



King's Research Portal

DOI:

[10.1080/01425692.2016.1253455](https://doi.org/10.1080/01425692.2016.1253455)

Document Version

Publisher's PDF, also known as Version of record

[Link to publication record in King's Research Portal](#)

Citation for published version (APA):

Francis, B., Archer, L., Moote, J., de Witt, J., & Yeomans, L. (2016). Femininity, science, and the denigration of the girly girl. *British Journal of Sociology of Education*, 1-13. <https://doi.org/10.1080/01425692.2016.1253455>

Citing this paper

Please note that where the full-text provided on King's Research Portal is the Author Accepted Manuscript or Post-Print version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version for pagination, volume/issue, and date of publication details. And where the final published version is provided on the Research Portal, if citing you are again advised to check the publisher's website for any subsequent corrections.

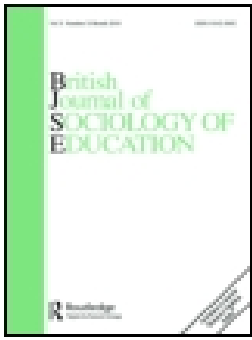
General rights

Copyright and moral rights for the publications made accessible in the Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the Research Portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the Research Portal

Take down policy

If you believe that this document breaches copyright please contact librarypure@kcl.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



Femininity, science, and the denigration of the girly girl

Becky Francis, Louise Archer, Julie Moote, Jen de Witt & Lucy Yeomans

To cite this article: Becky Francis, Louise Archer, Julie Moote, Jen de Witt & Lucy Yeomans (2016): Femininity, science, and the denigration of the girly girl, British Journal of Sociology of Education, DOI: [10.1080/01425692.2016.1253455](https://doi.org/10.1080/01425692.2016.1253455)

To link to this article: <http://dx.doi.org/10.1080/01425692.2016.1253455>



© 2016 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 24 Nov 2016.



Submit your article to this journal [↗](#)



Article views: 886



View related articles [↗](#)



View Crossmark data [↗](#)

Femininity, science, and the denigration of the girly girl

Becky Francis^a, Louise Archer^b, Julie Moote^b, Jen de Witt^b and Lucy Yeomans^b

^aUCL Institute of Education, University College London, London, UK; ^bKing's College London, London, UK

ABSTRACT

Hyper-femininity and the construction of the 'girly girl' label have been documented widely, but there has been less attention to their content (or any distinctions between these constructs). Indeed, it can be argued that the content of femininity remains a controversial and somewhat under-researched topic in feminist scholarship. This is also the case in relation to science, which has been widely characterised as a masculine terrain, but there has been less attention to why femininity is excluded from/by science. This article attempts to unpick some of these issues, with a particular focus on the construct of the 'girly girl', in relation to access to science. Drawing on qualitative data from the Economic and Social Research Council-funded ASPIRES 2 project, we analyse the discourses used by young people and parents in discussion of 'girly girls' and physics. We show the misogynist and excluding discourses projected onto the 'girly girl', and indeed that are used to interpolate femininity more broadly. We found that in discussions of science and (hyper-)femininity, even potentially positive feminine attributes were denigrated. Hyper-femininity was produced as 'more than lack': vacuous, but also a risible presence. In reflecting on our findings we consider whether femininity may be more derided in some discursive contexts (e.g. science discourse) than others, and whether femininity can or should be conceived as more than lack.

ARTICLE HISTORY

Received 22 March 2016
Accepted 24 October 2016

KEYWORDS

Femininity; science; physics; gender; girls; girly girl

Background

Hyper-femininity and the 'girly girl'

Constructions of femininity in educational contexts have been a longstanding topic of interest in feminist educational research. Analysis of the role of educational institutions in the (re)production of gender, and of trends and diversity in pupils' gender constructions, has often focused on one gender in particular. The explosion of interest in masculinity in the mid-1990s (or 'masculinities', as the topic of such studies tended to be conceived at the time) directed focus especially at boys and male teachers – indeed the apparent common conflation between male bodies and masculinity generated debate and criticism for an underpinning essentialism (see, for example, MacInnes 1998; Hood-Williams 1998; Francis 2000a, 2008). Studies that specifically focused on girls, and on productions of femininity, did not entirely disappear during this period (see, for example, Walkerdine 1997; Walkerdine et al. 2001; Reay 2001; Kehily et al. 2002); however, in the mid-2000s the trend for research on masculinity, and boys, made way in turn for a counter-wave of attention to femininity and girls (for examples of the latter, see Gonick 2004; Harris 2004; Aapola, Gonick, and Harris 2005; Lloyd 2005; Schippers 2007;

CONTACT Becky Francis  B.Francis@ucl.ac.uk

© 2016 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Renold 2005; Paechter 2006; Jackson, Paechter, and Renold 2010). The important and impressive body of scholarship on girls' constructions of gender in educational settings has provided rich understandings of the diversity of these productions, their intersection with other facets of identity, their implication for learning and educational engagement and success, and the role of educational institutions in maintaining gender identities and inequalities.

It may be argued, however, that femininity as a construct has received somewhat less attention. Building on the work of de Beauvoir ([1952] 1989), structuralist and poststructuralist work in the 1980s and early 1990s tended to characterise femininity as lack, the denigrated and passive Other to the elevated and active masculine Subject (for examples in the sociology of education, see Harding 1991; Walkerdine 1988, 1990). Since that period, although there has been extensive analysis of the various diverse manifestations of constructions of femininity in educational settings (and the consequences of these performances for peer relations, teacher perceptions and educational attainment), there has arguably been less attention to the defining characteristics of femininity itself. Notable exceptions include McRobbie's (2007, 2009) intervention on consumer femininity and the 'post-feminist contract'; Renold and Ringrose's (2008) response and reflection on McRobbie's thesis with recourse to Deleuzian conceptions of the molecular and molar; Schipper's (2007) speculations about 'masculine femininities'; and Paechter's (2006) reflections on the localised, collective production of specific performances of gender (via communities of practice) and assertions on the impossibility of 'hegemonic femininity'.

Meanwhile, a construction that has been analysed as a phenomenon, both as performed by some schoolgirls and as a point of analysis by feminist researchers, is 'emphasised', or 'hyper'-femininity, and the construct of the 'girly girl'. These various terms are often applied with little explanation, sometimes interchangeably. It is debatable whether these different formulations describe the same phenomena, or not. For example, 'emphasised femininity', referred to by researchers such as Connell (1987) and Hey (1997), appears to interpolate kindness, 'niceness' and 'good girl' (for example, Reay 2001) or 'sensible selfless' (for example, Francis 1998) identities, as well as a potential focus on other stereotypically feminine attributes such as concern with aesthetics, emotionality and so forth. Whereas 'hyper-femininity', with its semiotic hint at excess, appears more evocative of (hetero)sexualised femininity and investments/production of the object of the masculine gaze. Already, the good girl virgin/bad girl whore dichotomy, subject of historic feminist critique (for example, Irigaray 1985), begins to emerge; as does social class (see, for example, Reay 2001). Nevertheless, parameters have not been mapped in relation to the 'content' of the constructs emphasised or hyper-femininity. The 'girly girl' construct may perhaps be thought to address both elements.

The term 'girly girl' has been identified as used among schoolgirls themselves to describe girls performing certain (highly stereotypical) feminine behaviours, investments and aesthetics (Renold 2005; Duits 2008; Paechter and Clark 2010; Oliver, Hamzeh, and McCaughtry 2009) and notably comprises an entry in the Urban Dictionary (2016). Like 'hyper-femininity', it has also been applied by researchers as a category for analysis (Gonsalves 2014; Paechter 2010). Application of these terms is somewhat inflected by age: while the concept of hyper-femininity is more commonly (although by no means exclusively) applied to secondary/high school-aged young people, references to 'girly' productions of femininity more often emerge and/or are applied in research on primary school-aged children. (Again, this is not always the case, as illustrated for example by Gonsalves' [2014] doctoral student respondents; and secondary-aged students' use of the term in Read et al.'s [2011] research). The concepts have generated some analytic discussion. Carrie Paechter (2006), a key contributor on theorisation of femininity, argues that the hyper-feminine 'girly girl' is not a parallel to powerful constructions of masculinity (what she, following Connell [1993], refers to as 'hegemonic masculinity'). Rather, the performance of hyper-femininity comprises a negation of the masculine, and as such is characterised by powerlessness. Paechter (2006) points out that in the gender dualism the feminine is subordinated to the masculine, with power vested in the masculine. Femininity (as de Beauvoir asserted), is lack. Hence Paechter concludes that:

Hyperfemininity ... is a powerless position, one that is defined by the absence of power inherent not just in hegemonic masculinity, but, by virtue of the patriarchal dividend and the dualistic construction of masculinity and femininity, all masculinities. (2006, 8)

While we are in agreement with the thrust of this argument, and have ourselves made similar assertions, empirical work does challenge the view that hyper-feminine/girly girls are entirely without power (Renold and Ringrose 2008). As Hey et al.'s (2001) work showed, some girls are able to exert power over boys in certain contexts. Clearly, power in interaction may be constituted by myriad discourses other than gender, and it may hence be that this can explain such phenomena without recourse to acknowledgement of femininity as bearing power. But we also refer to empirical cases to illustrate the way in which 'precocious femininity' can use tropes of hyper-femininity to distract from less gender traditional modes of being, and/or to assertively play on heterosexuality (Francis, Skelton, and Read 2010). Moreover, power relationships are evidently exercised between girls and women, sometimes according to their constructions of gender (including constructions of femininity) (see, for example, Reay 2001; Renold and Allen 2006; Renold and Ringrose 2008; Sanders 2015).

In searching for theoretical accounts able to articulate the possibility of femininity/feminine productions of self as bearing power, we reject the notion of 'masculine femininities' (Schipper 2007) as essentialist (for discussion, see Halberstam 1998; Francis 2008). However, we wonder whether there might be productions of femininity that are hegemonic in the original (Gramsci 1971) sense of maintaining hegemony in norms, rather than in the sense that they bear power in their own right. We also wish to distinguish between the naming of performances of identity and the suggestion that such performances are consistently located in particular bodies (the latter expressing a typologies approach, which ignores the perpetually shifting, context-dependent nature of gender production).

Evidently, this is a highly complex, nuanced arena. Indeed, attention to gender fluidity has generated much theoretical attention to the fallacy of binarising the sexed body as male or female (Butler 1990; Fausto-Sterling 2000); as well as to the constant flux, contradiction and multiplicity of gender performances which on close inspection are rarely consistently or simply categorisable as 'masculine' or 'feminine' (Francis 2010; Francis and Paechter 2015). Increasingly, research is attuned to disruptions and inconsistencies in binarised gender constructions (see, for example, Yang 2016). Nevertheless, the dilemma remains that social trends according to gender, and gender discrimination and inequality, continue to be empirically demonstrated across societies and their institutions (Francis and Paechter 2015). Not surprisingly, therefore, while some researchers seek to find ways to refer to binarised gender whilst simultaneously highlighting fluidity,¹ perusal of key sociological journals in the field shows researchers' continued engagement with (binarised) gender as a unit of analysis. This is a dilemma which we recognise, and discuss further in relation to our own research and methods, in this article.

Our intention in this article is to explore further the notion and application of 'girly' femininity, and the relation (or otherwise) between 'girlyness' and uptake of Science, Technology, Engineering and Mathematics (STEM). This interest follows the hypothesis posited in the literature that STEM, as a symbolically masculine field and set of subject areas, is avoided by – or denied to – those girls who invest strongly in a feminine production of self (Gonsalves 2014).

Femininity and engagement with STEM

Inequalities in engagement, access and participation in STEM subjects and career paths continue to preoccupy policy-makers and other stakeholder organisations, both nationally (HM Treasury 2011; BIS 2008) and internationally (for example, Cook et al. 2013; US President's Council of Advisors on Science and Technology's 2010; Danish EU Presidency 2012). This is frequently driven by human capital concerns around the needs of the present and future economy, and a perceived STEM skills gap (House of Lords 2012; CBI 2012; Smith 2010; Vorderman et al. 2011). This gap is reported to be particularly acute in sectors such as engineering (House of Lords 2012; Royal Academy of Engineering 2012), mathematics and physics (Smith 2010).

But in addition to these concerns over the STEM ‘pipeline’, the imperative to widen (not just increase) STEM participation has also been made from a social justice perspective. On the one hand, it is argued that STEM occupations tend to be prestigious and well-remunerated jobs, making equality of access important (Greenwood, Harrison, and Vignoles 2011; Equal Opportunities Commission 2006). But more than this, many argue that there is a value and need for citizens to understand, participate in and shape scientific developments in society; and that they need to be scientifically literate to do so (Osborne 2007). In the United Kingdom, as in many western nations, participation in STEM subjects post 16 is impacted by gender, ethnicity and social class (Royal Society 2008; Gorard and See 2009; Archer et al. 2012a). Women, working-class students and those from particular minority ethnic backgrounds (e.g. Pakistani and Black Caribbean) are under-represented in the physical sciences and mathematics at degree level (Smith 2010; Elias, Jones, and McWhinnie 2006). Moreover, gender inequalities persist, not just in subject take-up but also in attitudes to science (Institute of Physics 2012; Smith 2010, 2011). These gendered patterns persist despite girls’ broadly equal attainment levels with boys at GCSE science (Haworth, Dale, and Plomin 2008; Royal Society 2008; Smith 2011).

There are a wide range of recorded factors contributing to girls’ lower take-up of the physical sciences and engineering in comparison with boys; from differential expectations and encouragement levels on the part of teachers, family and peers, to the content of the curriculum (for a review, see Archer et al. 2012a). However, students’ subjectivities have been shown to play a part. Girls have been shown to be less confident in their own abilities, and less likely to identify themselves as being ‘good’ at science and/or mathematics (irrespective of their actual attainment levels) (for example, Mendick 2005; Mujtaba and Reiss 2013). The association of science careers with masculinity has also been shown to be off-putting for some girls (Archer et al. 2012a, 2012b), with children perceiving science as being ‘for boys’ (Calabrese Barton and Tan 2009; Caleon and Subramaniam 2008; Carlone 2003; Farenga and Joyce 1999; Francis 2000b; Fennema and Peterson 1985). Especially, the construction of physics as ‘quintessentially masculine’ (Francis et al. 2016) has been shown to impede engagement for many girls, due to the lack of ‘fit’ of this symbolically masculinised subject with their identification with femininity (see Gonsalves 2014; Archer et al. forthcoming).

Of course, here again the situation is complex. Francis et al. (2016) show that issues of (lack of) representation of women in physics, and the continuing incidents of discrimination in the physics workplace which girls use as allegorical tales to illustrate the hostility of the profession to women, also have a strong impact on girls’ disassociation from physics. It is important, then, not to simply responsabilise (see Rose 1999) girls for their ‘failure’. Nevertheless, we were intrigued to explore whether students believed that constructions of gender were deterring girls from engagement with physics and engineering.

We apply a Foucaultian discourse analytic perspective to gender, drawing on a rich body of feminist work informed by Foucault (for example, 1980), to see gender as discursively produced (albeit, acknowledging the role of the ‘meaty body’ [see Shabot 2006] as generating, as well as produced by, discursive practices). One of us has also drawn on Michael Bakhtin’s (1981) concepts of monglossia and heteroglossia in application to both gender productions, and to the construct of gender itself; and this approach is also applied here.

Methods

The data analysed are drawn from the large-scale, longitudinal ‘Young People’s Science and Career Aspirations age 14–19 (ASPIRES 2)’ project, funded by the Economic and Social Research Council. ASPIRES 2 and its predecessor ASPIRES study have been tracking and exploring children’s science and career aspirations from age 10 to 19, with a particular focus on social identities and interest (or otherwise) in science. Methods include a quantitative online survey of the cohort, repeated with student participants in Years 6, 8, 9 and 11, and repeat interviews with a sub-sample of students and their parents. This article draws on qualitative data from students aged 15/16 (Year 11), from 132 individual interviews (in this project phase) with 70 students and 62 parents. These respondents had

been previously tracked since the young people were aged 10/11 (when they had been invited to choose their own pseudonyms). Interviews lasted between around 30 and 60 minutes in duration. Student and parent participants were asked about a range of topics concerning their science interests and preferences, including their reflections and opinions on the under-representation of women in physics. Maintaining a longstanding methodology for our work (for example, Francis 1999a; Archer and Francis 2007; Francis, Burke, and Read 2013), we asked students directly for their reflections and opinions on these trends, aiming to analyse their explanations and the discourses underpinning them. We drew on prior findings regarding the language used by young people to allude to the 'girly'/hyper-feminine productions of self adopted by some girls within educational settings (for example, Reay 2001; Renold 2005; Archer, Halsall, and Hollingworth 2007; Paechter and Clark 2007; Read et al. 2011; Gonsalves 2014) to formulate a question, responses to which form the basis of our analysis in this article.

It is important to note that this question was one of our last, and followed two others asking about why women are under-represented in physics. We then asked participants: 'Some people suggest that girls who are particularly "girly" and super-feminine are less likely to want to pursue Physics. Do you think that could be the case?'

It is worth highlighting that the term 'girly girl' interpolates particular constructions of gender: for example, it directly links constructed gender ('girly') with the sexed body (girl), as does the label 'macho man'. In this sense, our use of the term in our question immediately im/possilibilises some constructions and may be seen to exacerbate existing assumptions that femininity is an exclusively female terrain. In this sense, the term may be argued to be problematic. Moreover, our final questions, focused on women's under-representation in physics, again clearly evoke binary gender and hence serve to some extent to re-inscribe the binary even as we pursue a study inspired by feminist intentions to eradicate these inequalities.

All interviews were fully transcribed and thematically organised via NVivo. Data were then subject to Foucaultian discourse analysis following the methods advocated by Burman and Parker (1993), and elaborated regarding the distinction between discourses and narratives by Francis (1999b). An additional theoretical layer is applied to the analysis via application of the concepts of monoglossia and heteroglossia (Bakhtin 1981), and of gender monoglossia and gender heteroglossia (Francis 2012), in order to explain the dominance and diversity of particular gender constructions.

The equal rights of the girly girl: rejection of the association between hyper-femininity and disaffection from science

Many students rejected outright this conceit that strong investments in femininity reduce the likelihood of investment in physics, apparently due to their perception of a critical implication of the question for femininity and/or 'super-feminine' girls. This finding is interesting given that the 'girly girl' is a construct frequently evoked by young people themselves in their talk (Reay 2001; Paechter and Clark 2007; Gonsalves 2014), yet perhaps it is experienced differently when young people are directly confronted with the proposition. Age might also play a part, because some of the studies reporting this usage were conducted with younger age groups. Nevertheless, it is interesting to note that all respondents – adults as well as students – appeared to understand what we meant by the term. Girls in our sample were somewhat more likely than boys to reject the proposal, with half (18 girls, 49%) rejecting the suggestion, compared with less than a third of the boys (eight boys, 29%) (four girls and four boys said they did not know, or provided ambivalent answers). Forty-one per cent of the girls (15 girls) and 57% of the boys (16 boys) said they agreed that girls who are particularly 'girly' and super-feminine are less likely to want to pursue physics, albeit the majority felt that this was due to social perceptions and stereotyping, rather than due to essential differences.

As reported in other studies (Francis 2000a; Francis, Burke, and Read 2013), in responses to all our questions about gender we found a strong discourse of equality of opportunity animating responses that 'anyone can do anything' – in this case, that girls have equality of opportunity to partake in STEM

(Francis et al. 2016). As we have discussed elsewhere, this discourse also interweaves discourses of neoliberal individual agency (Rose 1999; Francis, Burke, and Read 2013) and opportunities as now equal (Volman and Dam 1998; Hey 2005; Francis, Burke, and Read 2013). Together, these discourses position gender discrimination as a thing of the past, and interpolate individual subjects as agentic authors of their own outcomes depending on ability, entrepreneurship and/or diligence (Bauman 2005). Those rejecting the proposition that girly girls are less likely to want to pursue physics again mobilised similar discourses of equality of opportunity and individual agency: ‘Er no I think like, you can’t be stereotypical, whatever. If they enjoy it [physics] then they can do it, so I think it completely depends on the person, so yeah’ (Isabel, Sri Lankan, female, social class 1).

Interestingly, although so many rejected the proposition that (particularly) feminine girls might be less likely to pursue physics, participants rarely challenged the construct of the ‘girly’ girl. Only one student actually contested the construct:

I don’t see that many ‘girly girls’. I don’t, I think it’s a real stereotype. There’s not a lot of girly girls in our school. The girls, like I’m like I’m a girl, I like to wear make-up and dresses, but at the same time I would be able to like roll in mud and play sports. I don’t think the stereotype of girly girls exists anymore really, so I don’t think it’s that much of a difference. (Carol, White European, female, social class 3)

Nevertheless, many more participants expressed offence at the implication behind the question. Victoria² (White Bulgarian, female, social class 4) retorts gravely that the suggestion ‘stereotypes girls’ who ‘like to take care of themselves and things. It’s like basically stereotyping saying that we’re not good enough to do it [physics]’. Poppy (White British, female, social class 1) recounts:

My Physics teacher said something about this as well which really annoyed me. [...] she was at parents evening and she said ‘Why not Physics?’ and I was like ‘I just don’t find it as interesting’ and then she said ‘Oh yeah you can usually tell the girls that want to do Physics, they look a bit tomboy-ish’ and then she could see my parents’ faces and me I was like ... and she’s like ‘Oh you’re not tomboyish’ and then she tried to change it. But like the fact that she has that opinion! And this Physics teacher ... I don’t know I think I just ... it shouldn’t be like that at all.

This outrage at the perceived ‘anti equal opportunities’ implication of the questions prompted countering by forceful narratives that ‘anyone can be whatever they like’ and ‘don’t judge a book by its cover’, which comprise the arsenal of equal opportunities discourse. Leah² (White, female, social class 4, mother of Celina) calls those making such claims about girly girls ‘idiots’, and likewise Ben (White, male, social class 3, father of Roger) concurs: ‘No rubbish, I think that’s rubbish. That’s my own opinion, and my daughter, she does ballet, tap, modern dancing, she likes pink and all that sort of stuff ... no she quite enjoys all the sciences.’ Several others were similarly dismissive, and rejections from girls were notably forceful.

This finding may be seen to be encouraging in terms of a rejection of deterministic stereotypes. Albeit, of course, Gonzalves’ (2014) research suggests that ‘girly girls’ are indeed less likely to continue with physics, and our own research has found that the few (middle-class) girls from our sample who did intend to take physics at A level invested in various disassociations from femininity and/or actively performed masculinity (Archer et al. *forthcoming*). The evidence that ‘girly’ femininity is hard to maintain over time in association with science (for example, Walkerdine 1990; Archer et al. 2013) is not recognised by the discourse of equality of opportunity, which submerges structural accounts of inequality (Francis, Burke, and Read 2013).

Like Ben, many more participants – especially girls – offered exemplars of ‘girly’ girls excelling at physics, to disprove the theory:

... because her other friend is ... in fact she used to be a model, right, so you’re not going to get that much more girly ... but she has still gone into Physics, you know she’s still got this real desire, this real passion to study Physics. (Debbie, mother of Bob, female, White British, social class 1)

No not at all, cos some of my friends are taking Physics and I think they’re quite girly. Just cos they’re good at the subject, they enjoy it, so that’s why they’re talking it. (Rebecca, White British, female, social class 2)

Because I’m also very girly (laughs) but then I enjoy my sciences. I think that there is no subject education-wise where it’s only male or female – it’s open to everyone [...] (Mieni, South Asian, female, social class 2)

This again highlights the importance of representation as ‘evidence’ of possibilities (Francis et al. 2016) to open up and deconstruct social norms – albeit here these exemplars may also be interpreted as ‘exceptions that prove the rule’. In other words, they may act to reject or hide the existence of long-standing social trends.

However, as already highlighted, over half the boys and around a third of girls agreed that the suggestion that especially ‘girly’ girls are less likely to pursue physics was plausible. We turn to these explanations next.

Damning the girly girl: femininity as superficiality

The affirmation that girly/super-feminine girls were less likely to want to pursue physics was often ascribed to social stereotypes associated with femininity:

if you’re particularly girly I assume that there’s lot of socialisation involved as well and concerns with your, you know with your appearance and as before Science requires a lot of focussed concentration and if you’re putting all your energy into something else then you may in your mind not have the time for Science. [...] For Science you need to have lots of pre-prepared knowledge as it were, so Science requires a lot of preparation whilst things such as History and English require lots of skills. (Buddy, White British, male, social class unknown)

Er I think again it’s linked to the stereotype that the ... yeah I think, because I think in the movies and stuff the most feminine women and girls are always the ones who are maybe not so smart or something; and then the not-so-popular ones are the ones who are good at Science, which I think is not true. (Gus, White British, male, social class 1)

However, besides the references to ‘stereotyping’, we can already see emerging within these quotes constructions of femininity as lacking in substance (‘concerns with appearance’) and dim (‘not so smart’) in contrast to (masculine) science as difficult and profound (‘requires a lot of focussed concentration’, needing ‘pre-prepared knowledge’ rather than ‘skills’). It was notable that some respondents positioned ‘girly’ girls as especially likely to be influenced by their peers, again suggesting superficiality and lack of ‘strength of character’: Georgie (White British, female, social class 1) maintains of ‘super girly’ girls that ‘they’re very much, they want to do what their friends think they should do and what their friends are doing and so they’ll go into like the same thing and maybe not, it wouldn’t be “Sciencey”’; and Olivia (mother of Bethany2, White British, female, social class 3) positions such girls as ‘quite influenced with peer pressure’. Other narratives already identified were also drawn upon by respondents more convinced by the proposition: for example, a few said that ‘girly’ girls would not wish to pursue science because of the association with manual and/or dirty work. Again, within this latter narrative, several mentioned engineering as especially associated with such manual constructions.

Others reflected that there are stereotypically gendered associations with particular subjects and their content which might impact stereotypically feminine girls’ choices:

It’s kind of like the dumb blonde stereotype as in they would rather pursue jobs in fashion or beauty or make-up and things like that, I don’t know. (Demi, White, female, social class 2/3)

Yeah, because like the majority of our year either want to do Health and Social or Beauty. (Charlie, White British, female, social class 2/3)

When I look at the girls at the girls in [Cheeky Monkey]’s class dotting about in their high heels with their extensions and their nails – they’re heading more towards Textiles. They don’t do Catering funnily enough, cos it’s too hard core – it means they’ve got to get their hands wet. (Lottie, mother of Cheeky Monkey, White, female, social class 3)

Presumably just the stereotypical girlie girl wouldn’t really be seen in a Physics type job or sort of any Science at all really. It’s more of a fashion parlour or spa or something. (Victor2, White British, male, social class 3)

Notably, ‘beauty’ and (to a lesser extent) hairdressing were frequently evoked as ‘girly’ occupations. As we observe elsewhere, the construction presented by Lottie, of girls not wishing to get dirty or wet, or break a nail (see Francis et al. 2016), were mobilised more broadly by respondents in reference to girls more generally, and very overtly present femininity as vain, obsessed with aesthetics and (consequently)

superficial. In the case of ‘girly’ subjects such as beauty and hairdressing, these were contrasted by some with physics, which as two students highlighted ‘isn’t very glamorous’. In keeping with the trends for caring jobs to be among those deemed appropriately feminine identified in the aforementioned and elsewhere (Francis 2002; Francis, Burke, and Read 2013), ‘health and social care’ was a further career path suggested by some students as more appealing to ‘girly’ girls: ‘Well I generally find that girly girls want to be caring and nurturing and that sort of thing, and so they may be inclined to nursing and that sort of thing’ (Joanne, White British, female, social class 2). Such constructions bring back the ‘nice girl’ association with kindness and caring. However, here again, references were often disparaging, positioning even such vocational, ‘caring’ investments as expressive of superficiality and lack:

Well a lot of them want to do things like health and social care and ... No, I just think it's I think girly, girly girls like they like to do girly things, nails. I was surprised by how many people want to do health and social care. [...] But I suppose I don't, I mean I don't know much about the subject. Does it lead to nursing? Does it lead to care? I don't know really what ... it kind of looks like a bit of a way out of doing a hard subject maybe. (Marie, mother of Louise, White, female, social class not recorded)

Such constructions of the ‘girly girl’ were more overt in some statements, and very clearly denigrated hyper-femininity as oppositional Other to the ‘cultural arbitrary’ (Bourdieu and Passeron 1977) of physics as ‘hard’, serious, profound and (fundamentally) masculine (Archer et al. *forthcoming*):

When I picture someone who's really feminine they just ... they're someone who isn't that focussed on doing something when they're older. And say something like a physicist – it requires independence and wanting to be it ... and not just going along with life. (Josh, White British, male, social class 3)

Because, I don't know, it's just most of (inaudible) [girly girls] who you see just don't like doing work. [...] Yeah, so and for them to do a hard subject that doesn't make sense. (Football Master, White, male, social class 3)

Also, supporting findings of previous studies, there remained evidence of a few boys constructing girls’ lives as vacuous and content-free in relation to boys’ lives and interests (Francis 2000a):

Um, maybe because like they have more time on their hands than boys do, because boys are more like, not that they have more stuff to do, but they have more ... I can't say more to think about, but like they're more I can't say active, but then [...] (Jake, Black African, male, social class 4)

Again, respondents positioned the subject of physics in direct contrast to such ‘vacuous’ constructions, as ‘hard’ and ‘hands on’. Kaka (Asian British, male, social class 2) argues that physics involves ‘actual getting down, using your hands’, and that ‘you wouldn’t expect a girly girl to be doing something like that’. He elaborates: ‘I mean you have experiments that are very very detailed, they need a lot of work.’

Heteroglossic contradiction

It is worth highlighting that narratives were far from always consistent in participants’ responses, illustrating the jostling, heteroglossic contradiction at play between different narratives within their responses. As has been found previously, the key tension creating contradiction, reconsideration and/or lack of resolution in their responses were clashes between discourses of individualism and equality of opportunity, with those of structural difference (including the genders as distinct) (Francis, Burke, and Read 2013). This monoglossia of individualist, agentic accounts, and the heteroglossic ‘bubbling up’ of structural difference in respondents’ talk, can also be illustrated in our findings (e.g. in the many responses that positioned subject choice as one of personal agency, but then later evoked social stereotypes or ‘natural’ gender differences as an explanation for a lack of women pursuing physics). However, in addition to this, our interview questions’ direct interpolation of gender difference also precipitated a variety of different constructions of gender in response, including that of gender as purely socially constructed. As many of the quotes already presented demonstrate, the monoglossic account of gender as binarised, with its hierarchical animation of the male as Subject and female as Other (Francis 2012), clearly maintains hegemony. However, it was notable how the discourse of equality of opportunity ‘troubled’ this binarised account, providing heteroglossic turbulence and contradiction. Davina’s (White British/European, female, social class 1) statements are illustrative:

I wouldn't say the fact that they're girly in itself has got anything to do with it, but I think there just tends to be a correlation for whatever reason. I think just ... again I think it's just to do with the state of mind. And I think it does tend to be kind of more of like a masculine state of mind that does tend to correlate with it. I don't think that they necessarily have any actual connection as such, but I think they just tend to be like ... it just tends to be kind of just the way it is. I do have a lot more male friends than most of my friends do, and I'm also probably more science-y than most of my friends are. So I guess there just is a bit of a ... yeah I don't know. I mean I guess it kind of is a bit more of a man thing in the sense that like men have more of a science-y state of mind, but I think that's got nothing to do with the fact that you are a male, it's just the way it is kind of thing I guess.

Hence narratives of individualism, individual merit (being girly has not 'anything to do with' lack of physics uptake; 'it's just to do with the state of mind') and equality of opportunity ('nothing to do with the fact you are male') conflict with those of science as masculine/male (more of 'a masculine state of mind'; 'a bit more of a man thing'; 'men have more of a science-y state of mind'). Yet interestingly, despite this heteroglossic contradiction, these tensions appear to co-exist in Davina's articulations without necessarily disturbing (and certainly not over-turning) the monoglossic maintenance of the gender binary and its production of physics as quintessentially masculine. Indeed, although Davina uses herself as an exemplar of a girl interested in science (animating the equality of opportunity discourse), as her quoted words begin to signal, and as we discuss in more detail elsewhere (Archer et al. *forthcoming*), Davina actively distances herself from femininity, and emphasises her masculine attributes and preference for male company, to explain and 'possibilise' her own investment in physics. Perhaps this supports Davies' (1989) scepticism at the traction of equality of opportunities discourse for disrupting the hegemony of the gender binary. She argues that much more radical discourses are required.

Discussion

Is 'girly' hyper-femininity simply a conduit for derision and abjection? Girly girls are 'loved' and protected within respondent narratives that draw on equality of opportunity discourses to assert their rights to exist. But also, despised and derided (sometimes simultaneously). However, as researchers such as McRobbie (2004) appear to acknowledge, this 'girly' production of femininity conversely exercises power over girls and women via media and commercial practices of marketised consumption (McRobbie 2004, 2007) which interpolate those young women conforming to the aesthetics and grooming practices of hyper-femininity as ideal objects of desire within the heterosexual matrix (see Butler 1990). In this sense, the rejection and disparagement of hyper-feminine girls by other girls may be read as a defensive action (Schippers 2007). Nevertheless, as Rich (2005) observes, derisive rejection of hyper-femininity as 'pathetic' by other girls/women (as well as by men/boys) serves to further devalue femininity.

Our findings seem to offer little consolation. Hyper-femininity, as evoked by the 'Girly girl' label, was overwhelmingly constructed as vacuous. Indeed, more gauche and pathological than an absence/lack – rather, an ephemeral, but nevertheless tiresome and pathetic, presence. Superficial, vain, dim, easily led: in short, ridiculous. In the discursive context of discussions of science and science access, even potentially positive characteristics associated with femininity, such as caring, vocationalism or glamour, have been soured within the construct of 'Girly girl', and cast as further evidence of pathology. This figure may be presented as entitled to equal rights to the same opportunities as others within equal opportunities discourse – but is interpolated as an object of compassion.

Clearly, these findings highlight both the misogyny still prevalent at the heart of constructions of gender, and the problematics of the monoglossic gender dichotomy with its continued connection between body (sex) and gender identification. In other words, to succeed in subjectification, girls are – at least to some extent – compelled to invest in a set of desires and productions which are simultaneously reified and despised in wider society (Walkerdine 1990; McRobbie 2007). The physical sciences are one of many exemplars of terrains constructed as profound and 'hard' (masculine) in direct contrast to constructions of femininity, rendering association and acceptance in this terrain difficult for those with female bodies (see Archer et al. *forthcoming*).

Yet the challenge remains what to do about this? This question applies both to the field of science and to feminist theory. In relation to the first, our findings add to extensive existing evidence that the domain of science is constructed as, and perpetuates, a masculine epistemology which is excluding of the feminine (and therefore often to girls, who are demanded to engage with femininity). This exclusivity needs to be challenged, and science opened up to diverse performances of gender.

In relation to feminist theory, succumbing to views of girls as ‘poisoned’ or ‘trapped’ by femininity seems to fall prey to misogyny. Is it possible to re-embrace ‘feminine’ traits such as care, emotionality and glamour? Or is a less problematic approach to continue to work for and celebrate heteroglossic gender diversity, to deconstruct the dichotomy? We suggest that this offers the best potential, and that research has a role in tracing and articulating gender heteroglossia in all its prevalence and variety.² Nevertheless, the semiotic construction of ‘girly femininity’ as an exclusively female domain, and the consequent risk of re-inscription of binaries in discussion of this term with interviewees, is highlighted by the nature of the data presented in this article. The data also remind us how entrenched the mono-glossic gender binary remains, and how much needs to be done to trouble it.

Further, in continuing to analyse this terrain, it remains imperative that constructs such as ‘femininity’ – and different productions of femininity and the discourses and performances that characterise them – are subject to scrutiny and precision. As Francis and Paechter (2015) argue,³ it is only by effectively identifying and mapping complexity and heteroglossia that we can supply the tools for gender deconstruction.

Notes

1. See, for example, Engebretson (2016), who refers to ‘male-’ or ‘female-identified individuals.’ For further discussion of this dilemma of analysing gender fluidity simultaneous to mapping gendered trends, see Francis and Paechter (2015).
2. See, for example, Francis (2010, 2012) and Francis and Paechter (2015) for further discussion.
3. See also Renold and Ringrose (2008), who make similar arguments but draw on Deleuze and Guattari’s (1993) constructs of the molecular and molar to analyse gender fluidity.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This work was supported by the Economic and Social Research Council [grant number: ES/L002841/1].

References

- Aapola, S., M. Gonick, and A. Harris. 2005. *Young Femininity: Girlhood, Power and Social Change*. Houndsmills: Palgrave.
- Archer, L., and B. Francis. 2007. *Understanding Minority Ethnic Achievement*. London: Routledge.
- Archer, L., A. Halsall, and S. Hollingworth. 2007. “Class, Gender, (Hetero)Sexuality and Schooling: Paradoxes within Working-Class Girls’ Engagement with Education and Post-16 Aspirations.” *British Journal of Sociology of Education* 28 (2): 165–180.
- Archer, L., J. DeWitt, J. Osborne, J. Dillon, B. Willis, and B. Wong. 2012a. “Science Aspirations, Capital, and Family Habitus: How Families Shape Children’s Engagement and Identification with Science.” *American Educational Research Journal* 49 (5): 881–908. doi:10.3102/0002831211433290.
- Archer, L., J. DeWitt, J. Osborne, J. Dillon, B. Willis, and B. Wong. 2012b. “Balancing Acts’: Elementary School Girls’ Negotiations of Femininity, Achievement, and Science.” *Science Education* 96 (6): 967–989. doi:10.1002/sce.21031.
- Archer, L., DeWitt, J., Osborne, J., Dillon, J., Willis, and Wong, B. 2013. “‘Not Girly, Not Sexy, Not Glamorous’: Primary School Girls’ and Parents’ Constructions of Science Aspirations.” *Pedagogy, Culture & Society* 21 (1): 171–194.
- Archer, L., Moote J., Francis, B., DeWitt, J., and Yeomans, L. (Forthcoming). “The ‘Exceptional’ Physics/ Engineering Girl: A Sociological Analysis of Longitudinal Data from Girls Aged 10–16 to Explore Gendered Patterns of Post-16 Participation.” *American Educational Research Journal*.

- Bakhtin, M. 1981. *The Dialogic Imagination: Four Essays*, edited by M. Holquist, Translated by C. Emerson and M. Holquist. Austin: University of Texas Press.
- Bauman, Z. 2005. *Work, Consumerism and the New Poor*. Buckingham: Open University Press.
- de Beauvoir, S. [1952] 1989. *The Second Sex*. Translated by H. M. Parshley. London: Random House.
- BIS. 2008. *The Science and Innovation Investment Framework 2004–2014: Economic Impacts of Investment in Research & Innovation*. London: Department for Business, Innovation & Skills.
- Bourdieu, P., and J.-C. Passeron. 1977. *Reproduction in Education*. Sage, London: Society and Culture.
- Burman, E., and I. Parker. 1993. *Discourse Analytic Research: Repertoires and Readings of Texts in Action*. London: Routledge.
- Butler, J. 1990. *Gender Trouble*. New York, NY: Routledge.
- Calabrese Barton, A., and E. Tan. 2009. "Funds of Knowledge and Discourses and Hybrid Space." *Journal of Research in Science Teaching* 46: 50–73.
- Caleon, I. S., and R. Subramaniam. 2008. "Attitudes towards Science of Intellectually Gifted and Mainstream Upper Primary Students in Singapore." *Journal of Research in Science Teaching* 45: 940–954.
- Carlone, H. B. 2003. "(Re)Producing Good Science Students: Girls' Participation in High School Physics." *Journal of Women and Minorities in Science and Engineering* 9: 17–34.
- CBI. 2012. *Learning to Grow: What Employers Need from Education and Skills. Education and Skills Survey 2012*. London: CBI.
- Connell, R. W. 1987. *Gender and Power*. Cambridge: Policy Press.
- Connell, R. W. 1993. *Masculinities*. Oxford: Blackwell Publishing.
- Cook, P., V. Beck, D. Brereton, R. Clark, B. Fisher, S. Kentish, J. Toomey, and J. Williams 2013. *Engineering Energy: Unconventional Gas Production*. Report for the Australian Council of Learned Academies. www.acola.org.au
- Danish EU Presidency. 2012. "International Roundtable on Gender and Social Mobility." Copenhagen, May 15.
- Davies, B. 1989. *Frogs and Snails and Feminist Tales*. Sydney: Allen & Unwin.
- Deleuze, G., and F. Guattari. 1993. *A Thousand Plateaus: Capitalism and Schizophrenia*. Minneapolis, MN: University of Minnesota Press.
- Duits, L. 2008. *Multi-Girl-Culture*. Amsterdam: Amsterdam University Press.
- Elias, P., P. Jones, and S. McWhinnie. 2006. *Representation of Ethnic Groups in Chemistry and Physics: A Report Prepared for the Royal Society of Chemistry and the Institute of Physics*. London: Royal Society of Chemistry/Institute of Physics.
- Engebretson, K. 2016. "Talking (Fe)Male: Examining the Gendered Discourses of Preservice Teachers." *Gender and Education* 28: 37–54.
- Equal Opportunities Commission. 2006. *Facts about Men and Women in Great Britain 2006*. Accessed October 28, 2015. www.unece.org
- Farenga, S. J., and B. A. Joyce. 1999. "Intentions of Young Students to Enroll in Science Courses in the Future: An Examination of Gender Differences." *Science Education* 83: 55–75.
- Fausto-Sterling, A. 2000. *Sexing the Body: Gender Politics and the Construction of Sexuality*. New York: Basic Books.
- Fennema, E., and P. L. Peterson. 1985. "Autonomous Learning Behavior: A Possible Explanation of Sex-Related Differences in Mathematics." *Educational Studies in Mathematics* 16: 309–311.
- Foucault, M. 1980. *Power/Knowledge: Selected Interviews and Other Writings, 1972–1977*. New York: Pantheon.
- Francis, B. 1998. *Power Plays*. Stoke-on-Trent: Trentham Books.
- Francis, B. 1999a. "Lads, Lasses and (New) Labour: 14-16 Year Old Students' Responses to the 'Laddish Behaviour and Boys' Underachievement' Debate." *British Journal of Sociology of Education* 20 (3): 357–373.
- Francis, B. 1999b. "An Investigation of the Discourses Children Draw on in Their Constructions of Gender." *Journal of Applied Social Psychology* 29 (2): 300–316.
- Francis, B. 2000a. *Boys, Girls and Achievement: Addressing the Classroom Issues*. London: Routledge Falmer.
- Francis, B. 2000b. "The Gendered Subject: Students' Subject Preferences and Discussions of Gender and Subject Ability." *Oxford Review of Education* 26 (1): 35–48.
- Francis, B. 2002. "Is the Future Really Female? The Impact and Implications of Gender for 14-16 Year Olds' Career Choices." *Journal of Education and Work* 15 (1): 75–88.
- Francis, B. 2008. "Engendering Debate: How to Formulate a Political Analysis of the Divide between Genetic Bodies and Discursive Gender." *Journal of Gender Studies* 17 (3): 211–223.
- Francis, B. 2010. "Re/Theorising Gender: Female Masculinity and Male Femininity in the Classroom?" *Gender and Education* 22 (5): 477–490.
- Francis, B. 2012. "Gender Monoglossia, Gender Heteroglossia: The Potential of Bakhtin's Work for Re-Conceptualising Gender." *Journal of Gender Studies* 21 (1): 1–15.
- Francis, B., and C. Paechter. 2015. "The Problem of Gender Categorisation: Addressing Dilemmas past and Present in Gender and Education Research." *Gender & Education* 27 (7): 776–790.
- Francis, B., C. Skelton, and B. Read. 2010. "The Simultaneous Production of Educational Achievement and Popularity: How Do Some Pupils Accomplish It?" *British Educational Research Journal* 36 (2): 317–340.
- Francis, B., P. Burke, and B. Read. 2013. "The Submergence and Re-Emergence of Gender in Undergraduate Accounts of University Experience." *Gender & Education* 26 (1): 1–17.

- Francis, B., A. Archer, J. Moote, J. DeWitt, L. Yeomans, and E. MacLeod. 2016. "The Construction of Physics as a Quintessentially Masculine Subject: Young People's Perceptions of Gender Issues in Access to Physics." *Sex Roles*. doi 10.1007/s11199-016-0669-z.
- Gonick, M. 2004. "Old Plots and New Identities: Ambivalent Femininities in Late Modernity." *Discourse* 25 (2): 189–209.
- Gonsalves, A. 2014. "Physics and the Girly Girl – There is a Contradiction Somewhere': Doctoral Students' Positioning around Discourses of Gender and Competence in Physics." *Cultural Studies of Science Education* 9 (2): 503–521.
- Gorard, S., and B. H. See. 2009. "The Impact of Socio-Economic Status on Participation and Attainment in Science." *Studies in Science Education* 45: 93–129.
- Gramsci, A. 1971. *Selections from the Prison Notebooks*. London: Lawrence and Wishart.
- Greenwood, C., M. Harrison, and A. Vignoles. 2011. *The Labour Market Value of STEM Qualifications and Occupations*. London: Royal Academy of Engineering.
- Halberstam, J. 1998. *Female Masculinity*. Durham and London: Duke University Press.
- Harding, S. 1991. *Whose Science? Whose Knowledge?*. Buckingham: Open University Press.
- Harris, A. 2004. *Future Girl: Young Women in the Twenty-First Century*. New York: Routledge.
- Haworth, C. M. A., P. Dale, and R. Plomin. 2008. "A Twin Study into the Genetic and Environmental Influences on Academic Performance in Science in Nine-Year-Old Boys and Girls." *International Journal of Science Education* 30: 1003–1025.
- Hey, V. 1997. *The Company She Keeps*. Buckingham: Open University Press.
- Hey, V. 2005. "The Contrasting Social Logics of Sociality and Survival: Cultures of Classed Be/Longing in Late Modernity." *Sociology* 39: 855.
- Hey, V., A. Creese, H. Daniels, S. Fielding, and D. Leonard. 2001. "Sad, Bad or Sexy Boys': Girls Talk in and out of the Classroom". In *What about the Boys? Issues of Masculinity in School*, edited by Wayne Martino and B. Meyenn, 124–139. Buckingham: Open University Press.
- Hood-Williams, J. 1998. "Stories for Sexual Difference." *British Journal of Sociology of Education* 18: 81–99.
- House of Lords. 2012. *Higher Education in Science, Technology, Engineering and Mathematic Subjects*. London: The Stationery Office Limited.
- Institute of Physics. 2012. *It's Different for Girls: The Influence of Schools – An Exploration of Data from the National Pupil Database Looking at Progression to a-Level Physics in 2011 from Different Types of School at Key Stage 4*. London: Institute of Physics.
- Irigaray, L. 1985. *Speculum of the Other Woman*. Eng. Translated by C. Gill NY: Cornell University Press.
- Jackson, C., C. Paechter, and E. Renold, eds. 2010. *Girls and Education 3–16, Continuing Concerns, New Agendas*. Maidenhead: Open University Press.
- Kehily, M.J., Mac An Ghaill, D. Epstein, and P.Redman. 2002. "Private Girls and Public Worlds: Producing Femininities in the Primary School." *Discourse* 23 (2): 167–177.
- Lloyd, G., ed. 2005. *Problem Girls*. RoutledgeFalmer: Abingdon.
- MacInnes, J. 1998. *The End of Masculinity*. Buckingham: Open University Press.
- McRobbie, Angela. 2004. "Post-Feminism and Popular Culture." *Feminist Media Studies* 4 (3): 255–264.
- McRobbie, A. 2007. "Top Girls? Young Women and the Post-Feminist Sexual Contract." *Cultural Studies* 21 (4-5): 718–737.
- McRobbie, A. 2009. *The Aftermath of Feminism: Gender, Culture and Social Change*, London: Sage.
- Mendick, H. 2005. "Mathematical Stories: Why Do More Boys than Girls Choose to Study Mathematics at AS-Level in England?" *British Journal of Sociology of Education* 26: 235–251.
- Mujtaba, T., and M. J. Reiss. 2013. "What Sort of Girl Wants to Study Physics after the Age of 16? Findings from a Large-Scale UK Survey." *International Journal of Science Education* 35: 2979–2998.
- Oliver, K., M. Hamzeh, and N. McCaughtry. 2009. "Girly Girls Can Play Games/Las Niñas Pueden Jugar Tambien: Co-Creating a Curriculum of Possibilities with Fifth-Grade Girls." *Journal of Teaching in Physical Education* 28 (1): 90–110.
- Osborne, J. 2007. "Science Education for the Twenty First Century." *Eurasia Journal of Mathematics, Science & Technology Education* 3 (3): 173–184.
- Paechter, C. 2006. "Femininities and Schooling", In *The SAGE Handbook of Gender and Education*, edited by Christine Skelton, Becky Francis and Lisa Smulyan, 365–377, New York, NY: Sage.
- Paechter, C. 2010. "Tomboys and Girly-Girls: Embodied Femininities in Primary Schools." *Discourse: Studies in the Cultural Politics of Education* 31 (2): 221–235.
- Paechter, C., and S. Clark. 2007. "Who Are Tomboys, and How Do We Recognise Them?" *Women's Studies International Forum* 30: 342–354.
- Paechter, C., and S. Clark. 2010. "Schoolgirls and Power/Knowledge Economies: Using Knowledge to Mobilize Social Power" in *Girls and Education 3–16: Continuing Concerns, New Agendas Edited by Carolyn Jackson, Carrie Paechter and Emma Renold*, 117–128. Berkshire, UK: Open University Press. ISBN 9780335235629.
- Read, B., B. Francis, and C. Skelton. 2011. "Gender, Popularity and Notions of in/Authenticity amongst 12 Year Old to 13 Year Old Schoolgirls." *British Journal of Sociology of Education* 32 (2): 169–183.

- Reay, D. 2001. "Spice Girls, 'Nice Girls', 'Girlyies', and 'Tomboys': Gender Discourses, Girls' Cultures and Femininities in the Primary Classroom." *Gender & Education* 13 (2): 153–166.
- Renold, E. 2005. *Girls, Boys and Junior Sexualities*. London: RoutledgeFalmer.
- Renold, E., and A. Allen. 2006. "Bright and Beautiful: High Achieving Girls, Ambivalent Femininities and the Feminisation of Success in the Primary School." *Discourse: Studies in the Cultural Politics of Education* 27 (4): 457–473.
- Renold, E., and J. Ringrose 2008. "Regulation and Rupture: Mapping Tween and Teenage Girls' Resistance to the Heterosexual Matrix." *Feminist Theory* 9(3): 313–338.
- Rich, E. 2005. "Young Women, Feminist Identities and Neoliberalism." *Women's Studies International Forum* 28 (6): 495–508.
- Rose, N. 1999. *Powers of Freedom*. Cambridge: Cambridge University Press.
- Royal Academy of Engineering. 2012. *Jobs and Growth: The Importance of Engineering Skills to the UK Economy*. September, 2012. London: Royal Academy of Engineering.
- Royal Society. 2008. *Science and Mathematics Education, 14–19. A 'State of Nation' Report*. London: Royal Society.
- Sanders, K. 2015. "Mean Girls, Homosociality and Football: An Education on Social and Power Dynamics between Girls and Women." *Gender and Education* 27 (7): 887–908.
- Schippers, M. 2007. "Recovering the Feminine Other: Masculinity, Femininity, and Gender Hegemony." *Theory and Society* 36 (1): 85–102.
- Shabot, S. 2006. "Grotesque Bodies: A Response to Disembodied Cyborgs." *Journal of Gender Studies* 15 (3): 223–235.
- Smith, E. 2010. "Do We Need More Scientists? A Long-Term View of Patterns of Participation in UK Undergraduate Science Programmes." *Cambridge Journal of Education* 40: 281–298.
- Smith, E. 2011. "Women into Science and Engineering? Gendered Participation in Higher Education STEM Subjects." *British Educational Research Journal* 37: 993–1014.
- Treasury, HM. 2011. *The Plan for Growth*. London: BIS.
- Urban Dictionary. 2016. Accessed January 22, 2016. <http://www.urbandictionary.com/define.php?term=Girly+girl>
- US President's Council of Advisors on Science and Technology. 2010. *Designing a Digital Future: Federally Funded Research and Development in Networking and Information Technology*. Washington, DC: Executive Office of the President, President's Council of Advisors on Science and Technology. <https://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-nitrd-report-2010.pdf>
- Volman, M., and G. Dam. 1998. "Equal but Different: Contradictions in the Development of Gender Identity." *British Journal of Sociology of Education* 19: 529–545.
- Vorderman, C., R. Porkess, C. Budd, R. Dunne, and P. Rahman-hart. 2011. *A World-Class Mathematics Education for All Our Young People*. London. Accessed March 21, 2016. <http://www.tsm-resources.com/pdf/VordermanMathsReport.pdf>
- Yang, C. C. R. 2016. "Are Males and Females Still Portrayed Stereotypically?" *Visual Analyses of Gender in Two Hong Kong Primary English Language Textbook Series*, *Gender & Education* 28: 674–692.
- Walkerdine, V. 1997. *Daddy's Girl*. London: Verso.
- Walkerdine, V. 1988. *The Mastery of Reason*. London: Virago.
- Walkerdine, V. 1990. *Schoolgirl Fictions*. London: Verso Books.
- Walkerdine, V., H. Lucey, and J. Melody. 2001. *Growing up Girl: Psycho-Social Explorations of Gender and Class*. Basingstoke: Palgrave. <https://he.palgrave.com/page/detail/growing-up-girl-valerie-walkerdine/?sf1=barcode&st1=9780333647837>