Title: **Emerging Gender Differences at Puberty and School Transition: The Consistency of Findings Across Era and Place**

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Abstract
(170 words)

Gendered identities can develop throughout the lifespan in an undulating process spurred at times by significant physiological, cognitive and social events. Two important developmental transitions occur in early adolescence (age 10-14): changing schools and puberty. This chapter reviews the development of gender identity and gender differences in school engagement, aspirations and achievement, during these multiple transitions. It synthesizes the findings of key in depth studies and new longitudinal research into school transition, spanning a 35 year period. This reveals little change in how boys and girls adapt to puberty and school transition across time in the US and the UK. The contribution of gender differences in adaptation to aspirations and achievement is found to be moderated by societal expectations and the provision of activities and structures that promote gender integration and equality. The chapter concludes by offering suggestions for how schools, policy makers and parents can manipulate this provision in order to gently influence the naturally occurring development of early adolescents' gendered identities, to facilitate their aspirations and achievement.

Introduction

At the age of 11 or 12 years, most children experience gender specific biological development accompanied by changing social expectations from peers and families. In the midst of this pubertal transition, children can also experience the major life shift of changing schools. This chapter reviews the development of gender differences in identity, aspirations and attainment, during these multiple transitions. After outlining its perspective on gender and the available research, it briefly discusses gender differences at puberty, then examines trends in gender differences at school transition over a thirty year period by collating evidence from key ethnographic and quantitative studies.

Here, gender is perceived as the outcome of biology interlinked with social and personal constructions of sex roles. These forces operate as a feedback loop that through the millennia have shaped much of our genetic and cultural inheritance of what it is to be female or male. Influences on gender therefore flow from many levels, from our mammalian ancestry, from our cultural heritage, inter-generationally and within the lifespan, all experienced by the individual in the second by second 'real time' of living. Gender is accepted as being both learned (e.g. Bandura, 1977) and innate.

Within the lifespan, biological and cultural 'maturity status markers' (Symonds, 2009) that for girls include growing breasts, wearing one's first pair of stiletto heels and pregnancy, provide coarse and salient shifts in gender identity that interact with daily indications of gender such as positive sexual attention from males. This information becomes internalized as the 'gender schema', which is an information gathering, sorting and storage system that selectively facilitates gendered behaviour and self-perceptions (Bem, 1981). The gender schema is thought to be a fundamental component of the self-concept which is conceptualised as a positively biased dynamic and organized system of self-perceptions, motives and values that responds negatively to threat (Epstein, 1973; Markus & Wurf, 1987).

Individual agency can also play a central role in gender development, as people actively or passively react to inherited biological and social gender characteristics. Early adolescents (age 10 to 14 years) might be less able to evaluate gender as a product of evolutionary and cultural heritage than are adults, given their limited exposure to these types of higher order concepts and the complexity of information that underpins them. The combination of the surge of gender specific information at puberty and limitations of children's evaluative capacities might result in an intensification of gender differences (first outlined by Hill & Lynch, 1983, as a socialization effect) in early adolescence.

For over 40 years, studies have catalogued changes occurring in children's psychology and behaviour at school transition. Observed changes are often linked with common features of post-transfer school environments, such as stricter teachers, more bureaucracy and a larger peer group (Eccles & Midgley, 1989; Symonds, 2009). Changing schools presents children with new environmental stimulus, and influences relational changes in school, peer, home, and neighborhood contexts (Symonds, 2009). Pubertal development alters both the individual and their experience of these multiple transitions, by influencing the feedback loop between the individual and their environment.

In a systematic review of early adolescent psychology at school transfer (Symonds & Galton, forthcoming), 20% of 170 studies reported gender specific findings. However, most reports were restricted to a couple of sentences with no in depth analysis. Fortunately those that did analyze gender in depth are amongst the most detailed studies of school transfer to date. These form the primary data source for this review. They include two quantitative longitudinal studies from the US and three UK studies that either use ethnography or a mixture of ethnography, systematic observation and survey research. A new study from the first author uses a mixture of design features and methods from across these studies such that the findings can be compared with those of the earlier studies by replicating the statistical analyses and triangulating the qualitative data. Evidence from the wider pool of research is presented alongside the findings of these studies.

Table 1. Summary of In-Depth Studies

Milwaukee study 1974-77	Two phase repeat measures study (G6-7 and G9-10[1]) of a stratified representative random sample of around 300 children in a two tier (K-8 to high school) or three tier (K-6 to junior high to senior high) system in Milwaukee (Simmons & Blyth, 1987).
ORACLE 1977-78	A pre- and post-transition multiple methods study of 486 children transferring to age 9-13 middle schools, age 11-14 middle schools, or age 12-18 senior schools (end number 334), in the English midlands. (Galton, Simon, & Croll, 1980; Galton & Wilcocks, 1983; Delamont & Galton, 1986).
Changing Schools 1979-80	A pre- and post-transition ethnography of mainly one class of children moving to a large high school (of around 2000 pupils) in the English Midlands (Measor & Woods, 1984).
Michigan Study of Adolescent Life Transitions (MSALT) 1983-84	A four-wave repeated measures survey of around 1,850 children moving from G6 in elementary school to G7 in Junior High School in the Michigan area. A variety of analyses are published in academic journals (cf Feldlaufer, Midgley, & Eccles, 1988; Wigfield et al., 1991; Eccles et al., 1993).

[1] School years are reported as US 'grades' which are one unit lower than English school 'years'. For example, US Grade 6 (G6) is equivalent to English Year 7. In both countries, the school year mostly begins in September (Fall) and finishes in June/July (Summer).

ORACLE Replication 1996-97	A replication of the original ORACLE study in the same school districts, using the same system of systematic observation and survey and attainment measures from over 600 pupils and 7800 observations. (Hargreaves & Galton, 2002).
Secondary and Middle School Adolescent Development (SAMSAD) 2007-08	A post-transition multiple methods study of G6 children remaining in one age 9-13 middle school (N=86) or transferring into G6 in one age 11-16 secondary school (N=262) in the East of England (Symonds, 2009). Methods were a two wave survey in Fall and Summer of the G6 year (Longitudinal N=192), and interviews and observations of 20 target pupils.

Pubertal development

The changes in early adolescent behaviour are considered more a product of pubertal development than of age (Hayward, 2003, p. xviii). Puberty alters the physique, the brain, the child's self-perceptions and behaviour, and others' expectations of the child. These transformations operate as a dynamic system. This brief section overviews gender differences in pubertal development so that interested readers can look for threads linking physiology and the social changes presented in section two.

Puberty occurs as three major physical events. Gonadarche begins when the hypothalamic gonadotropin releasing hormone (GnRH) hormone travels to the pituitary and stimulates the secretion of two further hormones, luteinizing hormone (LH) and follicle stimulating hormone (FSH). Initiated during the child's sleep (Fechner, 2003), LH and FSH travel through the blood to the testes and the ovaries, facilitating sperm and egg production and the secretion of testosterone or estrogen depending on gender, which stimulate the development of sexual organs and fertility (Sisk & Foster, 2004). Adrenarche is the increase of adrenal androgen that first occurs at ages 6 to 8 years and prompts the development of pubertal hair for both genders and facial hair and deepening of the voice for boys (Fechner, 2003). Thirdly, both genders experience a growth spurt of similar duration that begins earlier in girls but from a lower baseline height. This results in males being taller in adulthood (Tanner et al., 1976). Girls experience increased body mass earlier than boys (around 6 years versus 9.5 years) (Fechner, 2003) and at puberty tend to gain body fat whilst boys gain muscle (Eccles, 1999).

The release of pubertal hormones can be simultaneous or differentiated (Dahl, 2004), making it difficult to pinpoint an exact starting-point for puberty. Girls show outward signs of puberty roughly 18 months before boys (Brooks-Gunn & Reiter, 1990) and experience gonadal and adrenal development around six months to one year earlier than boys (Fechner, 2003). It is proposed that age at menarche is moderated by experiences of social hardship in childhood, with girls from more resource rich backgrounds experiencing menarche later (Belsky, Steinberg, & Draper, 1991).

Neuroscientific research finds gender differences in the timing of physical brain development in early adolescence. Gray matter (synaptic density) in the front temporal lobes increases until around ages 11 or 12, and then rapidly declines in a period of 'synaptic pruning' (Giedd et al., 1999), a process which generally occurs around two years earlier for girls (Lenroot et al., 2007). Girls' brains reach their peak cerebral volume at age 10.5, whilst this occurs for boys at age 14.5 (Lenroot et al., 2007). Work with animal models finds that new cells emerge in sexually dimorphic areas of the brain during puberty, a differential which is conserved into adulthood (Ahmed et al., 2008). These findings demonstrate how aspects of brain development in early adolescence are moderated by gender.

Gender intensification in early adolescence

Hill and Lynch's (1983) gender-intensification hypothesis attributes findings that early adolescent girls are more self-aware and less confident, and more oriented towards inter-personal goals and behaviours than boys, to the "acceleration of gender-differential socialization" (p.201). However their review also found gender variations in emotional behaviour (e.g. male aggression) that are potentially attributable to socialisation *and* biology. Regardless of the source of effect, gender intensification might dispose early adolescents towards activities that reinforce their gender identity and away from those that contradict it (Wigfield & Eccles, 1994). This tendency might be particularly strong at school transition where, it is suggested, children tend to rely on fundamentally stable aspects of the self-concept such as biological sex, when organizing their identity and behaviours (Jackson & Warin, 2000).

In childhood, boys are generally found to have more rigidly gendered identities than girls, and to avoid feminine behaviour whilst girls are more flexible (Whitehead, 2006). These differences are conserved into early adolescence where boys report more desire to not act like the opposite sex more than do girls (Simmons et al., 1987) and rate themselves more highly masculine than feminine, compared with girls' ratings of themselves as feminine as opposed to masculine (Comber, 2001). Both genders are found to be less sex stereotyped across time (Simmons & Blyth, 1987) and in comparison to 15/16 year olds (Comber, 2001), whilst the extent of differences between them remains. These findings, although in need of further replication, suggest an 'early adolescent limited' period of gender intensification.

School Transition

The following section pulls together main findings from the in depth studies in a series of sections on identity, aspirations and achievement.

Social Identities and Psychosocial Adjustment

Girls' friendships and self-perceptions

A salient change reported in girls' friendships in early adolescence is an increased tendency to analyze and discuss each other and other people, something which can quickly lead to arguments (Symonds, 2009). This is observed independently of school transfer in SAMSAD (2007-08), and in post-transfer populations in ORACLE (1977-78) and Changing Schools (1979-80).

- Joanna: "It's because when you're younger you don't really fall out. Because you don't know what it is" (Symonds, 2009, p. 161)
- Lee Anne: "If we ever fall out we just laugh our heads off and fall in again" (Delamont & Galton, 1986, p. 232)
- "Me and Jenny have fallen out with Janet you know" (Measor & Woods, 1984, p. 89)

Girls in these studies socialized in tight knit cliques, many having one 'best friend' within these. Friendship groupings were fluid across time, with friends being ejected and incorporated in a continuous process of 'friendship matching' (Symonds, 2009).

In-group similarities in fashion and behaviour can quickly develop post-transition, with groups becoming organized by girls' disposition towards school rules and heterosexual interaction (Measor & Woods, 1984; Symonds, 2009). Friendship groups based on deviant behaviours are observed to be more concerned about feminine appearances and attractiveness than are those who conform to school rules (Measor & Woods, 1984).

Girls' attention to hairstyles, jewelry and makeup appears to be accentuated in the first post-transfer year compared to its prominence at primary school and among non-transfer children of the same age (Measor & Woods, 1984; Symonds, 2009), possibly a consequence of the social comparison processes that take place as the children adjust to new peer groups. In SAMSAD despite restrictions at both schools, only the post-transfer girls were observed to wear nail varnish and jewelry ostentatiously. For example when sitting on the floor in Drama,

Chloe and Stacy stretched out their legs so that their stripy socks were clearly visible below their trouser hems. Chloe spent several minutes fiddling with her painted finger nails which were splayed on the carpet for all to see, including the teacher.

School equipment can also be used to exhibit feminine appearances. In Changing Schools (1979-80), popular girls' pencil cases were made of lilac coloured fur fabric or denim. One girl had to borrow her little sister's toy soldiers' pencil case and made apologies for it to her friends. Over 30 years later in SAMSAD, Sam and her friends were observed to use an oversized purple fluffy pen to gain attention. One girl lay stomach down on a table whilst twirling the pen in front of her. Sam made a public display of acquiring the pen, then stroked and twirled it in a manner that drew looks from other pupils in the class.

This budding sexuality is also apparent in girls' idealized choice of clothes to wear to school discos. In both ethnographies, girls reported wanting to wear clothes that were revealing, yet were cautioned by their mothers and older sisters. The girls are referred to as being "at a half-way stage" with "downward age-graded pressures...separating them from childhood, but holding them back from fully-fledged teenage status" (Measor & Woods, 1984, p. 104).

With increasing attention to their physical and social selves, it is unsurprising that girls are found to have higher levels of self-consciousness than boys (Jones & Thornburg, 1985). In SAMSAD, only girls who had experienced a school transition were concerned about the social pressures of growing up, however early maturing girls in both schools were worried about their breast development and wanted to stay like children (Symonds, 2009). Early maturing girls' evaluations of body image decline faster than do other girls and boys', regardless of whether or not they have changed schools (Petersen & Crockett, 1985; Simmons & Blyth, 1987). Feeling underdeveloped can also be problematic as the earlier *and* later that girls develop in relation to their peers, the lower their evaluations of body image (Tobin-Richards, Boxer, & Petersen, 1983). Late developers might wish for more developed bodies, whilst early developers might experience social complications of having a visibly sexual body in childhood.

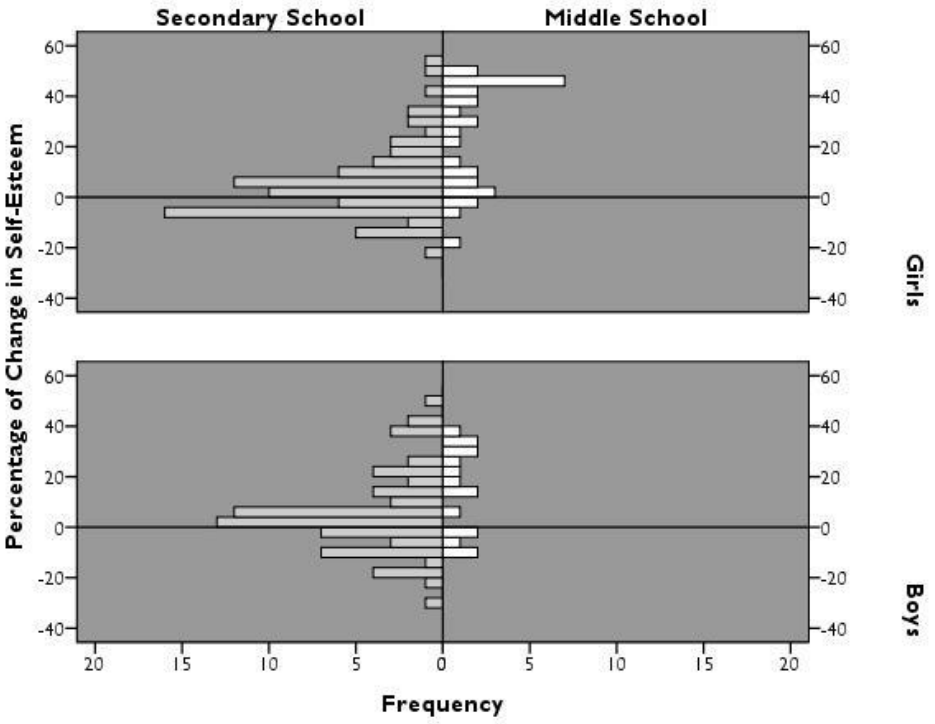
Girls are commonly found to have lower average self-esteem than boys across school transfer (Nottelmann, 1987; Wigfield et al., 1991), but only the Milwaukee study found that a greater percentage of girls had declining self-esteem *if* they had transferred schools at age 12 (56%) than if they had remained in a K-8 system (40%) (Simmons & Blyth, 1987). Also in a recent post-transfer study in Cleveland, G6 girls in a K-8 system had a more significant average rise in self-esteem across the school year than those at middle school (Zoller Booth,

Chase Sheehan, & Earley, 2007). The Milwaukee study also found that declines in self-esteem were dependent on the number of 'life transitions' that a girl experienced, including dating, puberty, geographic mobility and school transition (Simmons et al., 1987).

The SAMSAD data can be used to test some of Simmons and Blyth's findings, albeit with a smaller and less representative sample. School related self-esteem was measured with a 24 item Likert type scale constructed by Pell (Hargreaves & Galton, 2002). Highly acceptable reliability coefficients, (Cronbach's alpha) of .85 in Fall and .84 in Summer were obtained. Pubertal status was measured with a novel instrument designed to reduce embarrassment if pupils were later interviewed by the researcher. Pupils reported if and when they had experienced 'adult changes to their bodies'. Average reported pubertal onset was similar to that found in US studies using established measures (Coleman & Coleman, 2002). Children also noted whether their development was ahead of or behind their peers, using a five point Likert type scale.

The percentage of change in self-esteem in Summer was calculated from self-esteem scores in Fall (Figure 1), to replicate Simmons and Blyth's analysis of the percentage of girls who had declining self-esteem at transition. Ceiling effects are unlikely as the 3% of the sample that scored above 95% on the scale in Fall declined in self-esteem by Summer.

Figure 1. Distribution of Change in Self-Esteem



The resulting continuous change scores were categorized as increasing, stable (0% change) or decreasing. The percentage of secondary school girls whose self-esteem declined (39%) was far greater than in the middle school (13%), and on average the decline itself was greater (t =-4.551, df=40.227, p<.000). This is a more marked difference than Simmons and Blyth's findings of 56 per cent versus 40 per cent. There was no statistical effect of pubertal timing nor comparative status on the percentage of change in self-esteem and original self-esteem scores, no matter which test was used.

Table 2. SAMSAD self-esteem between schools and genders.

		Decrease		Stable		Increase		Total	
		N	%	N	%	N	%	N	%
Girls	Secondary School	30	39	3	4	43	57	76	100
	Middle School	4	13	2	7	24	80	30	100
Boys	Secondary School	24	34	4	6	42	60	70	100
	Middle School	5	31	0	0	11	69	16	100

The study of self-esteem at school transfer may have important implications for girls' educational attitudes and achievement. Children who feel good about their physical looks and achievement are likely to have higher self-esteem (Lord, Eccles, & McCarthy, 1994), suggesting that girls with lower self-image might be most at risk of declining self-esteem across transfer. In SAMSAD, girls who had higher self-esteem were more likely to be satisfied with their school work by the end of the year (Pearson's R=.37, p=<0.000), whilst there was no association for boys.

Boys' friendships and aggression

Well adjusted boys are observed to spend their leisure time at school in either large sports-oriented groups, or in smaller groups more interested in fantasy and role playing games (cf Swain, 2000). Out-of-school behaviours of "playing football together, or a more general going around with him" observed in the 1970s (Measor & Woods 1984, p.65) were also common in the 2000s: "going out with my mates, playing football, going down the park" (Bobby); although some boys preferred playing computer games with limited company alone or with a couple of friends (Symonds, 2009).

Boys' friendship groups appeared more stable across the post-transfer year than were girls' (Measor & Woods, 1984; Symonds, 2009) and their reasons for choosing friends were slightly different. In SAMSAD, Kevin reported careful friendship selection,"when I first

came I was a tiny bit cautious and I was just trying to work out who to make friends with and who not to make friends with" and Jacob felt that friends were important "because they make me feel slightly safer".

Boys are observed to quickly develop macho hierarchies post-transfer (Measor & Woods, 1984; Benyon, 1985; Symonds, 2009), resulting in friendship groups that fit broad categories of deviant (objecting to school rules), conformist (submissive to school rules) and 'knife-edgers' (using limited deviancy to gain social status without allowing it to interrupt achievement) (Measor & Woods, 1984), also noted by Comber (2007). Boys compete for 'top dog' status within and between friendship groups using aggressive behaviours of irritating and fighting other boys (Measor & Woods, 1984). Boys often discuss 'myths' of toughness and aggression occurring in the post-transfer school.

- Philip: "I've heard that there's these boys, and if you have a fight, they wear punch gloves with spikes, and they hit you and leave punch holes in your face" (Measor & Woods, 1984, p. 21).
- Charlie: "You can get picked on by the older people and they all have their threats like they are gonna chuck your head down the toilet" (Symonds, 2009, p. 145)

A small percentage of boys can become socially isolated depending on their role in the toughness game. Those who refuse to engage yet have a stable group of friends (like the 'conformists') are usually immune – perhaps due to 'safety in numbers'. However, boys who are perceived as 'weak' and are unsupported by friends are at risk of being bullied and emasculated (Measor & Woods, 1984). In contrast, those who are extremely aggressive are often disliked by other children. These boys can be described as 'vulnerable', often having disadvantaged family backgrounds, special educational needs, and difficulty communicating and sustaining relationships in general. In ORACLE (1977-78), a teacher described them as "loners, have few friends, tended to hang around with older boys... seek attention by fighting, challenging older boys to fight" (Delamont & Galton, 1986, p. 89). Like early maturing girls in Simmons and Blyth's analysis of cumulative change in self-esteem, vulnerable boys might have great difficulty coping with multiple transitions in early adolescence.

Aggressive behaviours at transition have been measured by reports of bullying and victimization (cf Pellegrini & Long, 2002), and hostility (Hirsch & Rapkin, 1987). Results suggest a peak in bullying immediately post-transfer then a decline in aggressive behaviours

on average across the post-transfer year. However, these analyses do not specify what happens to vulnerable aggressive boys, for whom transfer may be the straw that breaks the camel's back.

Heterosexual interaction

In transfer and non-transfer environments, early adolescent dating is commonplace (Simmons & Blyth, 1987). In Changing Schools (1979-80) and SAMSAD (2007-08), girls orchestrated much of the dating activity and were often responsible for 'hiring and firing' boys, particularly when their boyfriends ignored them (perhaps out of shyness or confusion). Relationships could be made and broken with lightning speed, some lasting for less than a day. However, not all relationships were 'speed dating' as some couples had been together for over a year.

Girls are observed to pay more attention to heterosexual relationships than do boys at the start of adolescence (Measor & Woods, 1984; Symonds, 2009) and have rated their popularity with the opposite sex as more important than have boys (Simmons & Blyth, 1987). Early maturing children report more dating than their peers (Simmons & Blyth, 1987) and 'deviant' children are observed to be more oriented towards heterosexual relationships than conformist children (Measor & Woods, 1984; Symonds, 2009). For example in SAMSAD, Billy walked around the science classroom pulling girls' bra straps, receiving smiles from the girls and a reprimand from the teacher.

Despite the fertility of dating behaviours, adolescents' friendship groups are observed to be mainly gender segregated, especially in classrooms. Boys' lunchtime sporting groups do not include girls, who instead stand around talking in small groups (Measor & Woods, 1984; Delamont & Galton, 1986; Symonds, 2009). Only SAMSAD observed (two) mixed sex cliques at the post-transfer school, perhaps in relation to the later era of study but also to the lack of time and equipment at lunchtimes.

- Charlie: " 'cause there's not much of a playground here, they've only got a few basketball hoops and then it's all concrete… you don't get much time to play and there's nothing really to do. So you just kind of like don't play at all".

The tendency for same-sex friendship groups might be a continuation from childhood. However, orientation towards heterosexual relationships in early adolescence might qualitatively alter this phenomenon. Here, gender segregation might become a response to the

growing complication of sexual attraction between opposite sex members, enabling same-sex friends to provide constructive support for, and even regulation of, each other's developing sexuality.

Academic Identities, Subject Perceptions, Motivation and Achievement

Gender segregation and cooperation

Early adolescents tend to work in single-sex 'cooperation' groups in class before (Measor & Woods, 1984) and after transition (Delamont & Galton, 1986; Symonds, 2009). For girls this potentially strengthens behaviours which facilitate academic achievement, such as communication (Whitehead, 2006). In-group members help each other by offering advice and lending personal equipment, and are observed to reject the advances of opposite sex peers who try to interact with the group for learning purposes (Measor & Woods, 1984).

Shortly after the sex-discrimination act was passed in the UK in 1975, post-transfer schools were still observed to segregate pupils by gender in timetables, roll calling and curriculum organisation, with some schools offering PE only to boys, and domestic sciences to girls (Delamont & Galton, 1986). In SAMSAD (2007-08) there was no gender segregation in any areas of school organization except for separate PE classes.

Comparison of the ORACLE studies reveals that a greater proportion of children sat in single-sex pairs post-transfer in the late 1970s (49%) compared to the 1990s (33%), with more mixed sex groups across time (7.3% vs. 23.5%) (Hargreaves & Pell, 2002). Pre-transfer, fewer pupils in both studies sat in single-sex pairs (7.3% and 23.5%). Children in both SAMSAD schools were observed to sit in single-sex groups, unless they had been allocated seating in mixed gender groups by the teacher.

Academic identities and behaviours

The development of student disengagement within the first post-transfer term is carefully documented in Changing Schools. During the first week, children were quiet, enthusiastic about working and did not break school rules. This was recognized by pupils and teachers as being an initial front. "They want to get a good name from the teachers" (Amy, p.51). The front was dropped by the third week when Roy and Pete began to graffiti their belongings.

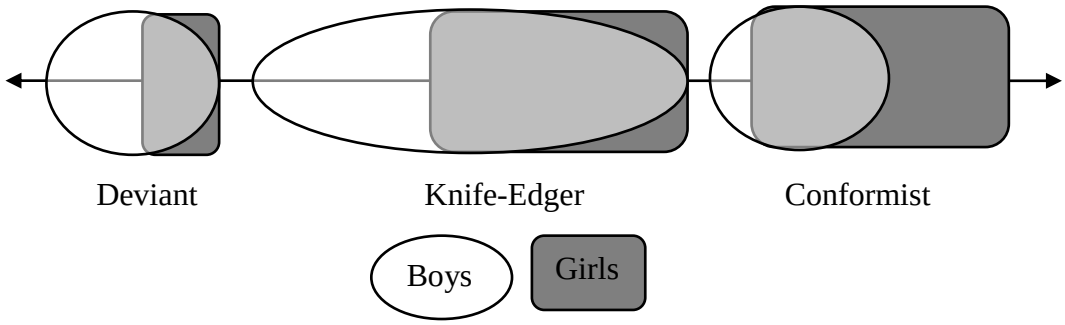
Soon after, several boys deliberately challenged the boundaries of classroom rules by arriving without equipment and ignoring commands. This process of 'sussing out' teachers

(Benyon, 1985), also called "hypothesis-testing" (Delamont & Galton, 1986, p. 58), is persistent across time. In the fifth week of term in SAMSAD (2007-08), a ‘learning skills’ teacher introduced the rules of a game designed to teach pupils how their brains sort information. One group of boys were keen to see how far they could push the teacher by offering her silly alternatives to the rules in serious voices. Afterwards, they began fidgeting in their seats and eventually slapped and punched each other until they were reprimanded. By the second term in Changing Schools (1979-80), deviant boys began to challenge teachers for centre stage through interruptions and diversions, in a process of 'hostile takeovers' of power in class. By third term, their attitudes to teachers and school had consolidated. Roy: "Mrs Gales has us for reading, fat cow!" (Measor & Woods, 1984, p. 110).

Groups of children who are either anti-school, pro-school or who play both sides have been given several titles for example ‘gangs, goodies and jokers’ (Pollard, 1985), and as mentioned, ‘deviants, conformists and knife-edgers’ (Measor & Woods, 1984). There are many possible reasons for deviant children’s disengagement from work including low motivation, concentration, ability and enjoyment of school; desire to portray ‘toughness’ and/or ‘coolness’ and fear of failure. In SAMSAD, deviant children were observed in lower ability sets only. Children in higher ability classes were often knife-edgers, perhaps as they could better manage the metacognitive and self-regulatory challenges of being sporadically ‘off-task’ whilst not getting into trouble. For example Kevin’s English teacher asked him to read a script aloud in order to distract him from chatting with his friend. Kevin did so but at breakneck speed in a commentator’s voice, enabling a quick return to his informal discussion. Matthew, in the same class, was never observed to interrupt the teacher, nor to be off task. He reported choosing his best friend very carefully, based on his friends’ positive attitude to work and rejection of deviant behaviour. For Matthew, doing well was central to maintaining a positive self-concept, “you feel like actually the teachers are personally interested in you and I just like to feel like that”.

In comparison to boys, fewer deviant and more conformist girls are observed in the three ethnographies, perhaps as girls are not under the same pressure to engage in the ‘toughness game’. Using Measor and Woods’ suggested continuum of deviant to conformist, UK early adolescent friendship groups might look a little like Figure 2.

Figure 2. Model of Friendship Groups



Among girls in the 1980s, deviance seems to be more commonly expressed through passive avoidance tactics as opposed to boys' active defiance (Measor & Woods, 1984; Delamont & Galton, 1986).

- Janet: "Some of the girls in our class, whisper and giggle, but the boys are the ones who make remarks out loud" (Measor & Woods, 1984, p. 116).

Girls who did speak loudly were rebuked by boys and labeled "mouthy" (p.117). "Needless to say, such sanctions act as powerful socializing agencies on girls in general, and contribute towards the tendency for girls and women to withdraw from the public verbal arena" (Measor & Woods, 1984, p. 117), although how true this is of modern classrooms is uncertain.

In SAMSAD, Chloe and Stacy soon began to prefer out-of-school socialisation to lessons. Stacy: "school brings education, school does bring friends. It's not as fun as you could have when you're outside the school with your friends". By the third term, only the girls in Changing Schools, and SAMSAD (below), discussed truanting from school.

- Sam: "I kind of think school quite sucks really. Well you don't really want to be here but you have too, which makes me annoyed because I don't really want to be here."
  Interviewer: "Why not?"
  Sam: "I mean what's the point in coming here when you can maybe do it at home and have free time to be you?"

Systematic observations of pupil classroom behavior in the ORACLE studies (1977-78 and 1996-97) were grouped into different pupil profiles using cluster analysis. ORACLE (1996-97) reports that there were more girls amongst the 70 percent of children who fitted into 'task-oriented' profiles of *hard grinders, group toilers* or *passive participants*, and more boys

amongst the 30 percent of children who fitted 'task-avoidant' profiles of either *routine helpers, distracted ghosts* and *attention getters.* Teachers responded to boys more often when they were engaged in horseplay or cooperating on routine tasks such as sharpening pencils and handing out text books, whilst they gave girls more attention when they were engaged in work, thus reinforcing these gendered personae. When pupils moved between primary and secondary school, more boys moved from task-oriented profiles into task-avoidant profiles than did girls. Similar behaviours were observed in SAMSAD. For example, Indiana displayed 'routine helper' behavior by wandering about, asking his friends about their work and borrowing pieces of equipment; avoiding doing any work himself while 'appearing' to be on task. When questioned about his behaviour, Indiana replied that he found the teachers' instructions confusing and didn't know what to do. Yet he engaged in work avoidance rather than ask for help. Boys were regularly observed to be boisterous and fidgety in class, especially in seated lessons like mathematics. They often burned energy by fiddling with objects, slapping and punching each other and making popping noises with their tongues.

Attitude to subjects

Children are found to most value subjects that are important for their future careers, in particular English and mathematics, in Changing Schools, ORACLE and SAMSAD. Despite these similarities, girls are commonly less enthusiastic about 'technical subjects' and more enthusiastic about abstract and relational subjects, than are boys. For example in the US, gender differences in attitude towards subjects were observed throughout elementary school, with girls rating reading and music as being more useful and important, and sport as less useful and important, than did boys (Wigfield & Eccles, 1994). These differences were found across transfer in the MSALT, with boys giving sport and English higher ratings than did girls (Wigfield & Eccles, 1994). In both US studies, there was little gender difference in attitude towards mathematics.

A comparison of the two ORACLE studies found consistent patterns of gendered attitudes towards subjects across a thirty year period (Galton, Hargreaves, & Pell, 2003b). Girls generally enjoyed English more and science less than did boys across transfer. Both genders experienced a 'honeymoon period' where liking for English peaked immediately post-transfer then declined. Attitude towards mathematics and science showed a linear decline across transfer for both genders. Similar to MSALT, there was no gender difference in mathematics enjoyment post-transfer. Using the same measures as ORACLE, Galton, Gray

and Rudduck (2003a) also found boys enjoying science more than were girls, and a linear decline for both genders in mathematics enjoyment, across transfer.

In Changing Schools, girls revealed less positive attitudes towards science than boys based on their expectations that science was too volatile and difficult for them. These expectancies were found to be more conditioned by interpretation of social expectations rather than by the girls' actual capabilities, in keeping with the 'expectancy-value' model of achievement motivation (Eccles (Parsons), 1983). Post-transfer, girls reported disliking dissection, the smell and danger of chemicals, and having to wear safety goggles. These attitudes were a continuation from primary school, where Stacey commented that: "One thing I don't want to do is cut up a rat. I don't think that's nice 'cos sometimes they do it alive so that you can see the heartbeat" (p.25). These attitudes extended to classroom behaviours with girls observed as more badly behaved in science than in any other subject. Girls displayed learned helplessness by refusing to use equipment that they perceived to be complicated or dangerous, such as microscopes and Bunsen burners, despite being able to perform risky and complex manual tasks in domestic sciences such as lighting a gas oven and operating a double needle sewing machine!

However in ORACLE (1977-80) and SAMSAD, girls did not report disliking science as a whole. In SAMSAD, Deirdre was bored by most 'sit down' lessons, but "in science you do some practicals so that's alright". Deirdre's perception demonstrates how attitude to subjects is commonly affected by children's experiences of engagement. In SAMSAD, both genders reported enjoying subjects that were active, practical and creative, like PE, science and art. More boys mentioned needing practical activity than girls, even seriously studious boys like Matthew: "It's just more fun doing physical things then just sitting on a desk, writing stories or answering questions". Many boys disliked English as they found writing 'boring', mainly regarding it as too abstract and devoid of concrete or authentic (true to life) learning.

Academic competencies

Children's perceptions of their achievements are found to decline across Grades 1 to 12 (Jacobs et al., 2002). Gender differences in these 'competence beliefs' tend to mirror differences in attitude to subjects. In the MSALT, boys' competence beliefs were higher for sport and mathematics, and lower for English, than were girls'. (Wigfield & Eccles, 1994). Girls' mathematics self-concepts declined whilst their English self-concepts remained high across transfer. (Eccles et al., 1986). These gender differences are not restricted to the US,

nor to time period, as boys aged 16 in the British Child Development Study (born in 1958, around 7000 of each gender) also had higher mathematics and science self-concepts and lower self-concepts in English than did girls (Sullivan, 2009).

Career aspirations

In Changing Schools (1979-80), none of the boys interviewed were supportive of their future wives working, regardless of whether their own mothers worked. 'Deviant' girls notably felt it their duty to run a home. Measor and Woods speculated that for these girls, working hard at school was therefore meaningless. Girls from one class wrote an essay, describing their lives from the perspective of an 80 year old. Each girl mentioned getting married. Only knife-edger and conformist girls initially saw themselves having a career, but not after marriage. Only two girls (conformist), wanted to continue their career after marriage, albeit in a diminished manner.

A few years earlier, early adolescent girls in the Milwaukee study were significantly more likely than boys to want future marriage and children (regardless of experiencing school transfer or puberty). However, this difference disappeared when they reached 15/16 years old, as boys' interest in having a family grew. Across Grades 6 to 10, girls were more likely to aspire to a college placement, and chose a future job with higher socioeconomic status, than did boys, despite reporting lower expectations from their parents for a future career. Despite this, only half the girls expected to work when they had children.

Girls in England by the late 2000s presented a different picture. The limitations on female work aspirations recorded in the 1970s were not evident in SAMSAD (2007-08). Here, 16 out of 20 boys and girls had made an initial (and in two cases a considered and decided) career choice by matching jobs they were familiar with, to what they were good at and/or interested in. No girls mentioned choosing not to have a career in favor of being a housewife and mother. Although some of the career choices were gender-stereotyped (i.e. Deirdre wanted to be a beautician, and Gus an accountant), many were not. For example both genders wanted to be teachers: Matthew a primary school teacher, Alex a mathematics teacher, Jacob a computing teacher and Yasmin a PE teacher. Children related these choices either to success in that subject or to a family history of teaching. The SAMSAD findings might represent a generational shift in the transmission of female work roles from mothers to children as most SAMSAD mothers worked, unlike in older ethnographies. Notably, both genders chose role models from their immediate environment, perhaps because this age group does not have much exposure to the world of work (Atherton et al., 2009). Therefore if

gender career stereotypes *do* exist in local environments, these might be readily incorporated into the self-construct during early adolescence.

Motivation

Boys are found to have lower achievement motivation than girls at transfer and more frequent task-avoidant behavior profiles (Hargreaves & Galton, 2002). Deviant and knife-edger boys are observed to moderate their work efforts in order to avoid achieving in front of their peers, (Measor & Woods, 1984) and are embarrassed to ask for help in case they look stupid (Measor & Woods, 1984; Symonds, 2009). Disadvantaged African American boys transferring to high school in Chicago were found to adopt avoidant coping mechanisms such as truanting, and only those whose families talked them through problems, managed to graduate (Roderick, 2003). These behaviours are part of a cycle of failure, where lack of achievement engenders feelings of low self-worth therefore trying to achieve is avoided in order to protect against further deflation (Covington, 1985). Here, conformity to gender stereotyped roles of masculinity (in which boys are supposed to be successful and powerful) and school achievement become a paradox (Whitehead, 2003). Boys whose gendered identities are more secure and less stereotyped are less likely to disengage for these reasons, and more likely to engage in seemingly 'feminine' tasks such as academic achievement (Whitehead, 2006).

Achievement

There is no clear pattern in achievement across transfer (Symonds & Galton, forthcoming) although several studies have found a post-transition dip (cf Galton & Wilcocks, 1983; Alspaugh, 1998). Given boys' tendency to quickly develop anti-learning strategies and profiles, they are potentially most at risk for an achievement slump. The Milwaukee study found that only boys dipped in achievement after G6 to G7 transfer. However this might be limited to early adolescence as both genders experienced a dip on transfer to senior high school.

Despite enjoying and valuing technical subjects more than girls, early adolescent boys are found to have lower achievement across transfer in mathematics and science. In ORACLE (1977-78), a greater percentage of girls made progress post-transfer than boys in general achievement (37% vs. 23%), mathematics (65% vs. 55%), language skills (56% vs. 44%) and reading (73% vs. 43%). ORACLE (1996-97) found that girls had higher vocabulary and spelling skills than boys when transferring at ages 9, 11 and 12. Boys only

made more progress than girls in the younger age groups, for mathematics, language and reading. If transferring at age 12, boys made less progress across subjects.

These findings point towards transfer in early adolescence increasing the risk of achievement loss for boys but not girls. Boys may be socially insecure about 'shining' or appearing stupid in a new environment, and may be disadvantaged by limited concrete and active work in secondary schools.

Conclusions

The outstanding feature of the studies reviewed here is the persistence of gender differences in adaptation to school transitions and puberty across a thirty five year period. This is graphically illustrated in Table 3 which notes phenomena observed in early adolescence that are independent of, or co-dependent with, transfer and puberty, across time.

Table 3. Trends in Gender Differences

Key Area	Phenomenon	1974-1984	1996-2008
	Independent of Both Transitions		
Identity	Males socialize in large 'sporty' groups or small 'specialist' groups	✓	✓
	Girls mostly socialize in smaller cliques inclusive of 'best friends'	✓	✓
Aspirations	Gender stereotyped subject attitudes and competence beliefs	✓	<
Achievement	Gender segregated cooperation groups	✓	>
	Independent of School Transition		
Identity	Gender segregated friendship groups	✓	✓
	Both genders like practical subjects, especially boys	?	✓
	Girls have lower self-esteem than do boys	✓	✓
Aspirations	Both genders want a future career	✓	✓
	Gender stereotyped career choices	✓	>
	Moderated by Pubertal Transition		
Identity	Both genders display continuous friendship matching	✓	✓
	Girls begin to 'fall out'	✓	✓
	Girls' friendships are more fluid than are boys	✓	✓
	Both genders engage in 'speed dating' and longer term dating	✓	✓
	Girls are more interested in heterosexual relationships than are boys	✓	✓
Aspirations	Girls expect to moderate future careers in order to have children	✓	?
	Both genders value 'utility' subjects for their future careers	✓	✓
	Moderated by School Transition		
Identity	Girls have an increased focus on self-image	✓	✓
	Girls are more vulnerable to self-esteem loss	✓	✓
	Highly aggressive males are socially isolated	✓	✓
	Boys 'suss out' teachers by challenging them for power	✓	✓
Achievement	Gender stereotyped pro /anti-learning profiles develop	✓	✓
	More boys adopt anti-learning personas than do girls	✓	✓
	Boys make less academic progress than do girls	✓	?

KEY: ✓= phenomenon present, ? = not studied, </> = phenomenon has potentially increased/decreased

Sexuality in early adolescence appears to encourage the construction of gender segregated identities and behaviours. Gender oriented mechanisms might operate within this, as in the importance of physical appearance for girls and group membership and social hierarchy for boys. From an evolutionary perspective, this may assist girls to develop traits that encourage pair bonding, and boys to practice skills in resource acquisition. Schools can help dilute the intensity of these effects by enforcing mixed sex groups and activities, and it might be that these behaviours are modified in single sex schools.

Interest in heterosexual relationships and sexual attractiveness, and decreased satisfaction with body image is more prevalent for girls. Concern in modern societies about children's exposure to sexual images in the media is perhaps well placed given these vulnerabilities. Schools can encourage girls to challenge attractiveness stereotypes through support programs, whilst governments and parents can attempt to limit exposure to inappropriate media.

The development of male social hierarchies and female concern about attractiveness appears to be spurred by school transition, where adolescents expect to engage in more adult type behaviours and are exposed to a larger and unfamiliar peer group. This can have a detrimental effect on boys' achievement, when boys see working hard in school as a barrier to social status. Policy makers should be aware of the potentially negative effects of scheduling a school transition in early adolescence for girls' body-image and on boys' aggression and achievement.

Another surprising revelation, given an arguable lessening of gendered career stereotypes across eras, is the continued gender difference in subject enjoyment. Enjoyment is likely to flow from task experience as, for example, boys report disliking sitting still and writing in the abstract. This particularly masculine desire for physical activity and preference for concrete learning experiences in early adolescence might also be part of our evolutionary heritage. Subject enjoyment may affect career choice, resulting in more take up of careers relating to science and mathematics for boys. Integration of practical, authentic and concrete learning into all subjects, or a switch to holistic cross-curricular learning might help broaden prospects for boys in early adolescence.

The observation that early adolescents have less gender stereotyped career choices is limited to the SAMSAD study. A wider investigation needs to be conducted into career choice in early adolescence to address this proposition, also to test whether early adolescent girls still expect to restrict their future careers in mind of childbearing. Careers education for early adolescents should focus on minimizing the gendered implications of certain careers

given that early adolescents can be more gender stereotyped than older adolescents, and advertise a wide range of non-gendered pathways within these given that early adolescents have relatively little knowledge of the world of work.

Gender differences in early adolescent behaviours are clearly evident in the reviewed research. School transition is a risk factor for negatively affecting boys' achievement and girls' self-perceptions, as well as for perpetuating gender differences that can persist into later development. Schools, policy makers and parents can attempt to avoid any ill effects of gender intensification by providing activities and structures that promote gender integration and dismantle gender stereotypes, and in this way contribute to an improvement in gender equality of aspirations and achievement in the future.

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