD, 2020).[47]

Classroom behaviours

Girls tend to defer to boys in whole-class interaction, desk-based group work, group work around computers, and oral assessment (Howe, 1997):

- Contributions from boys tend to predominate both physically and verbally during classroom interaction (see also American Association of University Women, 1995). This is attributable to boys' tendencies towards hand-raising, restlessness and possibly their reputation for misbehaviour – all of which tends to encourage teachers to give more air-time to boys. Boys ensure their dominance by establishing themselves as a source of help. Boys are asked for help more than girls are.
- In small-group work independent of direct teacher moderation, boys typically have the upper hand. This is evident in the control of

45. *Comments made by Rachel Simmons at the annual conference of the National Coalition of Girls' Schools, New York City, February 2016.*
46. *https://www.psychologytoday.com/blog/the-science-success/201101/the-trouble-bright-girls*
47. *https://www.theguardian.com/education/2019/dec/17/british-girls-fear-of-failure-pisa-ranking*

mouse and keyboard in computing, and in oral discussion – where boys tend to interrupt more (see also Riordan, 2002; Harskamp, Ding and Suhre, 2008).

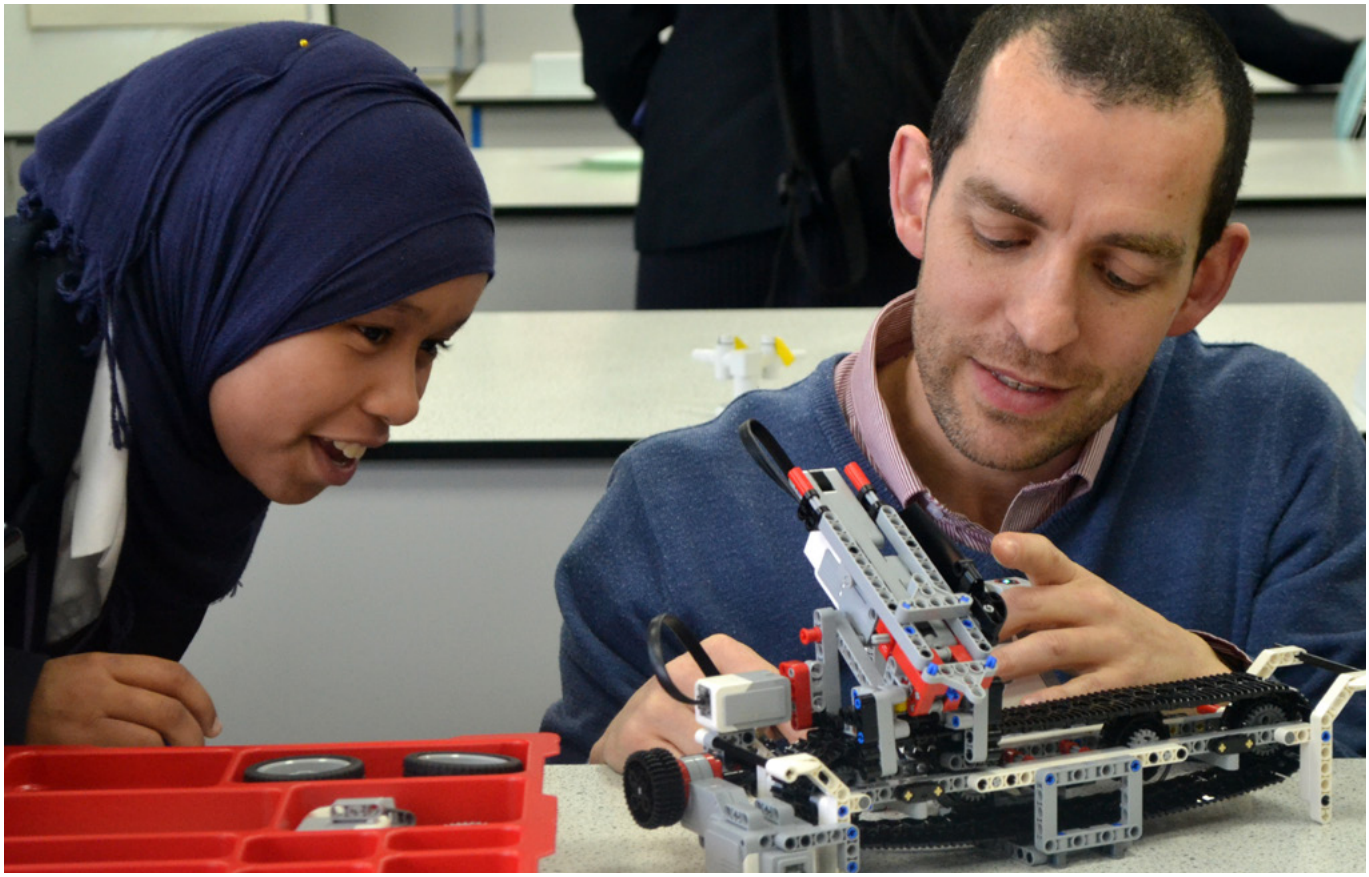
- Boys are more likely to contribute to discussion, and to volunteer for demonstrations and role-plays. They appear to have more experience than girls of having their contributions evaluated during classroom interaction.

These research findings are supported anecdotally by Eliot (2009): 'In some mixed-sex lab groups, boys take over the fiddling that's inevitably required to get an experiment to work. Girls stand back, reading the instructions or acting as scribes but less often handling the chemicals, equipment or slimy specimens – which impairs their confidence. So while girls understand the scientific concepts, they don't actually do science, a big handicap when it comes to exploring technical fields down the road.'

Myhill (2002) suggests that high-achieving girls typically show a tendency to be compliant, conformist and willing to please. Cornwell et al (2012) observe that girls show more positive behaviours with respect to learning (attentiveness, task persistence, eagerness, independence, flexibility, organisation) – all of which might explain why teachers do not feel the need to spend as much time on them – a connection made explicit by Beaman, Wheldall and Kemp (2006, 354): 'it may be that compliant girls are more of a benefit to their teachers than they are to themselves'.

In co-ed contexts, research suggests that girls are expected to exert a civilising influence on boys – moderating the boys' behaviour, softening the classroom atmosphere, being 'good girls' (Jackson, Dempster and Pollard, 2015; see also the memoir by Lynsey Hanley (2016)). Pinkett and Roberts (2019) object to 'timetabled segregation' in single-sex settings, but their main argument in favour of co-ed settings is that boys' behaviour can deteriorate in the absence of girls. They argue in effect that girls adopting 'caretaking roles' is for the greater good.

Lavy and Schlosser (2011) found that, 'a higher proportion of female peers lowers the level of classroom disruption and violence, improves inter-student and student-teacher relationships



as well as students' overall satisfaction in school, and lessens teachers' fatigue.'

Jones and Myhill (2004) confirm that beliefs about gender identity inform teachers' perceptions. High-achieving girls tend to conform to teachers' perceptions, but under-achieving girls tend to be largely overlooked.

The tendency for girls and boys to behave differently in mixed classrooms is a well-known one – girls being discouraged from speaking up or taking the initiative out of fear of looking either stupid or too smart (Campbell and Sanders, 2002)[48].

Many teachers in coeducational contexts make huge efforts to give a fair crack of the whip to girls. But giving due attention to the range of needs and preferences in mixed classrooms puts a huge onus on the teacher, as Sadker and Sadker (1990) identified in their discussion of the inequalities implicit in college classroom interactions (see also Whyte, 1985).

Reticence around adopting or assuming leadership roles

It is not just in classroom activities that boys tend, on the whole, to assert themselves over girls, and thus to set the agenda. Girls are more likely than boys to participate in extra-curricular activities, but boys are more likely to assume leadership positions in those activities (Campbell and Sanders, 2002; Datnow and Hubbard, 2002). It is self-evident that more comprehensive leadership and character development opportunities are made available to girls in girls-only schools.

A study of school sailing programmes in France and California found that young men were viewed as being more legitimate participants and regularly took up the lead role of skipper, whereas young women were considered secondary participants and were typically positioned as crew members (Schmitt et al, 2020).

48. *See also an article by Kara Lawrie-Plews in TES, 27 Jan 2017: https://www.tes.com/news/school-news/breaking-views/give-girls-space-just-be-themselves*

Risk-taking and risk-avoidance

Billy-Jean King has observed that, in her experience, 'Girls are taught to be perfect, boys to be brave'[49] (see also Saujani, 2019).

Part of the 'curse of the good girl' (Simmons, 2009) is the tendency to strive for perfection in everything, which in itself militates against the taking of risks[50]. A study by a teacher in a GDST school focused on the central problem that 'students are reticent during class discussions and reluctant to give opinions on historical issues, particularly when unsure of the "correct" answer'.[51] An OECD report considered the implications of the mixture of attributes typical of female students – lower self-efficacy and self-concept, but high motivation to do well in school. In maths and science in particular, lower self-confidence combined with a wish to succeed were seen as reasons for the higher proportion of high-achieving girls who 'choke under (often self-imposed) pressure' (OECD, 2015, 32). Gill, Esson and Yuen (2016) go further, and refer to dynamic of this 'closed mindset' leading to 'culturally-induced self-sabotage'.

While risk aversion might be another way of describing fear of failure, others have suggested that female students sometimes exhibit a 'fear of success' – or anxiety about not being able to repeat an achievement, leading to holding back or avoidance in a task (Gill, Esson and Yuen, 2016).

Cools et al (2019) investigated the effects of exposure to high-achieving peers in US high schools on the long-run educational outcomes of students. They found that greater exposure to high-achieving boys had a negative effect on maths and science grades, Higher Education trajectories, and even on labour force participation and birth rate. Greater exposure leads to lower self-confidence and aspirations and to more risky behaviour (including having a child before age 18). The effect was most strongly evident among girls in the bottom half of the ability distribution in high-achieving schools. Greater exposure to 'high-achieving' girls, on the other hand, increased attainment of relatively less high-performing girls. The effect of high-achievers on male outcomes was markedly different: boys seemed to be unaffected by high-achievers of either gender.

49. *Billy-Jean King, speaking at the second Global Forum on Girls' Education, Washington DC, 20th June 2018.*
50. *Barker, I. 'The cost of striving for perfection for girls', TES, 16 November 2012, 20-21*
51. *Gibbons, H. (2012) 'Enhancing girls' performance in history by encouraging greater academic risk-taking', unpublished MA dissertation, Durham University*

THE TROUBLE WITH GIRLS

Academic studies suggest that girls have a range of learning preferences as well as needs, which are best addressed on their own terms. Yet in innumerable classrooms the focus has tended to be on 'the problem with boys' – in tackling under-achievement and the need to engage and motivate boys (Gill, Esson and Yuen, 2016; Pinkett and Roberts, 2019).

Educational policy has concentrated on the problem of boys' underachievement, frequently contrasting it with the academic success of girls. This has encouraged a perception of girls as the 'winners' in the educational stakes, and assumes that they no longer experience the kinds of gender inequalities identified in earlier decades (Skelton, Francis and Read, 2010).

Girls are often treated as unproblematic, whereas there is plenty of evidence that girls' achievement – and indeed their health and happiness – are differently affected by, for example, anxieties about their performance, their ability, how they interact in mixed groups, how they perceive particular subjects, how they perceive themselves and how they are perceived by teachers and by their peers. Among girls, typically, academic motivation tends to be higher, but so too are levels of anxiety (Bugler, McGeown and St Clair, 2015; Damour, 2019). Raby and Pomerantz (2015) argue that, 'girls' academic success is neither easily embraced nor unambiguously accepted'.

Simmons (2011) has explored the ways in which girls express their anger in a culture that tends to accept the obvious aggressive acts of boys such as physical confrontations, but tends to encourage a more subtle handling of such feelings in girls. Simmons points to the writing of derogatory notes, exclusion from social groups, and other such actions as the ways indirect aggression enters into the friendships of girls. In a culture where girls are forced to express their anger in more suppressed ways, the resulting acts of bullying become a pattern of destruction. Because of the hidden nature of the expression of aggression in girls compared with boys, Simmons argues that society must find ways to allow females to express their aggression in ways that teach them that conflict is part of relationships.

Schools routinely encourage girls to reject gendered limitations on their aspirations, and to adopt a 'no limits' view. But while traditional stereotypes have been successfully dispatched, there remains a lot of pressure and expectation for female pupils to conform to more nuanced gendered type. As Gill, Esson and Yuen (2016) make clear, this in fact sets up new tensions: 'Part of being an adolescent girl … is to negotiate a path between confident self-expression, ambition and action, and a more accommodating, conforming approach to others.'

'In recent times, girls have shed the quiet image of being on the side-lines and have emerged as first-class students, top performers in … examinations, credited with being reliable in school-related tasks such as homework, neat writing, excellent bookwork, along with being well-behaved in class … They are model pupils whose achievements are expected to lead into high-profile positions and professions in any walk of life they choose.' (ibid, p.2)

Writer Jill Filipovic argues that today girls receive two conflicting messages: be mighty and be good[52]. Cary (2015) describes the tension between the pressure of scoring top grades - and looking like a supermodel. For Lisa Damour (2019), the question is how to get hyper-conscientious girls to build both confidence and competence at school[53].

In coeducational classrooms, as in national policy, the agenda is dominated by the need to raise boys' achievement through encouraging their greater engagement (Francis and Skelton, 2005)[54]. It could be argued that teaching styles, classroom tasks, curriculum content and assessment form and content, are all being used to address the needs of

52. 'The bad news on "good" girls', New York Times, 24 November, 2017

53. 'Why girls beat boys at school and lose to them at the office', New York Times, 7 February, 2019

54. Kuper, S. and Jacobs, E. 'Why are boys falling behind at school?' Financial Times Magazine, 15/16 Dec 2018

boys in particular. There have, for example, been criticisms of SATs tests in English at Key Stage 2, where the texts used and the nature of the questions seem to have been part of a self-conscious attempt to re-engage boys in reading[55].

Concerns about the need to engage and motivate boys have tended to dominate the agenda in terms of curriculum content, assessment forms, and teaching styles in co-educational contexts. More classroom time and attention is given to boys; higher expectations are made of boys; exams are re-structured to put more emphasis on 'sudden-death' tests; curricula are skewed to keep boys' interested. As a result, boys tend to monopolise teachers and resources. This has an impact in affecting what girls are allowed to do in the classroom and what they are encouraged to study in the curriculum. Ironically, as Pinkett and Roberts (2019) have shown, the educational strategies adopted to keep boys on side tend to reinforce gender stereotypes and fail to challenge chronic issues faced in the classroom by girls – including low-level harassment: 'The "distraction" provided by the presence of the opposite sex in coeducation is not just a question of romantic interest' (Leonard, 2006).

This seems to be implicitly understood by girls themselves, who tend to favour single-sex classes, whereas boys evidently prefer mixed-sex classes (Leonard, 2006). Girls seem to understand and appreciate the advantages of single-sex environments (Elwood and Gipps, 1999).

In 2012-13 three GDST schools participated in a research project led by Mike Younger from the University of Cambridge[56]. Students in Years 9 and 11 were surveyed, and they were clear on the advantages of single-sex settings, pointing to the absence of distractions and the freedom from boys' perceived tendencies to monopolise teachers' time. This was connected to the understanding that girls tend to be more mature, age for age. The result was perceived as a quieter, more focused learning environment.

Girls in the survey felt that they were more comfortable, less awkward and more able to relax and be free in the absence of boys. On one level, it meant that they could be less pressured about appearance, but more fundamentally they felt freer to ask questions, suggest answers and participate in discussions without the fear of 'looking stupid'. This was associated with a growing confidence and self-esteem. They also felt that they were able to discuss problems more effectively.

Early studies of the difference between single-sex and coeducational schools (see Dale, 1969) tended to promote mixing for the benefit of boys. Dale argued that boys did better academically in mixed schools, because girls' greater industriousness was communicated to them, and boys were spurred on by competition with the girls. His main concern was to promote what he saw as 'healthy' relationships, and in his view mixed-sex schooling was more 'natural' and provided protection against homosexuality (cf. Sullivan et al, 2012). To be sure, the evidence suggests that boys benefit from the presence of girls in educational settings. It is by no means obvious that mixing benefits the girls.

55. *Boys' Reading Commission (2012) Report of the all-party parliamentary literacy group. National Literacy Trust:* http://www.anneharding.net/tag/all-party-parliamentary-literacy-group-boys-reading-commission/

56. *Mike Younger (2016) Effective Pedagogies for Girls' Learning: A review of recent research. Girls' Day School Trust:* https://www.gdst.net/article/effective-pedagogies-girls-learning-report

DETERMINANTS OF SUCCESS IN SINGLE-SEX SCHOOLING

There is a widespread view that, in today's more equal society, schools should be both co-ed in make-up and gender-free in operation. However, significant structural obstacles remain with regard to gender equality. Kuriloff et al (2017) suggest that schools considering themselves to be gender-free might like to look at gender inequalities in their schools' own hierarchy, the incidence and nature of sexual harassment, the participation of girls in PE and games, the underrepresentation of girls in STEM subjects, and the evidence of classroom domination by boys and their particular needs.

A report by Equate Scotland (2016) recommended that single-sex classes and clubs might help address the gender disparities in recruitment and retention around STEM subjects at school. Their survey found considerable support for this among female students[57].

Merely separating boys from girls does not guarantee success (Francis and Skelton, 2005). Indeed, many would argue that segregation without other changes, in culture and pedagogy for example, tends to reinforce rather than challenge the gender stereotypes and limited horizons that constituted part of the original problem (Fabes et al, 2013). Harris (2004, 103) warns that 'schools '… have always been sites for the production of normative femininity and 'appropriate' young women'. She argues that, 'the space of schools is still designed to produce and regulate notions of appropriate young womanhood'. Iris Bohnet (2016) argues that designing gender equality should start with debiasing organisations instead of individuals.

It is therefore necessary to isolate and analyse the range of factors that, together, constitute a convincing and credible single-sex offer in GDST schools. The focus on girls is inscribed in the design of physical spaces, the nature of classroom interactions, curriculum design, co-curricular and leadership opportunities, an whole-school cultures – all aspects that have been emphasised by Deak (2010).

1. The physical design of girls-only spaces

Individual thought and behaviour, group interaction, indeed all kinds of learning, take place within a series of physical spaces, that may or may not reflect and reward particular modes of being and particular learning approaches.

Attention needs therefore to be given to the design of social spaces such as common rooms and study areas, but it also extends to landscaping. An example would be amphitheatre areas with small groups of seats – for use in spontaneous play by small groups of girls.

Play equipment in junior schools should be designed to encourage adventure (going for for pirate ships rather than fairy castles) and controlled risk (modern climbing frames with modern safety nets).

The girls themselves need to be closely involved in designing their own environment, and usually have high expectations with regard to environmental impact. Girls at several GDST schools have worked closely with teachers and architects to design new facilities – and environmental sensitivity has been a high priority.

Lang (2010) refers to Brisbane Girls' Grammar School, with its new Creative Learning Centre, designed by Michael Banney to group arts studies, and to serve all students as a meeting place and technology hub. The building was specifically designed to provide an environment adapted to teenage girls, and reflects their ways of learning and social interaction (see also Bell, 2007). Designs for new buildings in GDST schools currently seek to find spaces with supporting technologies for collaborative learning and small-group work.

Consultation with pupils has been a key part of the process of designing new sixth form centres, and the result is that they tend to act as a focal point in the social as well as the educational life of the girls

57. *http://www.heraldscotland.com/politics/14773820.Girls_only_science_lessons_could___39_help_reverse_gender_gap__39__in_crucial_industries/*

in the sixth form. A notable feature has been the way that girls have taken ownership of new spaces, spontaneously defining through everyday practice a gradation of learning and recreation 'zones' of different levels of formality.

2. Class time and classroom interaction

Belfi et al (2012) found that single-sex classes are advantageous for girls' well-being and academic self-concept (the results are more inconclusive for boys). They reviewed evidence that girls tend to behave differently, and indeed are treated differently, in different settings; and found that girls are more likely to conform to gender stereotypes in mixed classes: 'Gender is more salient in mixed sex groups than in single-sex groups' (see also Jackson and Smith, 2000). Cribb and Haase (2016) studied levels of concern over personal appearance (the 'thin ideal') and self-esteem, and concluded that, 'the presence of the opposite sex may inflate appearance concerns and lower self-esteem'.

Girls-only schools can reflect girls' learning needs and preferences in the ways in which timetables are constructed, with schools adopting lesson lengths that are calibrated to the 'learning arc' that tends to be slightly longer for girls. Some GDST schools have moved to lessons of an hour – which appears to be the ideal length of time to encourage deep learning. Forty minutes is too short, and the traditional 'double period' too long. Recent research certainly suggests that, typically, girls and boys function on different settings of biological clock (Lusher and Yasenov, 2016).

The debate about the effect of school and class size on educational outcomes has, perhaps surprisingly, a gender dimension. Humlum and Smith (2015) review the evidence showing that boys rather than girls benefit from smaller classes and smaller schools.

Classroom interactions tend to be different in girls-only environments, and teachers are able to give greater equality of air-time to individuals across the whole class. In single-sex classes there tends to be less peer-pressure, and consequent fear of failure – and correspondingly a greater willingness to explore, ask questions and take intellectual risks. Francis and Skelton (2005, p.142) argue that, '... single-sex classes provide girls a space away from the distractions of boys and they can provide opportunities for teachers to redress stereotypical constructions of particular subjects.'

Some studies suggest that girls' interest in science can be increased by choosing particular topics over others; by presenting topics in a female-friendly manner, and even by asking questions in particular ways (Kerger, Martin and Brunner, 2011; Murphy and Whitelegg, 2006)[58]. In girls-only classrooms procedures and interactions are very different. In lab classes, for instance, the pace can be dictated by girls' tendency to reflect and deliberate in planning an experiment, rather than by boys' preferences for leaping in and getting started.

Bohnet (2016) refers to studies showing that fifteen year old girls in single-sex UK schools are just as willing to take risks as their male counterparts. This is supported by the findings of Booth and Nolen (2012) that single-sex environments tend to modify students' risk-taking preferences, with girls from single-sex schools as likely to adopt higher risk strategies as boys, and more likely than girls from co-ed schools.[59]

Gibbons[60] and others have stressed the importance of providing an environment in which girls are encouraged to take intellectual risks, challenging answers which are prefaced by things like, 'I'm probably wrong but...' Kuriloff et al (2017) observe that girls respond well to 'Harkness-style'[61] discussion settings where the goal is not to have the right answer but to consider a topic from a variety of perspectives, in a judgement-free atmosphere.

In a study by three Essex University economists (Booth et al, 2014), undergraduates were put in a situation where they could choose between a safe and a risky choice (the latter potentially bearing greater reward). They found that after a period of time, females in all-female groups tended to

58. Stannard, K. 'Getting girls to stick with STEM subjects', TES, 6 December

59. See also 'Doing gender in classroom discourse', research report Laurel Center for Research on Girls: https://www.tes.com/news/school-news/breaking-news/sixth-form-girls-are-far-more-anxious-about-career-prospects-boys

60. Gibbons, H. (2012) 'Enhancing girls' performance in history by encouraging greater academic risk-taking', unpublished MA dissertation, Durham University

61. 'Harkness' refers to a teaching style whereby pupils sit around a large table to facilitate dialogue and discussion.

act more adventurously than their counterparts in mixed groups.

The quality of classroom interactions depends on the pedagogical response, and therefore on the ability of teachers to recognise and respond to different learning preferences. Any group of girls will exhibit a range of approaches, and clearly a girls-only environment does not invite, nor will it benefit from a 'one-size fits all' approach. The purpose of any form of setting or segregation, by ability or by gender, is not to negate differentiation, but to gain a purchase on it. In single-sex classrooms, girls can be treated as individual girls, and differentiation can be far more focused.

Teachers in GDST junior schools observe that girls in Key Stages 1 and 2 tend to exhibit distinctive behaviours, for example in seeking the reassurance of a clear plan. This might involve having the day's timetable clearly displayed, or in lessons, and in individual lessons, girls engage very positively when teachers set out a summary of prior learning at the beginning, and conclude with an indication of the next steps. There is a dark side to this, of course, of which teachers are well aware: girls tend to be more risk-averse, and will often want to start again if things go wrong. With groups of girls, teachers can address these issues, and exploit the opportunities, more directly. Teachers tend to argue that there is nothing really 'lost' by not having boys around, because in the primary phase boys and girls tend to play alongside, rather than with, each other.

The principal of Brisbane Girls' Grammar School observes that, 'What the teachers understand is that girls need to feel secure in their environment, they must be encouraged to feel confident about taking risks with their learning and, perhaps most importantly, they like to feel connected to each other' (Bell, 2007). In all-girls classrooms, girls can be appropriately challenged and encouraged to take risks and be adventurous in their views, attitudes, approaches and choices.

A US graduate reflected on her own experience in moving to a single-sex educational college environment (a college which has since become co-ed): 'Suddenly, no one in class called girls whores, sluts, slags. Nobody yelled 'faggot' at each other. All of the women and the teachers wanted to hear everybody's opinion. We all wanted to have discussions, not just 'be right' and 'win' the conversation. The airspace

Chambers (2005) studied single-sex language teaching in a coeducational comprehensive school, and stressed the importance of the training of staff, to avoid the tendency to regard boys and girls as homogeneous groups each with common needs rather than individuals with specific needs. Teachers need an enhanced awareness of the challenges and opportunities of single-sex teaching.

wasn't dominated with pointless vocal noise. Women spoke up, instead of being quiet to be popular.'[62]

Gilligan (1982; 2011) points out the tendency of many girls to "go underground" and silence themselves in order to avoid conflict and loss of friendships. Kuriloff et al (2017) observe that opportunities for collaborative project work help to counteract this tendency among female pupils.

Researchers in the biology department of the University of Minnesota investigated how the learning environment acts to influence female course grades and interest. They manipulated the classroom microclimate by varying the gender ratios of first-year undergraduate learning groups, ranging from 0% female to 100% female. They found that as the percentage of women in groups increased, so did overall course performance for all students, regardless of gender. Additionally, women assigned higher peer- evaluations in groups with more women than groups with less women. Thus they suggested an added benefit of the retention of women in STEM: increased performance for all, and positive peer perceptions for women (Sullivan et al, 2018).

3. Teachers and their roles

Eliot (2009) is generally sceptical of the claims made for single-sex education, but she argues that the greatest asset of successful single-sex schools is the gender composition of their staff: 'At all-girls' schools, one finds strong, dedicated women serving as role models in maths and science.' Campbell and Sanders (2002) argue that at college level, benefits follow from having a greater proportion of teachers who are female, and a positive learning environment which validates women's scholarship and women's issues: 'The content, practice and organisation of an educational setting matter greatly when student achievement is being assessed'. (See also Camps Bansell and Vierheller, 2016.)

Eliot argues that even in coeducational schools, subjects like ICT and science might be better taught in single-sex settings, by teachers of the same sex as the students. For pupils in primary school, the teacher's gender matters in terms of the construction of pupils' own gender identities (Skelton et al, 2006).

While there is no doubt of the potency of female role models, the issue is less critical in schools that focus exclusively on the education of girls, and where the overall ethos of the school is focused on affirming and empowering women. Male teachers in such environments add balance and make a significant contribution in supporting the ethos of girls-only schools.

However, there is evidence that merely teaching girls apart from boys is limited in its effect if teachers, of whatever gender, make no other (pedagogical) adjustments. Chambers (2005) studied single-sex language teaching in a coeducational comprehensive school, and stressed the importance of the training of staff, to avoid the tendency to regard boys and girls as homogeneous groups each with common needs rather than individuals with specific needs. Teachers need an enhanced awareness of the challenges and opportunities of single-sex teaching (see Chadwell, 2010).

Warrington and Younger (2001; 2003; Younger and Warrington, 2002) also found that single-sex teaching within co-ed schools had little impact on achievement levels in the absence of any

62. *Quoted in blog on Forbes online, 2014:* http://www.forbes.com/sites/jmaureenhenderson/2014/04/24/is-single-sex-education-still-relevant-these-alumnae-say-yes-and-are-willing-to-fight-for-it/#88bcb683063b

pedagogical adjustments. This supports John Hattie's assertion that the impact of single-sex classes, like that of many other factors, tends to be mediated substantially by the quality of teaching per se (Hattie, 2009). Hahn and Wang (2012) concluded that the otherwise positive effect of single-sex schooling on academic outcomes is very context-dependent.

An Australian study concluded that single-sex groupings create environments in which teachers can implement gender-inclusive science instructional strategies more readily and effectively than in mixed-sex settings (Parker and Rennie, 2002). However, they found that the extent to which teachers were successful in implementing gender-inclusive instructional strategies depended on their prior commitment to the project as a whole.

Lesson observations and interviews with teachers, conducted as part of the GDST Cambridge study referred to earlier, revealed that while most teachers do not self-consciously adjust their pedagogy to the teaching of girls (and therefore do not recognise girls as having distinctive learning 'styles'), they do nevertheless calibrate their techniques to respond to girls' learning 'needs' – thereby developing a form of 'girl-friendly' pedagogy that exploits the advantages of a single-sex setting.

'At one level, teachers' reflections suggested that they had not developed girls'-specific pedagogies, did not teach differently in a girls'-only classroom, or acknowledge that girls had different learning styles from those of boys. Classroom observations confirmed that a gender specific, girls'-orientated pedagogy was not explicit, and that – on the whole – classroom content and curricular focus was not gender specific. At the same time, however, teachers seemed to recognise that the girls they taught needed both more security and more challenge if they were to maximise their potential as learners. Whether this is gender-specific or not is arguable, since many boys of similar abilities need challenge and some of them certainly need more security

than they might care to admit publicly. What seems unarguable, however, is that many of the observed teachers in these schools had adjusted their pedagogy, whether explicitly or implicitly, to context, to provide secure environment for learning whilst at the same time building in challenges which increased girls' resilience and criticality…

What emerges here, then, in the practice and voices of the observed teachers is that the pedagogy which has developed– almost organically - within these schools, might not acknowledge that girls learn differently or have different learning styles to boys per se, but that teachers have developed and evolved a style of teaching and approaches to learning, sometimes almost sub-consciously, which has optimised the context of girls'-only classes. 'The feel of the lessons is different … the way the girls act, the teachers interact, the rapport established between girls and teachers all have emerged through time … enabled by the single-sex environment', and that practice has become implicit, based on experiences and on "what works, when, with whom" '.[63]

Kuriloff et al (2017) undertook a large-scale survey of what works well in US all-girls schools. They found that effective teaching involved three principal dimensions: relevance to students' lives; clarity of presentation and collaboration in learning. With regard to clarity, they found that girls typically appreciate clear procedures and policies in the classroom, explicit expectations of pupils, scaffolding of learning, and lessons that exhibit clear scope and sequence.

4. Curriculum choices, leadership and co-curricular opportunities

Tran (2018) used data from the Longitudinal Survey of Australian Youth (LSAY) to show that students' educational preferences and choices are gender driven. It found that girls in single-sex environments are more likely to pursue traditionally male-dominated fields.

Subject choice, according to the Institute of Physics (2012) is strongly associated with and influenced by students' own developing sense of identity, and how they see themselves in relation to a particular subject – something that is influenced by the context: in the maintained sector girls are almost two and a half times more likely to go on to do A-level physics if they come from a girls' school rather than a co-ed school. The Closing Doors report (Institute of Physics, 2013) finds that 'single-sex schools are significantly better than co-educational schools at countering the gender imbalances in progression' across a range of subjects, including physics (see also Justman and Mendez, 2018).

Even those sceptical of the academic advantages of all-girls schools tend to accept that by eliminating the boy-girl contrasts that inevitably arise in mixed classrooms, each sex might be freer to excel in a wider range of pursuits (Eliot, 2009). GDST schools' refusal to allow girls to typecast themselves according to others' perceptions is reflected in the distinctive and wide-ranging subject choices, and subsequent degree course choices, of GDST girls, when compared with girls nationally.

With respect to curriculum, arguments for single-sex education do not fall back on (questionable) assumptions or assertions about gender differences in attainment or interest in particular subjects, nor or any assumed underlying cognitive differences. It actually isn't very important whether we think that girls are typically less interested in mathematics or science, or whether we think that more of them should be. The essential thing is that every opportunity is provided for girls to make up their minds freed from the undue influence of prejudice – their own and other people's.

Co-curricular and leadership opportunities in girls-only schools reflect the fact that, across the curriculum and outside the classroom, roles are not pre-determined, and girls don't play second fiddle to anyone – in fact in the absence of boys they are just as likely to take up the trumpet. Meehan (2007, xvi) observes of single-sex schools, 'In the best of these schools, girls make most of the rules. In all of them, girls play all the roles: girls are the clowns, the chemists, the classical scholars…' She argues that, free from the judgement of boys, girls are active, not reactive. She also argues that in a single-sex environment, the pressure to 'grow up' is reduced, and girls are able to remain longer in the 'in-between years'.

63. Younger, M. (2016) 'Effective pedagogies for girls' learning'. Forthcoming: www.gdst.net

Balancing social life and study is itself a skill, and girls-only educational environments help pupils to achieve a balance by creating spaces for girls to learn without the continuous imposition of social pressures and distractions.

A single-sex education only seems artificial if one assumes that girls are one-dimensional, and that formal schooling constitutes the totality of their lives. Girls have lives outside school. Balancing social life and study is itself a skill, and girls-only educational environments help pupils to achieve a balance by creating spaces for girls to learn without the continuous imposition of social pressures and distractions.

That said, many GDST schools organise joint co-curricular activities with local boys' schools – including plays, debates, fashion shows and careers fairs.

5. The whole-school environment

Kuriloff et al (2017, p.5) make the point that, 'schools play a particularly large role in shaping students' gender identities, their beliefs about themselves, the possibilities they picture for their lives'. The importance of the whole-school context is stressed by Riordan (2015, p.8): 'It is the larger school context of all-girls or all-boys that makes the difference'.

Eliot (2009) is sceptical of most arguments for single-sex schooling, but she concedes that their proponents are on firm ground when they base their arguments on some of the motivational and interpersonal differences between the sexes – particularly the idea that individuals might benefit from some protected time away from the other sex during their formative years. Boys, she conjectures, might thrive in a more disciplined, competitive atmosphere; while girls are more likely to thrive in a more supportive, nurturing environment.

The effect of single-sex education is marked for whole schools, but not necessarily for segregated classrooms in co-ed schools. Riordan (2002) stresses the importance of 'an academic culture that is endemic to single-sex schools and cannot be produced in

one or two classrooms within an otherwise coeducational school.' Murphy and Whitelegg (2006) suggest that single-sex teaching in coeducational schools might even run the risk of reinforcing gender stereotypes – possibly by implying that girls have difficulty with particular subjects (see also Gill, Esson and Yuen, 2016). Limited separation by subject would indeed tend to ignore the whole-school dimension, including co-curricular activities and leadership opportunities. Smith (1984) outlines the difficulties involved in ensuring equal opportunities in coeducational classes and schools.

Outcomes for girls in single-sex settings within co-ed schools might be questionable not least because such initiatives have been mostly driven by the need to raise the standards of boys. Francis and Skelton (2005, 142) argue that 'single-sex classrooms are only effective in those schools with a whole-school approach to gender and not in those establishments which had adopted it on an ad hoc basis.' This is a view that is strongly supported by Leonard Sax, the US psychologist.[64]

But even whole-school single-sex environments alone don't guarantee success: they might still serve to underwrite rather than challenge gender stereotypes. They need to provide a culture and a set of structures that serve to challenge risk-aversion, and encourage a sense of adventure. Kruse argues that, 'sex-segregated education can be used for emancipation or oppression. As a method, it does not guarantee an outcome. The intentions, the understanding of people and their gender, their pedagogical attitudes and practices, are crucial, as in all pedagogical work' (quoted in Datnow and Hubbard, 2002).

Segregation might conceivably leave structural inequalities intact, with academic outcomes depending more on school factors than on gender separation; and single-sex educational settings might promote stereotypical gender roles and attitudes towards the opposite sex (Datnow and Hubbard, 2002). Whyte (1985) argues that 'it is probably true that many single-sex schools have a tendency to reinforce the traditional aspirations of boys and girls.'

The issue here is the need to balance recognition of gender differences with avoidance of gender stereotyping – something which schools of all kinds have to address. Boaler and Sengupta-Irving (2006) argue that, '...while the 'dichotomous' argument carries the danger of essentialism and stereotyping, the counter-argument, that gender differences do not exist, runs a different risk – that of overlooking the harsh inequalities that prevail in many places and that cause unequal achievement and participation.'

There is no a priori reason why single-sex schooling should fail to challenge gender stereotypes, except insofar as it is bound up with social and/or academic selection. The Single-Sex Strategy in Australia was associated with private schools, with the result that outcomes were vulnerable to class-specific gendered subjectivities rather than non-sexist schooling (Kenway and Willis, 1986). A New Zealand study found that selective single-sex schools are chosen not just because of access to academic achievement, but for the type of girls they are seen to be able to produce. Parents, and the girls themselves, have ideas about femininity which they seek to have reinforced by the school (Watson, 1997).

Fee-charging (and therefore to an extent socially-selective) girls' schools face a particular challenge in avoiding the reproduction of the very gender inequalities they seek to subvert. Halpern et al (2011) ask whether 'segregation' reinforces or subverts stereotypes and gendered behaviour. This links in very clearly with the proposition that sex selection in and of itself changes nothing, without concomitant commitments reflected in the principles and articulated in the practices of the school. Indeed there might be a danger of legitimising striving for perfection across the board, associated with intensive pressure, and overscheduled, stressful lives (Maxwell and Aggleton, 2013)[65]. Lee, Marks and Byrd (1994) stress the need for girls-only schools to actively discourage academic dependence in their pupils.

The GDST Cambridge study, referred to previously, stressed the importance of the cultural milieu created and maintained from

64. 'Is single-sex the recipe for success?' TES, 23 August 2013, 10.

65. Barker, I. 'The cost of striving for perfection for girls', TES, 16 November 2012, 20-21

the top down – with strong and empowering messages coming from the head and senior leadership team, and carried through in practice, in assemblies, presentations, displays, and co-curricular programmes.

The 'empowering' effect of attending an all-girls school has been cited as a factor in her development by Meghan Markle, Duchess of Sussex[66]. 'You guys all remind me so much of myself when I was growing up,' she told 14-year-old girls. 'I went to an all girls school which was incredibly diverse as well … I think being around such empowered young women, it becomes something that you all just grasp onto to understand your world. It's made you confident, well-spoken. You have an intention set to really do something to change the world, and you have to keep it up'.

The role of girls' schools in this context goes well beyond gender, of course. It involves educating pupils within an ethical framework of self and society – and as such schools are not cut off from the wider world. Core curriculum components and extra-curricular activities are often focused on developing this aspect of a pupil's whole education. An explicit purpose of GDST schools is thus to challenge and subvert stereotypes per se, and to empower their pupils to make informed, unconstrained and responsible choices.

66. *https://www.dailymail.co.uk/news/article-6292113/Harry-Meghan-return-Sydney-head-Bondi-Beach.html*

Today, women are getting better grades than men at colleges and universities ... But somewhere between graduating from college and entering the workplace, women lose this advantage. One year after graduation, men earn, on average, 18% more than women

THE COROLLARIES OF SUCCESS AT SCHOOL

Statistics showing a persistent gap in academic achievement between boys and girls, with girls over-represented in top grades and access to prestigious university places, might suggest that battles over gender equality have been won. Indeed, there is evidence of a backlash from some men who fear marginalisation[67]. But Harris (2004) stresses that while women are sometimes represented as the winners, they are living more complex lives than the dominant images of girls' freedom, power and success might suggest (see also Jackson, Paechter and Renold, 2010; Raby and Pomerantz, 2015; Gill, Esson and Yuen, 2016). In Crosnoe's view, the very fact that '… girls tend to be more successful educationally in general … means that the problems associated with not fitting in may be a greater threat to their educational careers.' (Crosnoe, 2011).

Perez (2019) observes that in many respects, we still live in a world designed for men. Marcal (2021) points out that at the turn of the twentieth century when motor cars were in their infancy, battery-powered cars competed with fossil-fuelled ones. The electric vehicles were cleaner and quieter but they were limited to a 60 km range on paved streets. Marketers identified them as primarily for women. Noisy, dirty internal combustion engines, which initially needed to be violently cranked to start, were preferred.

Bates (2015) points out that adults, young women just out of college, who routinely face sexual harassment on the job, earn on average just 82 percent of what men do.

It has been suggested that in the context of persistent gender disparities in career trajectories and incomes, gains by women in the academic sphere might represent a 'stalled gender revolution' (Schoon and Eccles, 2014; see also Ezzedeen et al, 2015).

There is a growing realisation that girls' success at school has not reduced the wide gender imbalance in terms of progression to the top of careers. Across the world women are outperforming men at school and at university, but this superiority is not translating into sustained success in the world of work. Men continue to outstrip women in terms of salaries and representation at the top of management structures (Kuriloff et al, 2017).[68]

Caroline Kitchener (2017, p. 5-6) has written about the disparity between college and career success:

'Today, women are getting better grades than men at colleges and universities … But somewhere between graduating from college and entering the workplace, women lose this advantage. One year after graduation, men earn, on average, 18% more than women.'

Part of the reason for gendered earnings disparities is the pattern of take-up of particular professions, itself traceable to subject choices at school and university (Mechtenberg, 2009)[69]. Girls' persistent under-estimation of their abilities in maths and science serves as a critical filter regulating access to higher status occupations Earnings disparities, though, exist even at the same levels in the same professions. Kitchener (2017, p.6) points to research evidence that, 'while differences in occupation and college major choice account for some of the gender wage gap, they don't account for all of it. About one-third of the gap … just comes down to gender'.

A lot has been written about the 'confidence gap' between genders when it comes to assumptions about the relationship between ability and progression. Women, it is argued, tend to be

67. *'The new authoritarians are waging war on women'. Atlantic Magazine: https://www.theatlantic.com/magazine/archive/2019/01/authoritarian-sexism-trump-duterte/576382/; 'Male trouble'. New York Review of Books: https://www.nybooks.com/articles/2018/10/11/male-trouble/*

68. *Franke-Ruta, G. 'Miss education: why women's success in higher education hasn't led to more female leaders', The Atlantic Magazine, April, 28 2013; see also Boffey, D. and Stewart, H. 'Parents to be offered guide to help boost girls' ambition', The Observer, 2 June 2013, 1*

69. *https://www.thetimes.co.uk/article/maths-for-girls-is-the-way-to-close-the-pay-gap-mqzxccl8j*

less self-assured, which is self-limiting because 'success correlates just as closely with confidence as it does with competence'[70].

Aspirations and self-concept form and develop early on. A survey commissioned by Girlguiding[71] found that the confidence gained by girls at school is more easily eroded in later years. 90% of nine- and 10-year-old girls felt they would have the same chance as boys at succeeding in their chosen jobs. This dropped to 54% among 11- to 16-year-olds, and to 35% among 17 to 21-year-olds. Girlguiding argues that girls' attitudes to themselves change as they become more aware of the barriers facing women in the workplace. Research by Oxford University's Careers Service confirms that sixth form girls are more anxious than boys about their ability to land a good job (Black and Turner, 2016).[72]

Sieghart (2021) writes that where girls report feeling deterred from pursuing a subject or career, it comes down to perceptions of discrimination resulting from social conditioning.

It is possible that success at school might actually help create the conditions for less effective performance at work. Garance Franke-Ruta[73] argues that, '... the behaviours that school rewards – studying, careful preparation, patient climbing from one level to the next – seem to give women an advantage academically, judging by the fact that they get higher grades than men do ... yet ... out in the work world, people hire and promote based on personality as much as on formal qualifications, and very often networking can trump grinding away.'

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70. http://www.abc.net.au/news/2017-05-28/confessions-of-a-confident-mediocre-man/8562708

71. Girls less confident as they grow older, says Girlguiding', BBC news: http://www.bbc.co.uk/news/education-36869186

72. https://www.tes.com/news/school-news/breaking-news/sixth-form-girls-are-far-more-anxious-about-career-prospects-boys

73. Franke-Ruta, G. op cit.; see also Lisa Damour 'Why girls beat boys at school and lose to them at the office', New York Times, 7 February 2019

Diprete and Buchmann (2013) observe that 'girls derive more intrinsic gratification from performing well on a day to day basis, a crucial advantage in the learning process'; yet according to Johnson and Mohr[74] , 'the very skills that propel women to the top of the classroom are earning us middle-of-the-pack marks in the workplace.' Decades of female over-achievement in academic terms have not resulted in a substantial closure of the 'confidence gap'[75].

There is a possible link between girls being over-praised at school and later underperformance at work. There is some evidence that teachers give inflated grades in recognition, not just of achievement, but also of attitude and classroom characteristics (Mateju and Smith, 2015). Mechtenberg (2009) sought to develop a unified explanation for three related phenomena: test scores and grades at school; subject choice at university and earnings at work.

This raises an awkward question: are we doing girls a long-term disservice by defining their performance in terms of their compliance to the expectations of behaviour and work patterns that reflect, reinforce and reproduce differences between the genders?[76]

Inspection reports on girls' schools betray gendered judgements when they commend girls' manners and politeness, and even the neatness of their work, in terms that would be unusual if applied to boys. As testing in schools becomes ever more standardised and tick-box in form, are we inadvertently encouraging girls in their typically more measured, step-wise approach to tasks? When we give higher marks to essays that show balance and equal weighting to arguments, and place laurels on the heads of those who shine in set-piece performances, recitations and productions, are we not setting them up to fail when they come up against spontaneous, competitive, combative situations such as prevail in interviews for selective universities and for jobs?[77]

The suggestion is that schools risk over-praising and underwriting compliant behaviour in girls. To counteract this, Johnson and Mohr[78] recommend five key ways of subverting gender stereotypes:

1. Figure out how to challenge/influence authority
2. Prepare, but also learn to improvise
3. Find effective forms of self-promotion
4. Welcome a less-prescribed career path
5. Go for being respected, not just liked.

This approach has been fleshed out in the Women's School to Work Guide, by Tara Mohr[79] , and in her book, Playing Big (Mohr, 2014). In a more populist vein, Joy Balma (2017) encourages girls to balance their inner "good girl" with their inner "diva"; while Reshma Saujani(2019) calls on girls to work at being 'brave not perfect'. Such an approach is taken further by Sally Nuamah, who argues that teaching girls must involve focusing on developing "achievement-oriented identities", namely increasing confidence, developing strategies for dealing with obstacles, and a willingness to transgress them. This is a deliberately gender-conscious agenda.

Marisa Porges is the head of an all-girls school near Philadelphia – after service as a navy pilot and at the White House in national security. She has identified core character traits that should be nurtured so that girls develop crucial skills for the modern, global world. Girls must stand up for themselves and ask for what they need and want; they must realize that competition can be a healthy endeavour and to not belittle their own skills for fear of upsetting others; they should be encouraged to use and expand their natural collaborative problem-solving abilities and be aware of the value of empathy; they must be able to adapt to a wide variety of rapidly changing circumstances (Porges, 2020).

74. *Johnson, W. and Mohr, T. 'Women need to realise work isn't school', Harvard Business Review Blog, 11 January 2013: http://blogs.hbr.org/cs/2013/01/women_need_to_realize_work_isnt_schol.html*

75. *Kay, K. and Shipman, C. 'The confidence gap', The Atlantic Magazine, May 2014: http://www.theatlantic.com/magazine/archive/2014/05/the-confidence-gap/359815/*

76. *Stannard, K. 'A woman's place is in the boardrooom', TES, 19 July 2013, 26-27*

77. *See 'The perils of being little miss perfect', Daily Telegraph 17/08/17, pages 19-20*

78. *Johnson, W. and Mohr, T. 'Women need to realise work isn't school', Harvard Business Review Blog, 11 January 2013: http://blogs.hbr.org/cs/2013/01/women_need_to_realize_work_isnt_schol.html*

79. *The Women's School to Work Guide: http://www.taramohr.com/gettheguide/*

There is evidence that these strategies are more effective when schooling takes place in single-sex settings. Tara Christie Kinsey, principal of the Hewitt School, New York, had previously been dean at Princeton: she has observed that after entering the university, women's confidence generally fell – with two exceptions: female athletes, and women who had been at single-sex schools[80]. Lee and Marks (1990) undertook a longitudinal study of students who reached their college senior year in 1986. They found that the single-sex educational experience produced sustained advantages in terms of raised academic aspirations, enhanced self-concept, and reduced propensity to gender-role stereotyping. This has been confirmed by a study in Australia: girls' confidence tends to fall below boys from around age 9, and persists into old age. But girls at single-sex schools buck this trend: no difference in self-confidence was found between boys and girls who had been educated in single-sex contexts[81](Fitzsimmons et al, 2018).

Across GDST schools, there is a strong focus on challenging the stereotype of the risk-averse, over-cautious, meticulously prepared pupil who excels in set-piece situations, but who finds herself on the back foot when faced with the challenges intrinsic to debates and interviews. Schools teach the educative and experiential value of failure; they have encouraged girls to celebrate successes and 'blow their own trumpet'; and coached them to develop techniques that lie at the heart of improvisation and stand-up comedy. Cross-Trust events such as the Young Leaders and junior young leaders conferences have given girls new opportunities and broader platforms for developing the dispositions likely to be highly effective beyond school.

There are two crucial considerations here:

First, a balance has to be struck between showing girls that all options are open, encouraging them to be aspirational, and challenging gender stereotypes on the one hand; while, on the other, giving them the skills of resilience required to deal with situations where they come up against stereotyping, unfairness and inequality. As Graff (2013, page 70) makes clear, 'It is a challenge to conceptualise a pedagogy for girls with its implicit dramatisation of difference in order to deconstruct constraints of gender stereotypes.'

Carinci and Wong (2009) found that young people tend typically to be more supportive of gender equality than their elders, but often lack the skills to realise those ideals. They argue the need for students to be taught the history of gender relations, and for schools to equip them with the appropriate tools for understanding and action, through an awareness of civil rights.

Second, some have questioned whether girls should be encouraged to adopt the 'masculine' traits of competitiveness, ambition and drive, rather than being encouraged to question and challenge the hegemonic power of those very traits, values and practices (cf. Francis and Skelton, 2005). But there are strong voices speaking up in favour of schools working purposefully to increase women's self-assurance and assertiveness, thereby enabling them to aspire to and then secure a wider range of prestige occupations (Black and Turner, 2016).

In a back-handed compliment, journalist Susie Mesure observed that, 'weirdly, at an all-girls' school, stereotypes aren't something you need to worry about because everyone is an individual' . But why use the word 'weirdly' to describe a common-sense correlation? It makes perfect sense to equate all-girls' settings with the disruption of stereotypes, because while equality aims are not unrealisable in a co-ed context, they are more straightforwardly achieved in a single-sex setting – a point made forcibly in a study of some Icelandic schools where elementary-age students are taught in single-sex settings for much of the day: students who had attended the schools had 'increased gender equality awareness', including the conviction that parents should bear equal responsibility for family- and home-related duties .

To those (mostly, it has to be said, men) who would argue that gender equality has been achieved, it is necessary to assert the persistence of deep-seated misogyny laid bare by Manne (2018).

80. Comments made by Tara Christie Kinsey at the annual conference of the National Coalition of Girls' Schools, New York City, February 2016

81. 'Girls match boys in confidence at single-sex schools, study finds', Sydney Morning Herald, 11 January 2019. Available at: https://www.smh.com.au/education/girls-match-boys-in-confidence-at-single-sex-schools-study-finds-20190110-p50qno.html

CONCLUSION:

Subversive Schools

Girls differ from boys not along any substantive intellectual or cognitive dimensions, but in attributes and dispositions that have their greatest impact in childhood and adolescence; and which mean that girls' learning needs and preferences are typically different from those of boys.

GDST schools offer an environment in which girls' distinctive learning needs and preferences can be addressed as a principle and as a priority.

Added to this is the influence of environment: in particular, gender stereotyping and gender differences in expectations and, often, self-definition, remain issues that need to be checked and challenged, not least at school. Girls should have the opportunity to be educated separately, not because they need protection as such, but because they deserve a level playing field.

GDST schools offer an environment free of the prejudice of gender-stereotyping, and free of distraction and harassment. In this liberating environment, girls are encouraged to be ambitious and to take intellectual risks.

All of this points to the necessity for girls-only educational spaces – and not just in terms of separate provision in otherwise mixed environments. 'Merely' separating girls from boys has little impact in itself – beneficial results flow only if this goes in lock-step with a self-conscious and sustained attention to girls' learning needs and preferences; through attention to, among other things, physical design, curriculum and co-curriculum opportunities and expectations, and teaching and learning strategies – in short, the whole-school culture.

GDST schools provide an environment, a set of values, a pedagogy and a practice which cannot easily be simulated in single-sex classes within coeducational schools, and which are not simply the product of separation of the sexes.

The best girls' schools succeed because, in striving to be excellent schools, and by delivering an outstanding education to their pupils, they understand that girls succeed wherever their particular learning and development needs and preferences are fully and specifically addressed, and where choices and opportunities are unconstrained by a priori assumptions about what girls like and can do.

GDST schools are girls' schools not just in intake and organisation, but in culture, vision and practice.

GDST schools are characterised by:

1. A commitment to excellence as schools: the non-negotiable starting point
2. Design of purpose-built learning spaces with girls in mind
3. Every curriculum and co-curriculum opportunity available to girls as a matter of course
4. Teaching and learning focusing on girls' learning needs and preferences
5. A whole-school culture which respects, nurtures, challenges and empowers girls.

GDST all-through day schools provide a learning environment specifically designed for and dedicated to the development and empowerment of successful, confident and adventurous girls.

GDST schools offer an environment in which girls' distinctive learning needs and preferences can be addressed as a principle and as a priority.

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