Motivational Processes Underlying Gender Gaps in

School Engagement and Achievement

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Motivational processes underlying gender gaps in school engagement and achievement

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Abstract

Boys lag behind girls in school across many western industrialised countries. On average, boys tend to be less engaged and perform worse than girls in secondary school. Yet efforts to close the gender gap may not be successful until we gain a precise understanding of the mechanisms contributing to the gender gap. This thesis presents three studies ($N = 1,668$) to unpack the motivational processes underlying the gender gap in school engagement and achievement, including gender differences in academic motivation (Study 1), gender differences in social motivation (Study 2), and a conflict between gender roles and school commitment (Study 3).

Study 1 examines gendered patterns of academic beliefs and goals as well as the impact of these motivational patterns on student achievement. Latent profile analyses revealed four mindset-related motivational profiles: growth mindset-high mastery goals, growth mindset-high multiple goals, fixed mindset-high performance goals, and fixed mindset-low all goals. Compared to girls, boys were more often found in the two fixed mindset profiles. Membership in these profiles, in turn, predicted poorer achievement.

Study 2 extends beyond a sole focus on academic motivation by investigating the joint role of academic and social motivation in explaining gender differences in school engagement. Compared to girls, boys endorsed more academic goals concerned with avoiding unfavourable judgement of ability and more social goals concerned with appearing cool in front of their peers. Furthermore, boys' higher levels of academic self-handicapping were primarily explained by their greater concerns about peer status.

Study 3 then moves beyond a binary perspective of gender to identify which boys and which girls are falling behind in school. Latent profile analyses identified seven subgroups of adolescent boys and girls, each displaying a unique pattern of gender role conformity. Young people who conformed to gendered ideals of appearance and behaviour showed the least adaptive patterns of motivation, engagement, and achievement. In contrast, those who rejected rigid constructions of gender had the most adaptive patterns of motivation, engagement, and achievement.

Taken together, findings from these three studies provide concrete suggestions in terms of what factors to target as well as who to target in educational interventions to close the gender gap in school.

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Table of Contents

List of Tables

List of Figures

Copyright Permission and Author Contribution Statements

This thesis contains three papers at various stages of publication. Contributions from my supervisors do not exceed the average supervisor input in PhD research.

Study	Publication	Copyright permission	Author contribution
1	**Yu, J.**, & McLellan, R. (accept with minor revision). Same mindset, different goals and motivational frameworks: Profiles of mindset-based meaning systems. *Contemporary Educational Psychology*.		JY conceived the study, collected, analysed, and interpreted the data, and drafted the manuscript. RM advised on the study design and the interpretation of results, and provided critical feedback on the draft.
2	**Yu, J.**, & McLellan, R. (2019). Beyond academic achievement goals: The importance of social achievement goals in explaining gender differences in self-handicapping. *Learning and Individual Differences*. https://doi.org/10.1016/j.lindif.2018.11.010	Authors can include their articles in full or in part in a thesis or dissertation for non-commercial purposes. https://www.elsevier.com/about/policies/copyright/permissions	JY conceived the study, analysed and interpreted the data, and drafted the manuscript. RM advised on the study design and the interpretation of results, and provided critical feedback on the draft.
3	**Yu, J.**, McLellan, R., & Winter, L. (invited revision). Which boys and which girls are falling behind? Linking adolescents' gender role profiles to motivation, engagement, and achievement. *Journal of Youth and Adolescence*.		JY conceived the study, collected, analysed, and interpreted the data, and drafted the manuscript. RM and LW advised on the study design and the interpretation of results, and provided critical feedback on the draft.

Chapter 1 Introduction

Assessment is an integral part of education, and large-scale testing at national and international levels enables us to compare academic performance between different groups of students. Differences in performance between male and female students are termed as the gender achievement gap. At one time, girls were the focus of educational gender gaps in the UK due to their poorer performance in maths-related subjects. However, boys' general underperformance has attracted considerable attention in more recent times. The most frequently cited evidence for boys' underachievement is the persistent gender gap in General Certificate of Secondary Education (GCSE) exams taken in England, Wales, and Northern Ireland. Boys' poorer performance routinely attracts widespread media coverage when the GCSE results are released. Some recent newspaper headlines include "Girls still lead the way over boys" (Allen-Kinross, 2019); "Girls beat boys in gaining 'clean sweep' of grade 9s" (Vaughan, 2018); and "Underachieving schoolboys 'must be a priority'" (*BBC News*, 2019).

Numerous explanations for boys' underachievement at GCSE have been put forward, but robust quantitative evidence in support of these explanations is often lacking. As will be discussed in this thesis, one promising explanation is student motivation. Not only are there gender differences in motivation (Bugler et al., 2015; Butler, 2014; Martin, 2004), accounting for gender differences in motivation reduces or eliminates the gender gap in achievement (F. Fischer et al., 2013; Heyder et al., 2017; Steinmayr & Spinath, 2008). Therefore, the aim of this thesis is to provide a comprehensive understanding of the motivational mechanisms underlying gender differences in school achievement.

In this first chapter, a review of the literature reveals three gaps of knowledge. Studies investigating the role of motivation in explaining the gender gap tend to focus on gender differences in individual motivational constructs. However, these studies (a) rarely consider the impact of gender differences in global motivational patterns, (b) overlook the influence of social motivation, and (c) fail to specify which boys are underachieving in school.

Chapters 2 to 4 then present three empirical studies to address these gaps. Study 1 investigated gender differences in academic motivational profiles and the longitudinal impact of these profiles on student achievement. Study 2 examined the joint role of academic and social motivation in explaining boys' maladaptive patterns of school engagement. Lastly, Study 3 adopted a 'which boys and which girls' approach to understand the influence of multiple masculinities and femininities on student engagement and achievement.

Finally, Chapter 5 concludes the thesis by synthesising findings across the three studies and outlines implications for future research and educational practice.

Boys' Underachievement in School

Boys' underachievement in English schools has received considerable media and research attention since the late 1980s. The term underachievement, however, is loosely defined and often interpreted differently by individuals. In fact, the term is often used to describe students' low, unsatisfactory academic performance. Yet, underachievement is conceptually and operationally different from low achievement. Able students with satisfactory grades can be identified as underachievers. To make matters more complex, underachievement and low achievement are often discussed in conjunction with the term achievement gap. Therefore, one aim of this section is to clarify the terminology. Low achievement will be considered first, followed by a discussion of underachievement. The second aim is to provide evidence to substantiate the claims of boys' low achievement and underachievement in English schools.

Low Achievement

Low achievement refers to poor levels of attainment in absolute terms. In this thesis, academic achievement or attainment is defined as performance on tests or examinations. I focus on GCSE attainment in particular because exam results at the end of compulsory education act as a gateway to further education, employment opportunities, and earnings in later life. It is important to note that GCSEs in England have been reformed recently. Key changes include (1) a greater focus on exams and the removal of coursework in most subjects, (2) a linear exam structure at the end of the course as opposed to multiple assessments upon completion of each module, (3) more challenging content such as more substantial texts in English and more demanding topics in Maths, and (4) a more differentiated grading system (Ofqual, 2017). Specifically, a new 9 to 1 grading scale replaces the old A* to G scale (see Table 1.1). Since a grade C/4 is recognised as a standard pass, I refer to students who fail to reach this benchmark grade as low achievers at GCSE.

A number of demographic factors, including gender, are robustly linked to low achievement at GCSE. Using census data, Cassen and Kingdon (2007) found that boys outnumbered girls by three to two among those who failed to achieve the benchmark grade in any subject. Similarly, when looking at the proportion of students achieving a grade D/3 or below across subjects between 2009 and 2019 (Table 1.2), boys on average are 8.3 percentage points more likely than girls to be low achievers. The pattern of low achievement, however, is more nuanced for specific core subjects. The gender gap in the probability of low achievement becomes even larger in English but is negligible or slightly reversed in maths.

Table 1.1 Comparing old GCSE letter grades to new number grades

Old grading structure	New grading structure	
A*	9	
	8	
A	7	
B	6	
	5	
C	4	Standard pass
D	3	
E	2	
F		
G	1	
U	U	

Note. This table is adapted from Ofqual (2018).

Table 1.2 Percentage of students achieving a grade D/3 or below by gender, 2009-2019

	All subjects			English			Maths		
	% boys	% girls	diff.	% boys	% girls	diff.	% boys	% girls	diff.
2009	36.6	29.7	6.9	43.8	30.8	13.0	42.4	43.0	-0.6
2010	34.7	27.5	7.2	42.0	28.2	13.8	41.4	41.6	-0.2
2011	34.0	26.5	7.5	41.1	27.4	13.7	41.1	41.3	-0.2
2012	34.6	26.7	7.9	43.1	28.5	14.6	41.3	42.0	-0.7
2013	36.4	27.8	8.6	43.7	28.7	15.0	42.1	42.6	-0.5
2014	36.0	27.1	8.9	46.4	30.6	15.8	36.9	37.0	-0.1
2015	35.6	27.0	8.6	42.4	27.2	15.2	35.3	36.5	-1.2
2016	38.0	29.0	9.0	48.5	32.4	16.1	38.2	38.8	-0.6
2017	38.7	29.2	9.5	46.5	29.1	17.4	39.5	40.7	-1.2
2018	37.9	28.8	9.1	45.4	29.9	15.5	40.0	40.5	-0.5
2019	37.3	28.6	8.7	46.0	29.7	16.3	39.9	40.8	-0.9
Mean	36.5	28.2	8.3	44.4	29.4	15.0	40.2	40.7	-0.5

Note. Data compiled from https://www.gov.uk/government/collections/statistics-gcses-key-stage-4.

      Some may claim that the preponderance of boys at the low end of GCSE performance is not surprising given the greater male variability in academic performance (Machin & Pekkarinen, 2008). However, evidence indicates that this uneven distribution is not similarly reflected at the top. Boys are also less likely than girls to be top performers (i.e., achieving a grade 7/A and above; see Table 1.3) in general as well as in English. Only in stereotypically male subjects such as maths do boys slightly outnumber girls as high achievers. Given that boys only cluster at the low end but are missing from the high end of the performance distribution, it is probably safe to conclude that boys are more likely than girls to be low achievers in secondary education. In addition, variations in the pattern of gender gaps across subjects underscore the importance of investigating the gender gap from a domain-specific perspective.

Table 1.3 Percentage of students achieving a grade A/7 and above by gender, 2009-2019

	All subjects			English			Maths		
	% boys	% girls	diff.	% boys	% girls	diff.	% boys	% girls	diff.
2009	18.7	24.3	-5.6	11.9	19.6	-7.7	15.5	15.1	0.4
2010	19.6	25.5	-5.9	11.9	20.5	-8.6	16.4	16.0	0.4
2011	19.9	26.5	-6.6	12.6	21.6	-9.0	16.5	16.5	0.0
2012	19.0	25.6	-6.6	10.6	19.5	-8.9	15.5	15.1	0.4
2013	17.5	24.7	-7.2	9.5	19.0	-9.5	14.5	13.8	0.7
2014	17.5	24.6	-7.1	9.6	19.1	-9.5	15.9	14.6	1.3
2015	17.4	24.5	-7.1	9.5	19.2	-9.7	17.6	15.8	1.8
2016	16.6	23.8	-7.2	8.8	18.2	-9.4	16.4	15.6	0.8
2017	16.2	23.4	-7.2	9.0	18.5	-9.5	16.5	14.7	1.8
2018	17.1	23.4	-6.3	9.8	18.5	-8.7	16.8	14.7	2.1
2019	17.5	23.7	-6.2	9.6	18.6	-9.0	16.6	15.2	1.4
Mean	17.9	24.5	-6.5	10.4	19.3	-8.9	16.0	15.2	0.9

Note. Data compiled from https://www.gov.uk/government/collections/statistics-gcses-key-stage-4.

Underachievement

Underachievement is a relative concept. However, what it may be relative to is less clear and has generated some conceptual and operational confusion. Two working definitions are frequently employed in the literature: a group-level perspective, which considers underachievement as a discrepancy between different groups of students, and an individual-level perspective that refers to a discrepancy between one's ability and achievement (Plewis, 1991).

Group-level perspective on underachievement. Underachievement, when viewed as a disparity in academic performance between groups, is identical to the conceptualisation of achievement gap, which similarly emphasises the disparity in performance between groups of students. In this sense, boys are thought to have underachieved persistently relative to girls in English secondary schools. The differential performance of boys and girls in public examinations is frequently highlighted in the media and cited as evidence in support of the underachieving boys claim. Figure 1.1 shows the percentage of students achieving at least five GCSE passes at grades A*-C, including English and maths—the main measure of school performance in the old GCSE. Girls consistently outperform boys at age 16, but the magnitude of the gap remains constant. The size of the gender gap, however, varies across individual subjects. Using a large, nationally representative sample in England, Deary et al. (2007) found that girls outperformed boys considerably in English at age 16 ($d = 0.41$), but the two groups did not differ meaningfully in their maths performance ($d = 0.03$).

Studies further suggest that girls as a group make more progress in secondary school, widening the gender achievement gap between ages 11 and 16 (Gray et al., 2004; Sammons, 1995). Based on aggregate measures of school performance, the gender gap at age 11 is trivial ($d = 0.05$-0.08; Calvin et al., 2010; Strand, 2014b) but becomes almost three times larger at

age 16 (*d* = 0.23; Strand, 2014a). The differential progress of boys and girls is even more apparent after the introduction of Progress 8, a new headline measure of school performance in the reformed GCSE. This indicator aims to capture the progress made by students during secondary schooling across a selected set of eight subjects. As can be seen in Figure 1.2, differences in the mean scores for boys and girls indicate that girls on average made a quarter to a half of a grade more progress than boys per subject. These results suggest that efforts to close the gender gap may need to focus on secondary rather than primary school years. Given that the gender gap is most evident at secondary school level, empirical studies presented in this thesis focus on this particular stage of education.
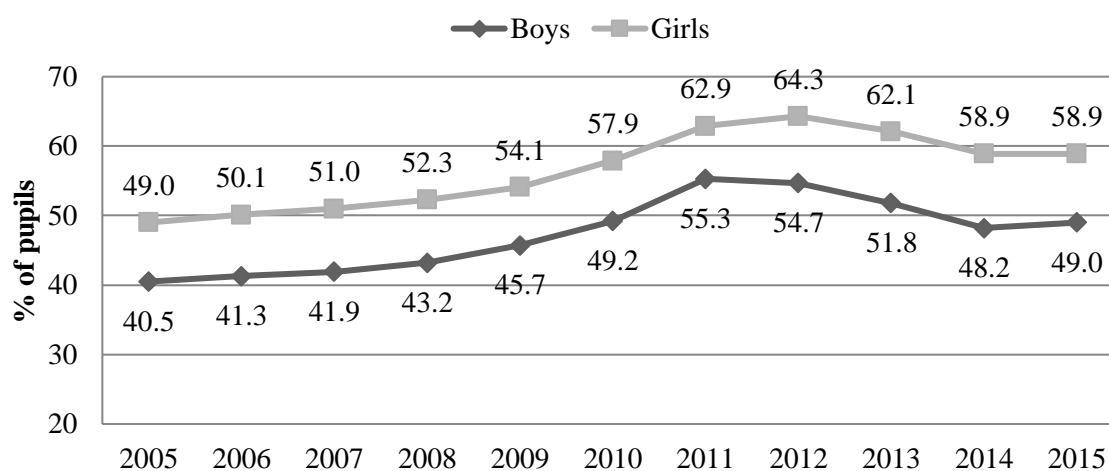
Figure 1.1 Percentage of boys and girls achieving five or more GCSEs at grades A*-C, including English and maths, 2005-2015
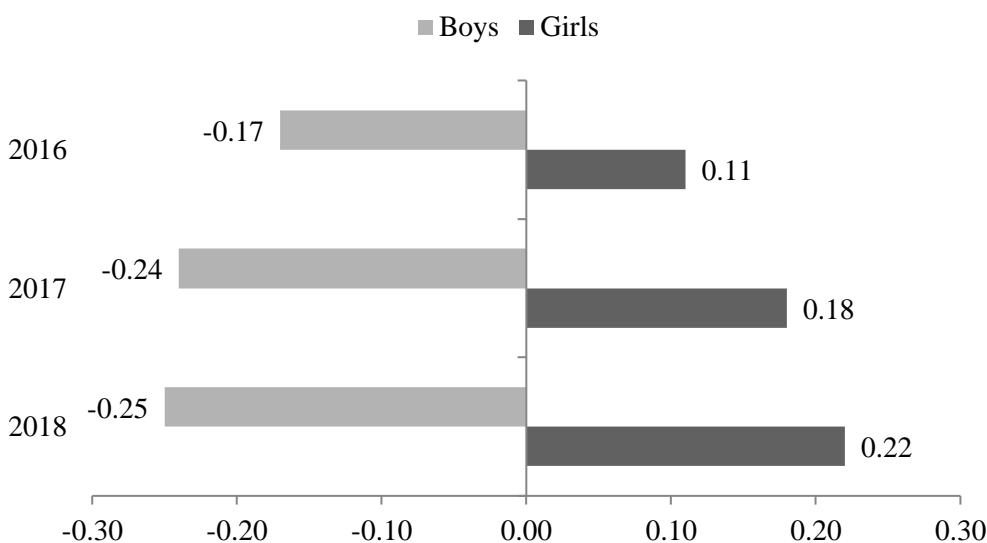
Figure 1.2 Average Progress 8 score by gender, 2016-2018

Individual-level perspective on underachievement. Some educational researchers argue that lower achievement relative to another group is insufficient to justify the claim of underachievement. According to Gorard and Smith (2004), to qualify an individual as underachieving, one needs to examine whether their performance falls below what would be expected from their ability. When underachievement is defined as an ability-attainment discrepancy, one way to answer the question "Are boys underachieving?" is to examine whether boys' achievement is in line with their intellectual ability, as indicated by IQs. Although IQ tests are imperfect measures of individuals' general intellectual ability, performance on such tests reliably and strongly predicts academic attainment and can serve as a proxy for unobserved ability. Evidence in the UK suggests that boys and girls do not differ on IQ scores at age 11 (Deary, 2003; Strand et al., 2006). Boys and girls, however, do show differential performance on certain subtests: boys tend to perform better in quantitative reasoning and girls in verbal reasoning, but the effect sizes tend to be small (Calvin et al., 2010; Strand et al., 2006). Mediation analyses further suggest that girls' advantage in school can not be explained by their better verbal skills (Deary et al., 2007).

There is also a close link between IQ scores at age 11 and later educational achievement at 16. The strength of this relationship is estimated to be about 0.80 (Deary et al., 2007), representing a strong correlation. Given the close association between academic achievement and intellectual ability as well as similar IQ scores between genders at age 11, one would not expect a sizable gender gap in academic performance at age 16. Nevertheless, despite no appreciable differences in intellectual ability measured by IQ tests, boys have been less successful than girls in high-stakes examinations. While boys tend to be overrepresented in both extremes of the ability distribution (Strand et al., 2006), an excess of them are found only at the low end of GCSE attainment. Studies in Germany and the US similarly show that boys perform worse than would be predicted by their IQ scores in secondary school (Duckworth & Seligman, 2006; F. Fischer et al., 2013; Steinmayr & Spinath, 2008). As a result, it may be valid to conclude that boys are indeed underachieving. They are not achieving what they are capable of and, compared to girls, they are not getting as much out of their education.

In this thesis, my usage of the term underachievement will encompass both group-level (why do boys underachieve relative to girls?) and individual-level perspectives (why do some boys underachieve but not others?). Given similar ability between boys and girls, to understand the differential attainment by gender, one needs to look beyond the concept of ability.

Motivational Processes Underlying Boys' Underachievement

In response to concerns about boys' underachievement in schools, researchers across disciplines attempt to identify potential factors and underlying mechanisms contributing to the gender gap. As will be discussed, a large body of research on boys' underachievement has adopted an exploratory approach, employing qualitative ethnographic methods to develop a richer understanding of the problem. These studies have been useful in suggesting possible explanations for the gender gap, but the underlying mechanisms often remain untested. Yet it is crucial for researchers to verify the mechanisms potentially responsible for the gender gap, because such knowledge can inform how to intervene effectively to raise boys' achievement. In this section, I first provide a brief overview of some claims that have been put forward to explain boys' underachievement, before reviewing relevant theories to illuminate the core constructs and processes that may contribute to the gender gap.

A number of explanations for boys' underachievement have been proposed in the literature, including, but not limited to, the lack of male role models in school, the use of coursework assessment in GCSE, and differences in motivation between boys and girls. However, not all explanations are sufficiently supported by empirical evidence. The male role model hypothesis, for example, claims that boys and girls benefit from being taught by teachers of the same sex, and the feminisation of teaching has led to boys' underperformance. Nevertheless, quantitative studies using large or nationally representative samples find no benefit of matching teachers and students by gender (Carrington et al., 2008; Helbig, 2012; Martin & Marsh, 2005).

Another common explanation is that the coursework assessment in GCSE gives girls an advantage because they tend to be more organised and neater in their work presentation. While the amount of coursework in GCSE has changed over time, there has been little corresponding change in the gender gap. For instance, the weighting of coursework in GCSE English dropped from 100% to 40% in 1994, but the gender gap continued to widen in the same year (QCA, 2006). Moreover, coursework has been removed from most subjects in the reformed GCSE, but as discussed in the previous section, the gender gap has remained largely static. As a result, coursework is unlikely to play a major role in accounting for the gender gap in performance (see also Elwood, 2005).

In contrast, there is a considerable body of evidence pointing to the importance of motivation in explaining the gender gap in attainment. Not only are there differences in motivation between boys and girls (Bugler et al., 2015; Butler, 2014; Martin, 2004), the association between gender and achievement often diminishes or disappears once differences in motivation are accounted for (F. Fischer et al., 2013; Heyder et al., 2017; Steinmayr &

Spinath, 2008). This suggests that the gender gap in achievement can be explained, at least in part, by motivation. Therefore, in this section I provide a more comprehensive review of the motivational factors and processes that might contribute to the gender gap, including (a) gender differences in academic motivation, (b) gender differences in social motivation, and (c) motivational implications of gender roles.

Gender and Academic Motivation: Prioritising Ability vs. Effort

Students' academic motivation is multidimensional and there is a vast array of motivational constructs from different theoretical perspectives. Fortunately, findings from exploratory studies on boys' underachievement have indicated several promising factors to investigate further. Notably, the notion of effortless achievement has been highlighted in ethnographic studies as a key explanation for the gender gap in school (Power et al., 1998). Drawing upon interview data, Jackson (2003) identified three core features of effortless achievement, including (a) the perceptions of ability and effort as inversely related, (b) fears about failing after trying and thus revealing low ability, and (c) strategic effort withdrawal to discount failure and augment success.

Jackson argued that boys tend to perceive effort as problematic in part because they interpret hard work as evidence of low ability. Achievement without hard work, in contrast, is equated with innate talent and perceived by many boys as the 'pinnacle of success' (Jackson & Dempster, 2009). Given the risks associated with effortful achievement and the benefits conferred by effortless achievement, it is unsurprising that many boys position themselves as effortless achievers in school.

Boys interviewed by Jackson also spoke of their concerns about failing and appearing incompetent in front of their peers. Rather than approach success and achieve, some boys adopted defensive strategies to provide themselves with excuses for poor performance. Jackson (2002) identified three strategies employed by some boys to protect their perceived ability and self-worth, including procrastination, intentional effort withdrawal, and disengagement. It was suggested that in the presence of failure, effortless achievement could provide an excuse and shift the attribution for failure away from ability. As a result, boys were able to preserve the belief that they could succeed if they tried (see also Covington & Omelich, 1979). Ironically, while these behaviours can soften the blow of poor performance, they may end up causing failures.

To explain boys' maladaptive beliefs and behaviours outlined above, Jackson alluded to the work of motivation theorists including Carol Dweck and Martin Covington. Jackson (2002) argued that boys' negative beliefs about effort might be guided by their conception of ability as innate and fixed, and that their fear of negative judgments and self-handicapping

behaviour might be linked to self-worth concerns. Therefore, I turn to relevant motivation theories next, namely mindset theory and achievement goal theory, to examine their utility in explaining the gender gap in attainment.

      Mindsets and beliefs about effort. Implicit theories, or mindsets, refer to a lay person's assumptions about the nature of their ability (Yeager & Dweck, 2012). Building upon her early work on children's learned helplessness, Dweck has identified two distinct ways people conceptualise their ability. Some people hold more of an entity theory or a fixed mindset—they view their ability as a fixed entity, whereas others hold more of an incremental theory or a growth mindset—they view their ability as a malleable quality (Dweck & Leggett, 1988).

      While fixed and growth mindsets represent two extreme views of the nature of one's ability, most people are likely to lie somewhere between these two extremes. This conceptualisation of mindset as ranging along a continuum is also reflected in its measurement. In the first ever study on ability mindset by Dweck's student Mary Bandura (1983), children were presented with three pairs of statements pitting the two views of ability against each other. Children were then asked to indicate their agreement with one view relative to the other by moving along a 10-point continuum, and the numbers across the three pairs of statements were added to create a sum score of mindset. The distribution of children's scores was found to be unimodal rather than bimodal, supporting the conceptualisation of mindset as a continuum rather than two distinct categories. However, for ease of interpretation, Dweck at times chose to dichotomise the measure and present findings in terms of group differences (Dweck & Leggett, 1988). Although this practice may help to illustrate the distinct patterns of cognitions, affect, and behaviour resulting from growth and fixed mindsets, dichotomisation can lead to the loss of statistical power and information about individual differences in research (MacCallum et al., 2002). Consequently, mindset is both measured and analysed as a continuous variable in this thesis.

      People's mindsets are closely associated with their beliefs about effort. Children with a stronger fixed mindset tend to believe that effort and ability are inversely related. They endorse statements such as "To tell the truth, when I work hard at my schoolwork, it makes me feel like I'm not very smart" (Dweck & Leggett, 1988). Fixed mindset students are also less likely to perceive the utility of effort in improving performance (Dweck, 2002). Growth mindset students, on the other hand, believe that effort activates and increases ability. They tend to endorse statements such as "The harder you work at something, the better you will be at it".

Independent of Dweck, Nicholls (1984) similarly proposed two distinct conceptions of ability. He found that children initially possess an undifferentiated conception of ability, where ability and effort are not distinguished. From this perspective, ability is self-referenced, and higher effort indicates greater learning and thus greater competence. However, older children tend to develop a more differentiated conception of ability, where ability is judged relative to that of others. This changes the meaning of effort: given equal performance, lower effort implies higher ability, whereas higher effort indicates lower ability. Similar to Dweck, Nicholls and his colleagues report that children may not develop a differentiated conception of ability until about age 11 (Jagacinski & Nicholls, 1984). Once developed, older children tend to draw on this inverse rule to evaluate ability and effort.

Given the close association between a fixed mindset and negative effort beliefs, one may wonder if a fixed mindset underlies boys' preference for effortless achievement. Interestingly, Dweck (1999) suggested that it was girls who might hold more of a fixed mindset (see also Dweck et al., 1978). Her inference was based on studies that documented girls' greater helplessness and inclination to attribute failure to low ability (e.g., Stipek & Gralinski, 1991). Nonetheless, these maladaptive responses among girls were found in earlier studies on gender differences in maths performance, where girls' ability was negatively stereotyped. In light of the changing stereotypes in education, it is unclear to what extent this pattern might still hold. Some recent studies report no significant gender differences in mindsets (Ahmavaara & Houston, 2007; Romero et al., 2014). Others show that women tend to view intelligence as more malleable (Spinath et al., 2003; Tempelaar et al., 2015). Overall, research on gender differences in mindsets is inconclusive. Despite the unclear evidence regarding gender differences in mindsets, research indicates that female students are more likely to place higher personal value on effort and believe that working hard is effective in improving performance (McCrea, Hirt, Hendrix, et al., 2008; Tempelaar et al., 2015).

While mindsets are relatively stable at the dispositional level, people have access to both views of ability, and contextual influences can make one view more cognitively accessible than the other. Scientific articles on brain plasticity have been used to induce a growth mindset in experimental studies (Hong et al., 1999), and interventions have been designed to produce more lasting changes in students' mindsets and achievement (Aronson et al., 2002; Blackwell et al., 2007; Yeager et al., 2019). Some studies have also begun to elucidate the role of contexts in shaping people's mindsets. Murphy and Dweck (2010) found that people shifted their mindsets systematically to match the mindset valued in a given setting. Contextual cues that signalled a culture of growth led people to rate motivation and development more important to the self. In contrast, cues that emphasised natural talent and

performance led people to view ability more central to the self. These findings have implications for research on boys' underachievement. It is possible that the effortless achievement culture in some male peer groups may shape boys' mindsets and effort beliefs.

Achievement goals and behavioural responses. People's mindsets and effort beliefs give rise to distinct achievement goals and responses to setbacks. Achievement goals refer to overarching reasons or purposes underlying one's achievement-related behaviour (Kaplan & Maehr, 2007). Theorists originally identified two distinct personal goal orientations: (a) performance goals, where the aim is to validate one's ability relative to others, and (b) mastery goals, where the purpose is to develop one's ability and achieve task mastery (Dweck, 1986; Nicholls, 1984). A distinction between approach and avoidance motivation was later incorporated into performance goals (Elliot & Harackiewicz, 1996), such that one can be motivated to gain favourable judgments of ability (performance-approach goals) or to avoid unfavourable judgements of ability (performance-avoidance goals). These two performance goals, along with mastery goals, form a trichotomous model of goal orientation.

Meta-analyses indicate that mastery goals are generally associated with positive outcomes, performance-avoidance goals with negative outcomes, and performance-approach goals with mixed outcomes (Huang, 2011; Payne et al., 2007). Recent studies reveal that the mixed findings on performance-approach goals may be explained by different conceptualisations of performance goals in the literature. Performance-approach goals concerned with validating ability (i.e., ability performance goals) are linked to undesirable outcomes, whereas performance-approach goals concerned with outperforming others (i.e., normative performance goals) are linked to more desirable outcomes (Hulleman et al., 2010; Senko & Dawson, 2017), especially when normative goals are pursued for autonomous reasons (Senko & Tropiano, 2016; Vansteenkiste et al., 2010). Given the focus of this thesis on motivational processes that might undermine boys' learning, performance goals are conceptualised as ability performance goals rather than normative performance goals.

Among the three achievement goals, the conceptualisation of performance-avoidance goals most closely resembles the concerns exhibited by boys in school. As discussed, Jackson (2003) found that some boys valued effortless achievement, feared academic failure, and did not want to appear stupid in front of their peers. This is closely paralleled by research on achievement goal orientations, which show that performance-avoidance goals are associated with negative effort beliefs (Tempelaar et al., 2015), fear of failure (Elliot & Church, 1997), and poorer academic performance (Hulleman et al., 2010). When gender differences in achievement goals emerge in studies, boys tend to adopt more performance goals while girls adopt more mastery goals (Kenney-Benson et al., 2006). Taken together, these findings from

psychology mirror the educational literature on underachieving boys, raising the possibility that some boys may operate under a performance-avoidance goal in school.

Distinct achievement goals predict a divergent set of motivational responses. A focus on task mastery contributes to adaptive learning engagement, such as increased effort and persistence, whereas a focus on avoiding incompetence leads to helpless behaviours, such as intentional effort withdrawal and procrastination (Elliot & Church, 1997). These defensive strategies are termed behavioural self-handicapping, which involves purposely creating obstacles to one's success to provide an excuse for failure (Urdan & Midgley, 2001). As suggested by some boys in ethnographic studies, failure in the absence of effort cannot rule out the possibility of high ability, while the occasional success can signal natural talent, which is highly valued (Jackson, 2002).

Since achievement goals can influence one's behavioural responses and are shaped by one's conceptions of ability and effort, it is unsurprising that self-handicapping behaviour is also linked to a fixed mindset (Hong et al., 1999; Rhodewalt, 1994). In addition, this relationship is mediated by one's beliefs about effort (McCrea, Hirt, & Milner, 2008). With regard to gender differences, men are more likely to engage in behavioural self-handicapping, and this can be partially explained by women's greater valuing of effort (McCrea, Hirt, & Milner, 2008). This result contradicts the earlier finding that girls were more prone to learned helplessness than boys, indicating that girls' maladaptive responses in maths might reflect an attribution bias limited to domains where their ability is negatively stereotyped.

In summary, there are striking parallels between findings from qualitative studies on boys' underachievement (effortless achievement, fear of appearing unable, and defensive behaviour) and the psychological literature on mindsets and related motivational constructs (negative effort beliefs, performance-avoidance goals, and self-handicapping). These parallels may not be coincidental, and applying a social-cognitive model of achievement motivation may offer insights into how boys' maladaptive beliefs and goals contribute to their lower achievement.

Motivational profiles. When considering one construct at a time, boys appear to be more sensitive to the trade-off between ability and effort, pursue more performance goals aimed at proving and protecting their ability, and are more willing to self-handicap to preserve perceptions of high ability. In contrast, girls seem to be more positive about the role of effort in improving performance, pursue more mastery goals focused on exerting effort and improving oneself, and are more critical of self-handicapping behaviour due to their greater valuing of effort. These differences may aggregate into distinct motivational patterns, such that boys might be more frequently found in an ability-focused motivational profile and girls

in an effort-focused motivational profile. Given the complex and likely multi-causal nature of the gender gap, gendered motivational patterns might be more able to account for boys' underachievement than the influence of any single variable. In addition, since students are often motivated by a range of beliefs and goals in school, examining gender differences in global motivational patterns may be closer to students' psychological reality than examining mean-level differences in any individual variable.

Shifting the focus from gender differences in motivational variables to motivational patterns also entails a different analytical perspective, namely a person-centred approach. Traditional variable-centred analyses compare how boys and girls differ *quantitatively* on one or more motivational variables. In contrast, person-centred analyses first classify individuals with different types of motivation into *qualitatively* different subgroups, before comparing the distribution of boys and girls in these subgroups (Niemivirta, 2002). For example, in a study on primary school children's combinations of achievement goals, Schwinger et al. (2016) identified a dominant mastery goal profile and a dominant performance goal profile. Students with dominant mastery goals reported significantly higher intrinsic motivation than those with dominant performance goals, indicating that the two groups differed in their motivational quality. In addition, girls were more commonly found in the mastery goal profile and boys in the performance goal profile. These results provide some evidence that boys and girls may differ in their patterns of academic motivation and these differences may emerge early.

Profiling students based on their academic beliefs (mindsets and effort beliefs), goals, and behaviour has the potential to capture the gendered tendencies towards effortless versus effortful achievement. If gender differences in academic motivational patterns indeed contribute to the gender gap in attainment, then a profile analysis would reveal an overrepresentation of boys in an ability-focused profile, characterised by the endorsement of a fixed mindset, negative effort beliefs, dominant performance goals, and defensive strategies. Membership in the ability-focused profile would, in turn, predict lower academic performance. In contrast, girls might be overrepresented in an effort-focused profile, characterised by endorsement of a growth mindset, positive effort beliefs, dominant mastery goals, and mastery-oriented strategies. Membership in the effort-focused profile would, in turn, predict higher academic performance over time. Overall, gendered motivational tendencies might place boys and girls on divergent learning trajectories, partially contributing to the gender gap in attainment.

Investigating individuals' natural combinations of mindsets, effort beliefs, achievement goals, and behavioural responses can also refine our theoretical understanding of the relations among these constructs. Molden and Dweck (2000) argued that mindsets

organise related constructs into a coherent motivational framework or *meaning system*. Fixed mindset students attach negative meaning to effort, pursue ability performance goals, and engage in defensive behaviour to cope with setbacks. In contrast, growth mindset students attach positive meaning to effort, pursue mastery goals, and engage in mastery-oriented strategies to overcome setbacks. Empirical studies using path analyses also support the one-to-one correspondence between mindsets, effort beliefs, achievement goals, and behavioural responses (Blackwell et al., 2007; Robins & Pals, 2002). Nevertheless, a person-centred approach might reveal a more dynamic set of relations between mindsets and related motivational constructs. It is plausible that in high-stakes evaluative settings, some growth mindset students may coordinate performance goals alongside mastery goals. Applying a person-centred perspective has the potential to refine motivation theories and knowledge of gender differences in academic motivation.

Gender and Social Motivation: Prioritising Status vs. Connection

Qualitative studies further suggest that effortless achievement may offer social benefits to students in addition to academic benefits. Not only does it augment the perceptions of ability in success and discount the role of ability in failure, effortless achievement may enhance one's coolness and popularity at school (Jackson, 2002, 2003). One recurring theme in qualitative studies is that investing a lot of effort in academic work is considered uncool in adolescence. Boys, in particular, seem to experience a conflict between working for academic success and striving for popularity among peers, which might contribute to their greater valuing of effortless achievement and subsequent underperformance (Francis, 2009; Jackson & Dempster, 2009).

There are two potential reasons why boys, more so than girls, may experience a conflict between effort and popularity. One possibility is that displaying academic effort is especially costly for boys' popularity. Some qualitative studies suggest that working hard at school is more accepted among girls (Adler et al., 1992; Epstein, 1998), but the results from quantitative research paint a somewhat different picture. For example, based on questionnaire data, Jackson (2006) found that adolescent girls were just as likely as boys to agree that it was uncool to work hard in school. Experimental studies similarly found that high effort decreased and low effort increased students' popularity, and these relationships were not moderated by gender (Heyder & Kessels, 2017; Juvonen & Murdock, 1995). These results indicate that even girls have to withhold effort in order to gain peer approval. Since showing too much effort appears to be problematic for both genders, an alternative possibility is that boys attach greater importance to being seen as popular, and thus find the social benefits of effortless achievement more appealing (see Martino, 1999). Research in psychology supports that boys

and girls differ in the goals they strive for in peer relationships (Rose & Rudolph, 2006). Therefore, I review the literature on social goals next, and consider how gender differences in social motivation might further contribute to boys' valuing of effortless achievement and their underperformance.

Two categories of social goals. Researchers have studied students' social strivings within a number of theoretical frameworks, including (a) a goal content approach, (b) a goal orientation approach, and (c) an interpersonal motive approach (see Table 1.4). As will be discussed, there is considerable overlap in the conceptualisation of social goals across the three frameworks. First, a goal content approach focuses on the specific social outcomes that individuals strive to achieve (Jarvinen & Nicholls, 1996; Wentzel, 2000). Frequently studied social goals within this approach include intimacy goals ("I like it when someone understands how I feel"), popularity goals ("I like it when I'm the coolest"), and dominance goals ("I like it when they are afraid of me"; Kiefer & Ryan, 2008).

Table 1.4 Theoretical frameworks for studying students' social strivings

Framework	Definition	Connection-oriented social goals	Status-oriented social goals
Goal content approach	Specific social outcomes that individuals pursue	Intimacy goals; Relationship goals	Popularity goals; Dominance goals;
Goal orientation approach	Orientations towards achieving social competence	Social development goals	Social demonstration goals
Interpersonal motive approach	Orientations towards fulfilling basic social needs	Communion goals	Agentic goals

Second, similar to the conception of achievement goals, Ryan and Shim (2006, 2008) proposed three broad orientations towards achieving social competence. A social development goal focuses on developing social competence and positive peer relationships ("I like it when I learn better ways to get along with friends"). A social demonstration-approach goal focuses on demonstrating social competence and gaining positive judgments from others ("It is important to me that other kids think I'm popular"). A social demonstration-avoidance goal focuses on demonstrating that one does not lack social competence and avoiding negative judgments from others ("I try not to do anything that might make other kids tease me"; Ryan & Shim, 2008).

Third, an interpersonal motive approach suggests that individuals' social goals are organised around the fulfilment of two superordinate social needs: agency and communion (Locke, 2000). A communal orientation is aimed at achieving and maintaining positive relationships, affiliations, and intimacy with others ("When with other kids at school, how

important is it for you that you feel close to others?"). In contrast, an agentic orientation is aimed at achieving social influence, status, or power in relationships ("... how important is it for you that the others respect and admire you?"; Ojanen et al., 2005). These two overarching orientations also fit into a circumplex model, such that all social goals can be viewed as different blends of agency and communion (Locke, 2000).

Although the three approaches are rooted in different theoretical traditions, I argue that most of the social goal constructs can be subsumed under two broad categories of social goals. Connection-oriented social goals focus on maintaining close relationship with others and encompass intimacy goals, social development goals, and communal goals. In contrast, status-oriented social goals focus on maintaining and enhancing status in relationships and encompass popularity goals, dominance goals, social demonstration goals, and agentic goals. Of particular interest to this thesis, studies show that the kinds of social goals students pursue in school can influence their academic motivation and achievement.

Cross-domain effects of social goals. Most studies investigate students' social goals in relation to social outcomes such as pro-social behaviour, and only more recently are social goals examined in relation to students' academic motivation and achievement. Adoption of connection-oriented social goals has been linked to a range of positive academic outcomes. Students who prioritise social connection in relationships are more likely to have higher academic self-efficacy and intrinsic motivation (Shim & Finch, 2014), more mastery goals (Horst et al., 2007), greater willingness to seek help (Roussel et al., 2011), higher levels of academic effort and engagement (Kiefer & Ryan, 2008; Kiefer & Wang, 2016), and better academic achievement (Ojanen et al., 2013). It is possible that students with connection-oriented social goals experience more positive relationships with peers and teachers in school, which facilitates their academic motivation and achievement.

Adoption of status-oriented social goals, in contrast, has been linked to various academic costs. Students who prioritise social power and status in peer relationships tend to report lower academic self-efficacy (Kiefer & Shim, 2016), more performance goals (Ryan & Shim, 2006), greater help seeking avoidance (Kiefer & Shim, 2016; Ryan et al., 1997), higher levels of disruptive behaviour (Shim et al., 2013), lower levels of academic effort and engagement (Kiefer & Wang, 2016; Liem, 2016), and worse academic achievement (Kiefer & Ryan, 2008). These results suggest that during adolescence students who want to enhance their peer status tend to engage in less adaptive learning behaviours. This might be explained by the devaluing of academic effort in adolescent peer groups (Heyder & Kessels, 2017; Juvonen & Murdock, 1995), and the increased social prestige associated with rule-breaking behaviour and academic disengagement (Galván et al., 2011; Gorman et al., 2002).

Gender differences in social goals. In their review, Rose and Rudolph (2006) found consistent differences in boys' and girls' social goals. Girls are more likely to endorse connection-oriented goals, whereas boys tend to pursue status-oriented goals in peer contexts. The size of these effects ranges from medium to large. Similarly, in a cross-sectional study of more than 1,000 students aged between 6 and 22 years, LaFontana and Cillessen (2010) showed that boys, regardless of age, were more preoccupied with peer status than girls. These gender differences in social motivation may have implications for boys' academic engagement and achievement. During adolescence, boys may be more willing to prioritise status over academic achievement, and engage in behaviour that enhances their social standing, such as disruptive behaviour and reduced effort, even if this puts their academic success at risk. Research therefore needs extend beyond academic motivation to understand the role of social motivation in explaining boys' valuing of effortless achievement and underperformance in school.

Gender Roles and Motivational Implications

A 'laddish' or 'macho' form of masculinity is another commonly cited explanation for boys' underachievement in ethnographic studies. At the core of the laddish masculinity is an anti-school attitude as well as devaluation of hard work and academic engagement (Hadjar et al., 2014). A laddish construction of masculinity is thought to be appealing to many boys because it is the culturally dominant, hegemonic form of masculinity and can enhance boys' social status (Francis et al., 2010; Jackson & Dempster, 2009). Since the laddish masculinity is developed in opposition to the learning culture in school, academic engagement becomes less likely and even problematic for a subgroup of boys who adopt the laddish masculinity (Francis et al., 2010). It is suggested that a misfit between laddish masculinity and academic engagement may pose a barrier to some boys' learning and achievement.

From a psychological perspective, Kohlberg (1966) similarly proposed that people prefer to engage in activities that are congruent with their gender identity. More recently, Oyserman and her colleagues developed an identity-based motivation (IBM) model to explain the role of identity in guiding actions (Oyserman & Destin, 2010). According to IBM, people are highly sensitive to contextual cues about social meanings attached to different behaviours, and are motivated to engage in behaviours that match their salient identities (Oyserman, 2013). As a result, identity-congruent actions feel natural whereas behaviours that do not match one's identity feel unnatural and difficult to enact (Oyserman et al., 2014). Applied to the context of boys' underachievement, IBM would predict that for a subgroup of boys who adopt a laddish masculinity, displaying academic effort and engagement might feel difficult and incongruent with being a boy. In contrast, disengaging from learning activities and

misbehaving might be more congruent with their chosen male identity, but these self-defeating behaviours can backfire and undermine their achievement (see also Kessels et al., 2014).

A mismatch between certain forms of masculinity and academic engagement may indeed contribute to some boys' underperformance. In a cross-sectional study of over 1,200 students in England and Wales, Whitehead (2003) found that endorsement of traditional gender norms was negatively associated with boys' achievement at the end of secondary school. In a study of over 6,000 Flemish students, adolescent boys with more traditional beliefs about gender roles experienced a lower level of school belonging (Huyge et al., 2015). This suggests that the perceived mismatch may further erode boys' subjective experience of feeling connected in school. Elmore and Oyserman (2012) extended these correlational findings by manipulating the perceived fit between students' gender identity and school success. When adolescent boys were led to view their academic identity as congruent with their gender identity, they reported more academic-related goals, higher success expectation, and increased their effort on a subsequent academic task.

These findings transcend the often-binary understanding of the gender gap. Rather than lumping all boys into a single category, studies reviewed above suggest that it is boys who adhere to traditional masculinity that tend to underperform. This nuanced insight is crucial because a longstanding critique of the educational gender gap research is that it fails to identify which boys are underachieving, as many boys perform as well as girls in school (Weaver-Hightower, 2003). Acknowledging vast individual differences within each gender group, researchers show that gender roles, or one's enactment of masculinities and femininities, often provide a better explanation for the gender differences found in reading and writing motivation (McGeown et al., 2012; Pajares & Valiante, 2001). Furthermore, recent development in multidimensional measures of masculinities provides an opportunity to identify specific aspects of masculine norms that may hinder boys' learning and achievement (Mahalik et al., 2003). For example, Kahn et al. (2011) found that conformity to the norms of emotional stoicism and extreme self-reliance was associated with lower intrinsic desire for knowledge and stimulation among male undergraduate students. In another study, Marrs (2016) found that endorsement of physical aggression and extreme self-reliance was associated with a surface approach to learning and a focus on rote memorisation of information. Through adopting a variable-centred approach, these studies show that male students vary in their degree of conformity to traditional masculinity, and those who conform more strongly to traditional masculine norms tend to experience a greater conflict between academic commitment and their gender identity.

Gender role profiles. In addition to different *degrees* of conformity to a given dimension of masculine norm, male students may simultaneously conform to or resist multiple aspects of masculine norms and to varying degrees, resulting in distinct *patterns* of gender role adherence. Consequently, an appropriate analytical technique is needed to model how conformity to multiple dimensions of masculine norms may work in tandem to influence student motivation and achievement. In a pioneering study, Fischer and Good (1998) applied cluster analysis to investigate young men's patterns of responses to four dimensions of traditional masculine norms: status, antifemininity, toughness, and violence. They identified five distinct gender role profiles: Traditional, Moderately Traditional, High Status/Low Violence, High Violence/Moderately Traditional, and Nontraditional. In addition, young men with distinct gender role profiles differed in their attitudes towards gender equality, such that the Nontraditional profile reported the most egalitarian attitudes. Findings from this study illustrate the promise of a person-centred approach for understanding different types of masculinities and their implications.

Applied to the context of boys' underachievement, a person-centred approach may shed light on the following unresolved questions. Besides laddish masculinity, what are some other versions of masculinity among adolescent boys? How do these distinct masculinities influence students' motivation and achievement? In fact, many ethnographic studies have sought to address similar questions. For example, this line of qualitative enquiry has generated a list of masculinity profiles, ranging from 'macho lads', 'real Englishmen', 'cool guys' to 'swots', 'wimps' and 'academic achievers' (Connell, 1989; Mac an Ghaill, 1994; Martino, 1999). Yet critics suggest that this focus on typologies of boys largely overlooks the impact of masculinities on learning (Vantieghem et al., 2014; Weaver-Hightower, 2003). In addition, the plethora of labels and seemingly inconsistent profiles across studies has limited researchers' ability to synthesise this body of work. In contrast, a person-centred approach can identify emergent, quantitatively derived gender role profiles. The relations between different profiles and academic outcomes can also be modelled explicitly. A person-centred approach, therefore, lends itself well to quantification, prediction, and replication.

In addition to recognising the heterogeneity among boys, a person-centred approach may be used to study different groups of girls in school. As reviewed earlier, although boys outnumber girls as low achievers, 30% of the girls also fail to attain a standard pass in English GCSE (see Table 1.2). An exclusive focus on mean gender differences has often rendered these poorly performing girls invisible in educational gender gap research. By employing a person-centred approach and examining different types of masculinities and femininities, researchers can shift the focus from 'boys versus girls' to identify 'which boys and which

girls' are falling behind in school. Consequently, I argue that a person-centred approach has the potential to transcend the gender dichotomy and provide a more nuanced understanding of the gender gap in school.

Synthesis of the Literature

This review first distinguishes underachievement from low achievement, and clarifies what is meant by underachievement at both individual and group levels. Evidence is then provided to show that in English secondary schools, boys are more likely to be low achievers, underachieve relative to girls, and fail to reach their full potential. In light of the complex and multi-causal nature of the gender gap, this review identifies three potential motivational processes that might contribute to boys' underachievement: (a) gender differences in academic motivation, (b) gender differences in social motivation, and (c) a conflict between gender roles and academic commitment. There is some support for these potential explanations in exploratory qualitative studies, but findings from these small-scale studies are often limited to specific samples and contexts. In light of the pervasive gender achievement gap in schools, there is a need for quantitative work to ascertain the mechanisms that potentially influence a large number of boys.

Regarding academic motivation, it is possible that boys' preference for effortless achievement may partially account for their underperformance at GCSE. Ethnographic studies suggest that boys' adoption of effortless achievement may be simultaneously motivated by (a) their perceptions of a trade-off between ability and effort, (b) concerns about failing and appearing incompetent, and (c) perceived benefits of low effort in discounting failure and augmenting success. These depictions of effortless achievers resemble students who operate within a fixed mindset motivational framework (negative effort beliefs, performance-avoidance goals, self-handicapping). Therefore, gender differences in motivational patterns may partially account for the gender achievement gap.

Regarding social motivation, ethnographic studies suggest that serious academic engagement is considered uncool during adolescence, and that boys' adoption of effortless achievement may be further driven by their concerns about peer status. Research on social goals indicates clear gendered tendencies such that girls focus on relationship building whereas boys attach greater importance to status enhancement. Given these gender differences in social goals, it is possible that boys may be more likely to prioritise reputational gains over academic achievement by reducing effort in school. Consequently, researchers need to investigate the role of social motivation in boys' maladaptive school engagement.

The review further suggests that research on gender and academic performance remains group-based and focuses on mean differences in quantitative psychology. Although

there may be general principles that influence boys' and girls' motivation and achievement, there are large within-group variations so that not all boys are failing in school and not all girls are performing well. A sole focus on mean differences or low achieving boys in past research renders many subgroups invisible (e.g., high achieving boys, low achieving girls, and those with an average achievement; see Figure 1.3). Therefore it is crucial to tease apart these within-group differences to complement the broadly researched between-group differences. Shifting the focus from gender to gender roles and identifying different types of masculinities and femininities may offer nuanced insights into which boys and which girls are falling behind in school.

Given these three gaps identified in the review, three empirical studies were conducted to probe the motivational processes contributing to boys' underachievement. These studies are outlined next.

Group-based quantitative research

Qualitative research on low achieving boys

Subgroups invisible to researchers
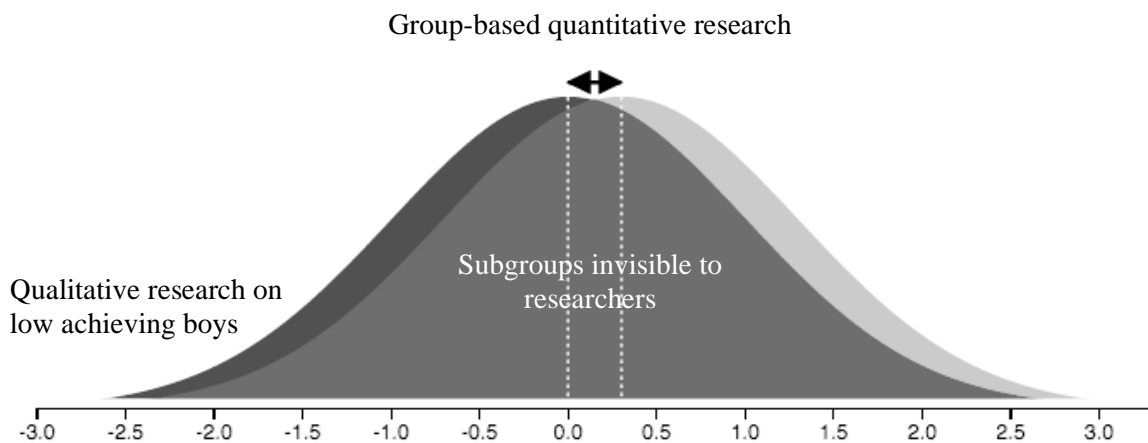
Figure 1.3 An exclusive focus on mean differences has rendered many subgroups invisible in past research

Overview of Current Studies

Chapters 2 to 4 present three empirical studies, each investigating one potential mechanism that might contribute to boys' underachievement in school, including (a) gender differences in academic motivation, (b) gender differences in social motivation, (c) the influence of gender roles. All studies were conducted in secondary school settings because the gender gap in achievement widens during this stage of education. In addition, since the patterns of gender gap vary across different subjects, all studies assessed students' academic motivation in English and maths to examine the generality of hypothesised motivational mechanisms.

Table 1.5 Overview of current studies

Study	Focus	Research Questions	Source of data	*N*	Sample	Analysis	Variables
1	Academic motivation	• What are the emergent patterns of mindset-related motivational profiles? • How does students' gender relate to their profile membership? • How do mindset-related motivational profiles predict students' achievement?	Primary	535	Years 10-11 (14-16 years old)	Latent profile analysis	• Mindset • Effort beliefs • Achievement goals • Perseverance • Self-handicapping • Academic achievement
2	Social & academic motivation	• Are there gender differences in social goals, academic goals, and self-handicapping behaviour? • Can social and academic goals mediate gender differences in self-handicapping?	Secondary	536	Year 9 (13-14 years old)	Structural equation modelling	• Social goals • Achievement goals • Self-handicapping
3	Gender roles	• What are the emergent gender role profiles and how common are these profiles? • How do the emergent gender role profiles relate to students' motivation, engagement, and achievement?	Primary	597	Years 10-11 (14-16 years old)	Latent profile analysis	• Conformity to masculine roles • Conformity to feminine roles • Mindset • Perseverance • Self-handicapping • Academic achievement

An overview of the studies is provided in Table 1.5. Study 1 examines gender differences in patterns of academic motivation as well as the impact of these motivational patterns on student achievement. Study 2 extends beyond a sole focus on academic motivation by investigating the joint role of academic and social motivation in explaining gender differences in school engagement. Study 3 then moves beyond a binary perspective of gender to identify distinct subgroups of boys and girls based on their gender roles as well as compares group differences in motivation, engagement, and achievement. In combination, the three studies identify key motivational factors and processes that contribute to the gender gap, as well as the subgroups of boys and girls that are at the greatest risk of underachievement.

State-of-the-art methods were utilised to answer the proposed research questions. Latent variable analyses were employed in all studies to account for measurement error. Analyses were performed in Mplus (Muthén & Muthén, 1998-2017) using estimation methods that are robust against deviations from the normality assumption. Research questions in Studies 1 and 3 focused on identifying groups of individuals who differed in their academic motivation or gender role conformity. The nature of these questions calls for person-oriented analyses, or techniques that treat individuals or groups of individuals as the unit of analysis. Specifically, latent profile analysis was used to classify individuals with similar response patterns into homogeneous subgroups. Unlike traditional cluster analysis, latent profile analysis is a model-based method, which reduces subjectivity and provides more rigorous criteria for deciding on the number of underlying groups (Vermunt & Magidson, 2002). In contrast, research questions in Study 2 focused on comparing mean differences in variables and understanding interrelationships among variables. The nature of these questions calls for variable-oriented analyses, or techniques that treat variables as the unit of analysis. Specifically, for the first research question, measurement invariance was performed since psychometric equivalence of a construct between groups is a pre-requisite for comparing group means (Putnick & Bornstein, 2016). For the second research question, structural equation modelling was utilised to include multiple mediators in the model.

A combination of existing and newly generated datasets was used to answer the proposed research questions. Existing data were analysed in Study 2, and new data were collected for Studies 1 and 3 with the planned analyses in mind (i.e., latent profile analysis). Estimating the required sample size for latent profile analysis is not straightforward. The statistical power for detecting the correct number of profiles is determined by the number and quality of indicators as well as the degree of separation between profiles, the latter of which is unknown before analysis (Tein et al., 2013; Wurpts & Geiser, 2014). That said, a literature review of 38 psychology studies found that the median sample size for latent profile analysis

is 377 (Tein et al., 2013), suggesting this is a worthy goal for Studies 1 and 3. To increase the representativeness of the sample and the generalisability of the findings, a range of secondary schools serving different communities were purposefully recruited. Studies 1 and 3 each included four schools, and students in Years 10 and 11 from the participating schools were invited to take part. The study protocol was reviewed by the Faculty of Education ethics committee, and parental consent was obtained from all participants prior to data collection (a copy of parental consent form used in Study 1 and Study 3 can be found in Appendix A and Appendix E). The achieved sample sizes in Study 1 ($n = 535$) and Study 3 ($n = 597$) are well above the median for psychology studies using latent profile analysis. For Study 2, the dataset comes from the Laddishness and Self-Worth Protection study (Jackson, 2008) and has been made publicly available via the UK data service—a repository for publicly-funded research data. The key research question in Study 2 involves a mediated effect, and a simulation study indicates that a sample size of 462 would provide 80% power to detect a small mediated effect (Fritz & MacKinnon, 2007). Therefore, the sample size of Study 2 ($n = 536$) is deemed sufficient for the planned analysis.

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Chapter 2 Same Mindset, Different Goals and Motivational Frameworks:

Profiles of Mindset-Based Meaning Systems (Study 1)

Abstract

Growth and fixed mindsets have been linked to distinct effort beliefs, goals, and behaviours, creating a seemingly dichotomous pattern of motivation. Yet, students holding the same mindset are unlikely a homogenous group and may further differ in their motivational patterns. The current study employed a person-centred approach to investigate how mindsets and associated constructs naturally cohered and functioned together to influence student achievement. Data were collected from 535 English students (aged 14-16 years) on mindsets, effort beliefs, achievement goals, perseverance, and self-handicapping, along with their English and maths performance at the end of secondary school. Latent profile analyses revealed four distinct profiles. Across the profiles, students' mindset co-varied with effort beliefs, mastery goals, perseverance, and self-handicapping, but the relationship between mindsets and performance goals was less straightforward. Two profiles supported the classic growth mindset–mastery goal (*Growth-Focused*) and fixed mindset–performance goal pairings (*Ability-Focused*). The other two profiles, however, displayed alternative combinations of mindsets and goals that had not been acknowledged in the past. Specifically, some growth mindset students embraced performance goals alongside mastery goals (*Growth-Competitive*), and some fixed mindset students did not endorse performance goals (*Disengaged*). The two growth-oriented profiles consistently performed well, and *Growth-Competitive* students even outperformed *Growth-Focused* students in maths. Compared to girls, boys were more often found in *Ability-Focused* and *Disengaged* profiles. Overall, the results indicate a nuanced set of relations between mindsets and achievement goals, highlighting the dynamic integration of motivational beliefs and goals within individuals.

Keywords: implicit theories of intelligence; mindset; achievement goals; latent profile analysis; academic achievement; gender differences

Introduction

Students can think about the nature of their ability in two ways (Dweck & Leggett, 1988; Nicholls, 1984). Some have a *fixed mindset* or an *entity theory*—they view ability as a fixed trait, while others have a *growth mindset* or an *incremental theory*—they view ability as a malleable quality that can be developed (Dweck et al., 1995). Fixed and growth mindsets are systematically linked to students' beliefs about effort, achievement goals, and behaviours (Blackwell et al., 2007). As a result, mindsets can organise associated motivational constructs into a coherent framework or '*meaning system*' (Molden & Dweck, 2000, 2006). Growth mindset students, on average, view effort positively, pursue mastery goals to develop their competence, persist through challenges, and achieve better academic performance. In contrast, fixed mindset students tend to view effort negatively, pursue performance goals to validate their competence, engage in self-defensive behaviours, and show worse performance over time (Dweck & Molden, 2017).

Despite these well-documented differences between growth and fixed mindset students (*between-mindset differences*), few studies have examined variations in motivation and achievement among students holding the same mindset (*within-mindset differences*). Yet, I argue that those with the same mindset are unlikely a homogenous group and may further differ in their goals, behaviour, and achievement. For example, since school environment becomes increasingly performance-oriented when students progress through education (Eccles & Roeser, 2011), might some growth mindset students seek performance goals alongside mastery goals? If so, how does their academic performance compare to growth mindset students who endorse only mastery goals? Dweck and Leggett (1988) suggested that although growth mindset students tend to adopt mastery goals, some of them might be able to coordinate both mastery and performance goals (see also Molden & Dweck, 2000). Indeed, research on achievement goal profiles often highlights a group of students who pursue mastery and performance goals simultaneously (Niemivirta et al., 2019; Wormington & Linnenbrink-Garcia, 2017), but these studies examining patterns of achievement goals alone have not yet considered students' underlying mindset. The current study thus adopts a person-centred approach to examine how mindsets and associated motivational factors naturally cohere and function together to influence student achievement. By profiling students based on a broader set of variables constituting the mindset-based meaning system (i.e., effort beliefs, achievement goals, perseverance, and self-handicapping; discussed below), the current study may unveil more nuanced relationships between mindsets and other motivational constructs. In addition, given that motivation is domain-specific (Guay & Bureau, 2018) and that girls tend to display more adaptive patterns of school motivation (Butler & Hasenfratz, 2017), I

aim to compare students' mindset-related profiles in English and maths and examine the gender compositions of these profiles.

In the following sections, I first summarise key findings from research examining between-mindset differences, before synthesising evidence for the possible within-mindset differences in motivational frameworks. Next, I review gender differences in mindset-related constructs before outlining the current study.

Different Mindsets, Different Motivational Frameworks

According to Dweck and colleagues (Dweck, 2002; Molden & Dweck, 2000), children's mindsets become increasingly linked to beliefs about effort, achievement goals, and behavioural patterns, forming a holistic meaning-making system that influences student achievement. Notably, experimental and longitudinal studies show that mindsets are causal antecedents of other elements in the meaning system. First, mindsets can transform the meaning of effort. In one study, undergraduate students primed with a fixed mindset tended to view hard work as a sign of low ability, whereas those in the growth mindset condition tended to view effort as a tool to increase ability (Hong et al., 1999). Second, mindsets can shape students' achievement goals or reasons for engaging in academic tasks. In a study of fifth and sixth graders, children were given some unsolvable puzzles before having a choice to work on other problems (Bempechat et al., 1991). After the initial failure, children primed with a fixed mindset preferred easier problems that would affirm their ability (i.e., an ability performance goal), whereas children primed with a growth mindset preferred more challenging problems that would develop their ability (i.e., a mastery goal)[1]. Third, mindsets can lead to different patterns of behaviour in achievement settings. Students with a growth mindset are more likely to persevere and try harder when encountering obstacles (Robins & Pals, 2002). In contrast, after receiving negative feedback, students primed with a fixed mindset tend to forgo opportunity to improve the skills needed for successful performance (Hong et al., 1999; Nussbaum & Dweck, 2008). This kind of behaviour can be considered as self-handicapping, which involves deliberately creating barriers to success so that potential failure is less indicative of one's ability (Török et al., 2018).

In early adolescence, mindsets, effort beliefs, goals, and behaviours begin to gain coherence and influence student achievement collectively (Molden & Dweck, 2006). In a longitudinal study following students from seventh to ninth grade, students holding a stronger

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[1] Although subsequent research has introduced the approach-avoidance distinction to mastery and performance goals, a growth mindset is associated positively with mastery goals and negatively with performance goals, regardless of an approach or avoidance orientation (Burnette et al., 2013). Therefore, I focused on the primary mastery-performance distinction in the review of the literature.

growth mindset showed greater gains in maths achievement, and the relationship between mindsets and achievement was mediated by students' effort beliefs, achievement goals, and behavioural responses to setbacks (Blackwell et al., 2007). In light of the systematic associations between mindsets (growth versus fixed), beliefs about effort (useful versus futile in increasing ability), achievement goals (mastery versus performance), and responses to challenge (perseverance versus self-handicapping), the present study focused on these constructs as core components of the mindset-based meaning system.

Although path analysis has demonstrated that mindsets form a network with other beliefs, goals, and behaviours, a person-centred approach may be more appropriate for testing the meaning system hypothesis directly. A person-centred approach identifies groups of individuals who are similar to each other on a set of variables (Collins & Lanza, 2010). In the current study, a focus on the patterns of variables will illuminate how mindsets, effort beliefs, goals, and behaviours naturally cohere into a larger motivational framework. In fact, a recent study has applied a person-centred perspective to study some key elements of the mindset-based meaning system. Chen and Tutwiler (2017) classified sixth and tenth graders into distinct subgroups based on their mindsets and achievement goals. Consistent with the meaning system hypothesis, they found a growth-oriented profile where students reported a growth mindset alongside dominant mastery goals. However, they did not find a profile combining a fixed mindset with dominant performance goals. This discrepant finding suggests that additional person-centred research is needed to understand the natural combinations of mindsets and achievement goals within individuals.

Same Mindset, Different Motivational Frameworks

Research reviewed thus far focuses on between-mindset differences and implies a dichotomous pattern of motivation stemming from two opposing mindsets. Nevertheless, I argue that the relationships between mindsets and associated factors may be more complex than assumed. While people holding distinct mindsets show a preference for either mastery or performance goals when the two goals are pitted against each other, growth mindset is only weakly correlated with mastery and performance goals (rs = .19 and –.15; for a meta-analysis, see Burnette et al., 2013). This means that the straightforward relation between mindsets and achievement goals may not hold for a subset of the population, and that people may combine their mindsets and goals in a more nuanced manner than what might be expected from current theorising. Additionally, studies have identified several common patterns of achievement goals, including (1) dominant mastery goals, (2) dominant performance goals, (3) high mastery/high performance goals, and (4) moderate-low mastery/moderate-low performance goals (for reviews, see Niemivirta et al., 2019; Wormington & Linnenbrink-Garcia, 2017).

Although the first two profiles correspond well to students with a growth or fixed mindset, it is unclear what type of mindset might underlie the latter two patterns of goal endorsement.

Might the high-mastery/high-performance goal profile represent a group of growth mindset students who embrace performance goals? Or are they fixed mindset students who endorse mastery goals? Empirical studies investigating these possibilities found rather mixed evidence. For example, Stone (1999; also described in Dweck, 1999) assessed fifth graders' mindsets before giving them tasks that were framed as either performance- or mastery-oriented. On the performance task, growth mindset students showed no reluctance to adopt a performance goal: they were as likely as the fixed mindset students to express a desire to outperform others, and were even more likely to agree that the task would reveal their current ability. Students with a fixed mindset, however, agreed more strongly that the performance task was also a measure of their permanent and global ability. When directed towards the mastery task, fixed mindset students initially valued gains in learning as much as growth mindset students. However, fixed mindset students were soon overwhelmed by their own performance concerns even in a mastery context. These findings suggest that fixed mindset students may have difficulty in sustaining a mastery goal, but growth mindset students can coordinate mastery and performance goals simultaneously. In contrast, Schwinger, Steinmayr, and Spinath (2016) found the opposite pattern in a longitudinal study of primary school students in Germany. They showed that fixed mindset children had a greater likelihood of being in the high-mastery/high-performance goal profile relative to the mastery goal profile, but this result was observed in only one out of five time points. Given the conflicting findings in past studies, additional research is needed to clarify the type of mindset underlying the high-mastery/high-performance goal profile.

In addition, what type of mindset might underlie the moderate-low mastery/moderate-low performance goal profile? It is worth noting that students with low to moderate levels of mastery and performance goals tend to show the lowest levels of academic engagement and achievement (Niemivirta et al., 2019). Consequently, researchers have called for more studies to understand these disengaged students (Wormington & Linnenbrink-Garcia, 2017). Based on previous studies, it is plausible that a fixed mindset might underlie the moderate-low mastery/moderate-low performance goal profile and partially account for its maladaptive consequences. Schwinger et al. (2016) found that a fixed mindset was associated with an increased likelihood of belonging to the moderate and low multiple goal profiles. In addition, studies in sport psychology show that motivational profiles with low mastery and performance goals are further characterized by a fixed mindset and high amotivation (Chian & Wang, 2008; Wang et al., 2002). Together, these results suggest that when students

perceive their ability in a domain as fixed and lacking, they may fail to see the purpose of engaging in domain-related activities, thereby falling into a state of indifference.

In summary, although variable-centred research paints a straightforward, one-to-one correspondence between mindsets and achievement goals, the link between the two may be less straightforward than is commonly assumed. Studies reviewed above suggest that not all growth mindset students dismiss performance goals, and not all fixed mindset students are preoccupied with performance goals. By employing a person-centred approach, the present study may reveal unique combinations of mindsets and achievement goals (especially performance goals) within individuals.

Gendered Motivational Frameworks

In her review of gender differences in motivation, Butler (2014; Butler & Hasenfratz, 2017) proposed a tendency for boys to 'prove and protect' their abilities and for girls to 'try and improve' their abilities. These gendered tendencies have some parallels with motivational frameworks underpinned by a fixed or growth mindset. Therefore, one might wonder if boys and girls would be differentially represented in distinct mindset-related profiles. If so, this holds implications for understanding boys' relative underachievement in school (Voyer & Voyer, 2014).

When examining mindsets alone, most studies observe no meaningful gender differences (e.g., Ahmavaara & Houston, 2007; Tucker-Drob et al., 2016). This includes a recent study employing a nationally representative sample of 10th graders in the US, which found that boys and girls were equally likely to hold a growth mindset in maths (Hwang et al., 2019). Although single studies sometimes reveal a stronger growth mindset among either boys (Chen & Pajares, 2010; Diseth et al., 2014) or girls (Spinath et al., 2003; Tempelaar et al., 2015), there appear to be no systematic gender differences across studies.

Regarding achievement goals, however, small but consistent gender differences have been found, and the pattern of gender variations are tied to specific subject domains (Wirthwein et al., 2019). When goals are assessed regarding a verbal domain or school motivation in general, girls tend to report more mastery goals (Martin, 2004; Peterson & Kaplan, 2016), but this tendency often diminishes or disappears in maths-related domains (Butler, 2008; Friedel et al., 2007). In contrast, boys tend to prioritise the goals of validating competence or avoiding displays of incompetence (i.e., performance-approach and -avoidance goals; Peterson & Kaplan, 2016; Yu & McLellan, 2019). Studies on goal profiles similarly show that girls are overrepresented in profiles with dominant mastery goals, whereas boys are overrepresented in profiles with dominant performance goals (Luo et al., 2011; Schwinger et al., 2016).

Gendered tendencies towards 'proving and protecting' versus 'trying and improving' (Butler, 2014) can also be inferred from boys' and girls' effort beliefs, perseverance, and use of self-handicapping strategies. Girls generally place a higher value on effort and believe more strongly that effort leads to improved performance (McCrea et al., 2008; Tempelaar et al., 2015). In addition, girls, on average, tend to persist longer when facing challenges (Schnell et al., 2015), and this finding holds across self-report and behavioural measures (Gilmore et al., 2003; Vermeer et al., 2000). In contrast, when encountering difficulties, boys tend to employ self-handicapping strategies to discount low ability as the cause of failure and to protect their self-worth (McCrea et al., 2008; Yu & McLellan, 2019).

Overall, variable-centred studies have found small but consistent gender differences in many components of the mindset-based meaning system. Although boys and girls both *believe in their potential to grow*, gender differences in effort beliefs, goals, and behaviours suggest that girls place greater importance on *working towards growth*. The present study extended prior research to investigate the proving versus improving motivational tendencies from an integrative, person-centred perspective. Based on past research, more girls were expected to belong to growth-oriented motivational profiles, particularly in school subjects that are perceived as congruent with their gender identity (Wirthwein et al., 2019).

Study Overview and Hypotheses

The current study employed a person-centred approach to examine the various ways mindsets and associated motivational factors cohered and functioned together as a meaning system. Specifically, it addressed three research questions. First, what are the emergent patterns of mindset-based meaning systems in English and maths? I focused on mindsets, effort beliefs, achievement goals, perseverance, and self-handicapping as core components of the system because these constructs are systematically linked to each other and exert influence on student achievement collectively (Blackwell et al., 2007; Robins & Pals, 2002). Based on prior variable-centred research, I expected to first identify two profiles reflecting between-mindset differences in motivational frameworks (*Hypothesis 1*):

- a *Growth-Focused* profile, evidenced by a growth mindset, positive effort beliefs, dominant mastery goals, high perseverance, and low self-handicapping; and

- an *Ability-Focused* profile, evidenced by a fixed mindset, negative effort beliefs, dominant performance goals, low perseverance, and frequent use of self-handicapping strategies.

Furthermore, I argue that there may be individual differences in the ways mindsets are combined with other factors, which have been rendered invisible in previous variable-centred research. As a result, I expected to find profiles showing alternative combinations of

mindsets, effort beliefs, goals, and behaviour. Given the dearth of research testing the meaning system hypothesis from a person-centred perspective, I took an exploratory approach and did not specify the pattern of these alternative profiles. Students' profile memberships in English and maths were also compared to examine the domain-specificity of motivational frameworks.

Second, how do profiles of mindset-based meaning systems predict students' subsequent achievement in English and maths? Previous research suggests that mindsets form the core of meaning systems—they are causal antecedents of other constructs and can change the meaning of goals and behaviour (Hong et al., 1999; Stone, 1999). It was thus predicted that regardless of the configurations of factors, profiles with a growth mindset would show better achievement over time, whereas profiles with a fixed mindset would show worse achievement (*Hypothesis 2*).

Third, how does students' gender relate to their profile memberships? In light of the gendered motivational tendencies (Butler, 2014), girls were expected to be more frequently found in growth-oriented profiles, indicated by a growth mindset, positive effort beliefs, mastery goals, and perseverance (*Hypothesis 3*). This gender difference was expected to be larger in English, a domain that is viewed as stereotypically compatible with girls' gender identity.

Method

To increase the transparency and openness of research, I have made the analysis code available on the Open Science Framework (OSF).

Participants and Procedure

The sample comprised 535 students (295 girls, aged 14-16 years) from four state-funded secondary schools in England. Students were in the last two years of secondary education (Year 10: $n = 319$; Year 11: $n = 216$) and were working towards the national General Certificate of Secondary Education (GCSE) exams taken at the end of Year 11. This sample was chosen because past studies suggest that mindset-based meaning systems may be most impactful when students encounter academic challenges (e.g., Blackwell et al., 2007). The average level of student achievement was diverse across participating schools: the proportion of students obtaining a pass grade in GCSE English and maths ranged from 23% to 69%. Participants were predominantly White (79.1%) and Asian (12.3%), with the remaining identified as mixed race (5.4%) and Black (1.9%). Nine per cent of the students spoke English as an additional language (EAL), and 10.3% received free school meals (FSM) due to low family income.

The study was approved by the departmental ethics committee. Prior to data collection, parents were informed of the study and were given the opportunity to withdraw their child. Students also provided assent to participate. Questionnaires assessing key motivational constructs were group administered to students during regular school hours in spring term. Teachers responsible for administering the questionnaire were provided with an instruction sheet containing the purpose, ethics, and procedures of the study. Students were told that participation was completely voluntary and that their responses would not be seen by anyone at home or school. Students subsequently took the GCSE exams at the end of Year 11, and their achieved grades were obtained from school records. The time lag between assessments of motivation and achievement was introduced to examine the potential impact of mindset-based meaning systems on student performance.

Measures

The current study used well-validated scales from previous research (see Appendix B for a copy of the distributed questionnaire). Motivational constructs were assessed with respect to the domains of English and maths. All items were rated on a Likert scale ranging from 1 (*disagree a lot*) to 6 (*agree a lot*).

Mindset. Students' mindset was assessed with a three-item scale adapted from De Castella and Byrne (2015). The items measured a fixed mindset (e.g., 'My ability in … is something that I can't change very much') and were reverse scored so that higher scores indicated a stronger growth mindset. Only negatively worded items were used because both my pilot and previous studies found that positively worded items are extremely compelling and prone to social desirability responses (e.g., Dweck et al., 1995). The reliability of the scale, as indicated by Cronbach's alpha (α), was .77 for English and .78 for maths.

Effort beliefs. Items assessing beliefs about effort were adapted from the study by Blackwell et al. (2007). Again only negatively phrased items were used (5 items; e.g., 'If I'm bad at …, working hard won't make me better at it') and were reverse scored so that higher scores reflected a stronger belief about the utility of effort in increasing ability. The scale displayed good internal reliability (α = .81 for English and .83 for maths).

Achievement goals. Mastery, performance-approach, and performance-avoidance goals were measured using items adapted from the revised Patterns of Adaptive Learning Scales (PALS; Midgley et al., 2000). Mastery goal items assessed a focus on developing academic competence (5 items, α = .89 for English and .86 for maths; e.g., 'One of my goals in ··· is to learn as much as I can'). Items tapping performance goals focused primarily on the ability validation component. Performance-approach goal items evaluated a focus on demonstrating competence relative to others and gaining favourable judgment (5 items, α =

.92 for both English and maths; e.g., 'One of my goals is to show others that I'm good at …').
Performance-avoidance goal items assessed a focus on avoiding negative judgement or
displays of incompetence relative to others (4 items, α = .79 for English and .80 for maths;
e.g., 'It's important to me that I don't look stupid in my … class').

      Perseverance. Four items were used to assess the extent to which students persevere
when facing challenges. These items were borrowed from the study conducted by Elliot,
McGregor, and Gable (1999) and measured one's tendency to maintain effort on academic
tasks even when they became difficult or boring (e.g., 'If a particular topic or problem
confuses me in my … lesson, I go back and try to figure it out'). Cronbach's alpha
coefficients were .82 for English and .83 for maths.

      Self-handicapping. Academic self-handicapping was measured using a six-item
scale adapted from the PALS (Midgley et al., 2000). These items assessed intentional effort
withdrawal prior to evaluations to generate excuses for potential poor performance. An
example item is 'I sometimes put off doing my maths homework until the last minute so I
have an excuse if I don't do so well'. This scale showed good internal reliability (α = .83 for
English and .86 for maths).

      Achievement. Academic achievement was operationalised as English and maths
grades in national GCSE exams taken by all students at the end of compulsory secondary
education. These exam results are high-stakes for both students and schools because they are
crucial for educational progression and are used to rank schools in league tables. GCSE
exams were recently reformed and participants in this study were among the first to sit the
more challenging exams. Students' performance was graded on a scale from 1 (the lowest) to
9 (the highest) and was standardised before analyses to ease interpretation.

      Covariates. Students' background characteristics and prior achievement can
influence subsequent performance and the probability of belonging to a given latent profile.
The current study thus included a number of covariates to investigate the unique effect of
latent profiles on achievement as well as the independent effect of gender on profile
membership. These covariates included ethnicity, language background, and FSM status—all
of which were self-reported by participants at the end of the questionnaire. In addition,
students' English and maths performance on the National Curriculum Tests (NCT) was
gathered from schools to indicate prior achievement. These tests are taken by all students at
the end of primary school in England and represent the only national test data available prior
to GCSE. NCT scores were standardised within the entire sample before analyses.

Analytic Strategy

Data analysis proceeded in three steps. First, I verified the factor structure of motivational variables in measurement models. Next, latent profile analysis (LPA) was conducted based on factor scores saved from the measurement models to identify subgroups of students with distinct mindset-based meaning systems. Lastly, once the optimal profile solution was determined, outcomes and predictors of profile membership were incorporated into the final LPA model. All analyses were conducted in Mplus Version 8 (Muthén & Muthén, 1998-2017) using the maximum likelihood estimation with robust standard errors (MLR). Missing values were handled by the full information maximum likelihood procedure (FIML) in Mplus.

Measurement models. I verified the factor structure of motivation measures using exploratory structural equation modelling (ESEM; Asparouhov & Muthén, 2009). A confirmatory approach to ESEM was adopted so that items were specified to load on their respective factors and cross-loadings were freely estimated but targeted to be as close to zero as possible. Recent research has illustrated the merits of ESEM when small cross-loadings can be expected among various motivation measures (e.g., Guay et al., 2015). This is the case in the present investigation where conceptual and empirical overlap has been reported among some study variables (e.g., performance-approach and performance-avoidance goals; Linnenbrink-Garcia et al., 2012).

Model fit was assessed using the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardised root mean square residual (SRMR). Good model fit was indicated by a CFI value close to 0.95 or above, a RMSEA value close to 0.06 or below, and SRMR close to 0.08 or below (Hu & Bentler, 1999).

Latent profile analyses. Students responding similarly on the motivation measures were classified into distinct subgroups using LPA. Factor scores saved from the ESEM models were used as latent profile indicators because they assigned more weight to items with higher loadings, thereby partially controlling for measurement errors (Morin et al., 2016). Furthermore, factor scores are estimated in standardized units ($M = 0$, $SD = 1$) and can be readily interpreted as deviations from the sample mean.

Models with two to six profiles were estimated and the optimal number of profiles to retain was initially guided by several statistical indicators (Nylund et al., 2007). These included the Akaike information criteria (AIC), the consistent AIC (CAIC), the Bayesian information criteria (BIC), the sample-size adjusted BIC (SABIC), and the bootstrap likelihood ratio test (BLRT). A lower value on AIC, CAIC, BIC, and SABIC indicates a better fitting model, and a non-significant BLRT test supports a model with one less profile.

To further facilitate model selection, information criteria were plotted to identify the elbow point after which the improvement in fit became minimal (Petras & Masyn, 2010), and theoretical interpretability of the profiles were also considered. Moreover, a solution with one less profile was preferred when additional profiles did not differ qualitatively from existing profiles (Morin et al., 2016). Finally, I relied on the entropy (ranging from 0 to 1) to describe the accuracy of the final solution, with higher values representing greater classification precision (Celeux & Soromenho, 1996). Once the optimal profile solution was selected, post hoc analyses were performed to examine how profiles differed from one another on each indicator.

Outcomes and predictors of latent profiles. To examine profile differences in student achievement, I used the BCH method introduced by Bolck, Croon, and Hagenaars (2004), which is equivalent to a weighted ANOVA and outperforms alternative approaches in simulation studies (Bakk & Vermunt, 2016). Specifically, a manual BCH was performed to examine differences in academic achievement across profiles while controlling for the effect of socio-demographic and achievement covariates (Asparouhov & Muthén, 2014b). Profile-specific means were compared using the MODEL CONSTRAINT command and can be interpreted as the independent influence of latent profiles on student achievement.

Finally, to investigate the effect of gender on profile memberships, the R3STEP command was used to perform multinomial logistic regressions while controlling for other covariates (Asparouhov & Muthén, 2014a). Specifically, the latent class variable was regressed on all predictors simultaneously so the coefficients for gender represented its unique contribution adjusting for all other effects in the model.

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Results

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Preliminary Analyses

ESEM models with target rotation showed excellent fit to data in English and maths according to the CFI (.968 and .981), RMSEA (.037 and .029), and SRMR (.018 and .018), supporting the underlying factor structure of the motivational constructs (see Appendix C for factor loadings). Means and standard deviations of observed variables are reported in Table 2.1 separately for each gender. Boys and girls scored similarly on the majority of measures but there were some exceptions. In English, girls reported higher levels of mastery goals ($d = 0.42$), perseverance ($d = 0.44$), and achieved better grades than boys ($d = 0.39$). In maths, girls again reported more mastery goals ($d = 0.21$) and greater perseverance ($d = 0.27$), but the size of gender differences was attenuated. In addition, boys adopted more performance-approach goals ($d = -0.22$) and outperformed girls in maths ($d = -0.19$).

Intercorrelations among variables are shown in Table 2.2. Theoretically consistent patterns of correlations were observed. Growth mindset was associated positively with positive effort beliefs (rs = .75 and .73 in English and maths, respectively), mastery goals (rs = .47 and .43), and perseverance (rs = .39 and .46), but negatively with performance-avoidance goals (rs = −.23 and −.23) and self-handicapping (rs = −.37 and −.44). Interestingly, growth mindset and performance-approach goals were nearly uncorrelated (rs = −.07 and −.14). In addition, students' English and maths achievement related positively to growth mindset (rs = .14 and .21), positive effort beliefs (rs = .18 and .23), and perseverance (rs = .12 and .19), but negatively to self-handicapping (rs = −.25 and −.28).

Table 2.1 Means and standard deviations for observed variables by gender

Variable	English			Maths		
	Girls	Boys	d	Girls	Boys	d
Growth mindset	4.23 (1.08)	4.18 (1.09)	0.05	4.37 (1.14)	4.42 (1.04)	−0.04
Positive effort beliefs	4.54 (1.02)	4.48 (0.98)	0.06	4.55 (1.09)	4.67 (0.92)	−0.11
Mastery goals	4.58 (0.94)	4.16 (1.06)	0.42***	4.60 (0.97)	4.39 (0.98)	0.21*
PAp goals	2.72 (1.29)	2.64 (1.18)	0.06	2.63 (1.26)	2.92 (1.30)	−0.22*
PAv goals	2.95 (1.21)	2.85 (1.09)	0.09	2.96 (1.28)	2.88 (1.15)	0.07
Perseverance	4.25 (1.00)	3.81 (0.99)	0.44***	4.29 (1.07)	4.01 (1.02)	0.27**
Self-handicapping	2.01 (0.88)	2.13 (0.89)	−0.13	2.08 (1.02)	2.17 (0.96)	−0.09
Achievement	5.49 (1.84)	4.79 (1.77)	0.39***	4.92 (1.98)	5.32 (2.13)	−0.19*

Note. PAp = performance-approach, PAv = performance-avoidance. Positive Cohen's d values indicate higher scores for girls. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 2.2 Intercorrelations between observed variables in English and maths

Variable	1	2	3	4	5	6	7	8
1. Growth mindset		.73	.43	−.14	−.23	.46	−.44	.21
2. Positive effort beliefs	.75		.46	−.12	−.33	.51	−.61	.23
3. Mastery goals	.47	.50		.19	.10	.76	−.33	.10
4. PAp goals	−.07a	−.16	.18		.78	.13	.34	.02a
5. PAv goals	−.23	−.34	.04a	.74		.04a	.42	−.01a
6. Perseverance	.39	.48	.72	.11	−.03a		−.36	.19
7. Self-handicapping	−.37	−.57	−.26	.33	.41	−.32		−.28
8. Achievement	.14	.18	.02a	−.09	−.07a	.12	−.25	

Note. Values below diagonal correspond to variables in English; values above diagonal correspond to variables in maths.
a Nonsignificant correlation, $p > .05$.

Profiles of Mindset-Based Meaning Systems

Fit indices for LPA solutions with two to six profiles in English and maths are reported in Table 2.3. The AIC, CAIC, BIC, and SABIC values continued to decrease with the addition of profiles, and BLRT remained significant for all the solutions. The values of the information criteria are also graphically presented as elbow plots (see Figures A1 and A2 in the Appendix at the end of this chapter). These plots suggest that the improvement in fit

flattened around four profiles in English, but the pattern was more ambiguous in maths and both three and four profiles seemed plausible. Careful examination of the four-profile solutions in conjunction with the three- and five-profile solutions suggested that adding a fourth profile resulted in a theoretically interpretable and qualitatively distinct profile in both subjects, whereas the five-profile solution split an existing profile into two identical profiles. Thus, based on fit indices and theoretical significance of the profiles, the four-profile solution was retained in both subjects, with a reasonably high level of classification accuracy (entropy = .85 for both English and maths).

Table 2.3 Fit indices for latent profile analyses

Profile	LL	#fp	AIC	CAIC	BIC	SABIC	*p*BLRT	Entropy
English								
2	−4615.39	22	9274.78	9390.99	9368.99	9299.15	<.001	.84
3	−4450.98	30	8961.96	9120.43	9090.43	8995.20	<.001	.83
4	**−4308.28**	**38**	**8692.57**	**8893.29**	**8855.29**	**8734.67**	**<.001**	**.85**
5	−4231.70	46	8555.40	8798.38	8752.38	8606.36	<.001	.87
6	−4168.99	54	8445.98	8731.22	8677.22	8505.80	<.001	.85
Maths								
2	−4697.17	22	9438.35	9554.56	9532.56	9462.72	<.001	.80
3	−4520.55	30	9101.10	9259.57	9229.57	9134.34	<.001	.84
4	**−4420.22**	**38**	**8916.44**	**9117.16**	**9079.16**	**8958.54**	**<.001**	**.85**
5	−4352.65	46	8797.29	9040.27	8994.27	8848.26	<.001	.88
6	−4295.49	54	8698.98	8984.22	8930.22	8758.81	<.001	.88

Note. Values in bold indicate the selected model. LL = loglikelihood; #fp = number of free parameters; AIC = Akaike information criteria; CAIC = consistent AIC; BIC = Bayesian information criteria; SABIC = sample-size adjusted BIC; *p*BLRT = *p*-value for bootstrapped likelihood ratio test.

The same four profiles consistently emerged across the two subjects: (1) *Growth-Focused*, (2) *Ability-Focused*, (3) *Growth-Competitive*, and (4) *Disengaged*. These profiles in English and maths are illustrated in Figure 2.1 and Figure 2.2, while the profile-specific means on each indicator are reported in Table 2.4 and Table 2.5. In line with *Hypothesis 1*, I identified two profiles illustrating the between-mindset differences documented in variable-centred research. In both subjects, students in the *Growth-Focused* profile (Profile 1) believed that ability can be improved through hard work, prioritised mastery goals over performance goals, reported high levels of perseverance, and refrained from self-handicapping. In contrast, students in the *Ability-Focused* profile (Profile 2) showed the exact opposite pattern of motivation. They held a fixed mindset, viewed effort to develop ability as futile, and gave up easily when facing challenges; meanwhile, they adopted goals and behaviours concerned with proving and protecting their self-worth. Together, Profiles 1 and 2 were the most common profiles in both subjects, comprising approximately two thirds of the students (62% in English and 69% in maths).
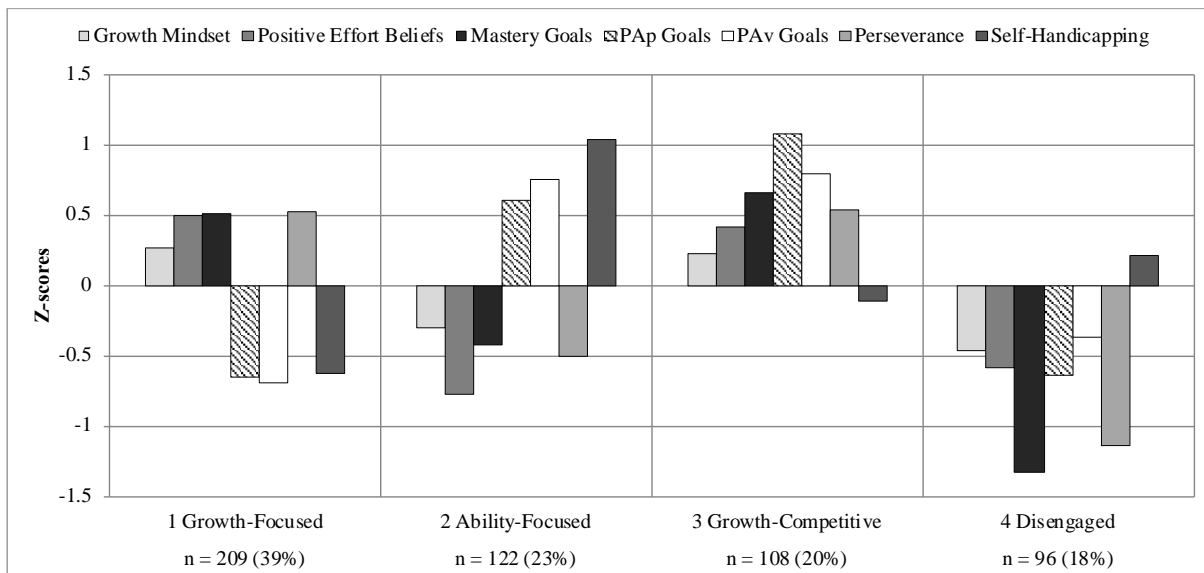
Figure 2.1 Final profile solution in English
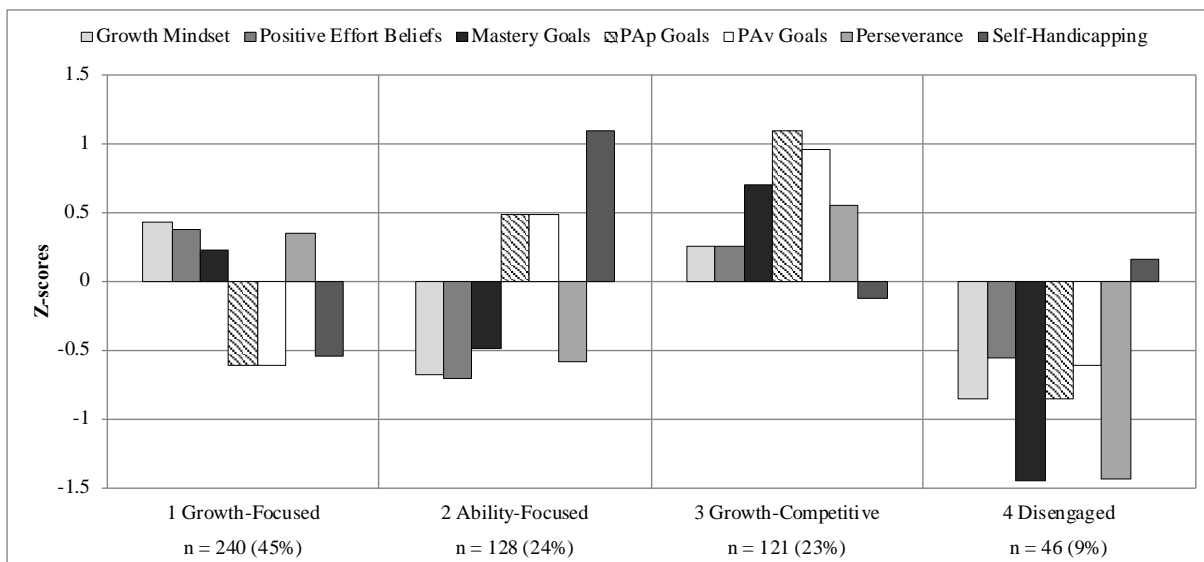
Figure 2.2 Final profile solution in maths

Table 2.4 Equality tests of motivational and outcome variables across latent profiles in English

Variable	Growth-Focused	Ability-Focused	Growth-Competitive	Disengaged
Profile indicator				
Growth mindset	0.26a	−0.30b	0.23a	−0.47b
Positive effort beliefs	0.49a	−0.78b	0.41a	−0.58b
Mastery goals	0.50a	−0.42b	0.66a	−1.33c
PAp goals	−0.65b	0.61a	1.08a	−0.64b
PAv goals	−0.70c	0.75a	0.80a	−0.38b
Perseverance	0.53a	−0.50b	0.53a	−1.14c
Self-handicapping	−0.63d	1.04a	−0.11c	0.21b
Outcome				
English achievement	−0.02ab	−0.25c	0.04a	−0.20bc

Note. Values are z-standardized. Values with different subscripts in the same row are significantly different at $p < .05$. Analyses predicting achievement outcome from latent profiles controlled for gender, ethnicity, language background, free school meal status, and prior achievement.

Table 2.5 Equality tests of motivational and outcome variables across latent profiles in maths

Variable	Growth-Focused	Ability-Focused	Growth-Competitive	Disengaged
Profile indicator				
Growth mindset	0.42a	−0.68b	0.26a	−0.86b
Positive effort beliefs	0.37a	−0.71b	0.25a	−0.56b
Mastery goals	0.22b	−0.49c	0.70a	−1.45d
PAp goals	−0.62c	0.48b	1.09a	−0.86c
PAv goals	−0.62c	0.49b	0.96a	−0.61c
Perseverance	0.35a	−0.58b	0.55a	−1.44c
Self-handicapping	−0.55c	1.09a	−0.13b	0.16b
Outcome				
Maths achievement	0.10b	−0.16c	0.28a	0.00bc

Note. Values are z-standardized. Values with different subscripts in the same row are significantly different at $p < .05$. Analyses predicting achievement outcome from latent profiles controlled for gender, ethnicity, language background, free school meal status, and prior achievement.

The other two profiles, however, displayed alternative patterns of mindset-based meaning systems. Students in the *Growth-Competitive* profile (Profile 3) were similar to the *Growth-Focused* students in terms of reporting a growth mindset, positive effort beliefs, and high perseverance. Yet, *Growth-Competitive* students could be distinguished from all other groups by their joint pursuit of mastery and performance goals. In English, *Growth-Competitive* students were as mastery-oriented as the *Growth-Focused* students, and were equally performance-oriented as the *Ability-Focused* students. In maths, *Growth-Competitive* students were even more mastery-oriented than the *Growth-Focused* students and significantly more performance-oriented than the *Ability-Focused* students. This elevated level of performance goal pursuit, however, was accompanied by a moderate level of self-handicapping. Importantly, the *Growth-Competitive* profile was not a group of students who simply agreed with every statement, as some scales were negatively worded and reverse scored. This profile was the third largest group in the study, comprising about one fifth of the students (20% in English and 23% in maths).

Finally, I consistently observed a small group of students who were similar to the *Ability-Focused* students in terms of holding a fixed mindset and negative effort beliefs, but were further characterised by very low scores on other dimensions of motivation (except for self-handicapping). Notably, this profile reported the lowest level of mastery goals and perseverance. Due to their lack of motives to engage and lack of willingness to persist on academic tasks, I labelled this the *Disengaged* profile (Profile 4). The size of this profile was larger in English (18%) than in maths (9%). This was somewhat surprising and, as will be explained, was a result of boys moving into or out of the *Disengaged* profile across subjects.

Students' profile memberships in English and maths are cross tabulated in Table 2.6. There was some evidence supporting the domain specificity of students' motivational

frameworks. Only 64% of students remained in the same profile across the two subjects. Students in the *Growth-Focused* profile, unencumbered by concerns about self-image (i.e., low performance goals and low self-handicapping), largely maintained their growth orientation across subjects, whereas membership of other profiles seemed to be more subject-dependent.

In sum, my findings not only supported the between-mindset differences theorised by Dweck, but also revealed nuanced within-mindset differences in students' motivational frameworks. Contrary to popular assumptions, some fixed mindset students reported only low levels of performance goals (*Disengaged*), whereas some growth mindset students did not shy away from pursuing performance goals (*Growth-Competitive*).

Table 2.6 Consistency of profile membership across subjects

	English Profile 1	English Profile 2	English Profile 3	English Profile 4	Total	% remain
Maths Profile 1	**178**	9	13	40	240	74
Maths Profile 2	6	**74**	27	21	128	58
Maths Profile 3	16	30	**66**	9	121	55
Maths Profile 4	9	9	2	**26**	46	57
Total	209	122	108	96		
% remain	85	61	61	27		

Note. Profile 1 = Growth-Focused; Profile 2 = Ability-Focused; Profile 3 = Growth-Competitive; Profile 4 = Disengaged. Overall consistency = 64%.

Outcomes and Predictors of Mindset-Based Meaning Systems

The next aim was to investigate differences in academic achievement across the four profiles while controlling for prior achievement, gender, ethnicity, language background, and FSM status. Profile-specific means for English and maths achievement are shown in Table 2.4 and Table 2.5. Regarding English achievement, an omnibus test for an overall difference across the profiles was significant, χ^2 (3) = 8.68, p = .034, suggesting that profile membership was associated with students' subsequent exam performance. Pairwise comparisons showed that *Growth-Competitive* and *Growth-Focused* profiles obtained the highest scores in English and did not differ from one another. The *Growth-Focused* profile also scored higher than the *Ability-Focused* profile, and showed a trend towards better performance than the *Disengaged* profile (p = .052). The *Ability-Focused* and *Disengaged* profiles scored the lowest and did not differ from each other.

Regarding maths achievement, an omnibus test for an overall difference across the profiles was also significant, χ^2 (3) = 24.75, p < .001. The *Growth-Competitive* profile scored the highest in maths, followed by the *Growth-Focused* profile. The Ability-Focused profile

again scored the lowest. The Disengaged profile fell in between the Growth-Focused and Ability-Focused profiles but these differences did not reach statistical significance.

Overall, the results indicated that mindset-based meaning systems influenced students' academic performance beyond the effects of prior achievement, gender, ethnicity, language background, and socioeconomic status. Consistent with *Hypothesis 2*, the two profiles with a growth mindset consistently performed better than the two profiles with a fixed mindset (between-mindset differences). The findings further showed that in maths, the *Growth-Competitive* profile outperformed the *Growth-Focused* profile, and the *Disengaged* profile appeared to be less detrimental than the *Ability-Focused* profile (within-mindset differences).

Finally, I examined whether gender was a significant predictor of students' profile membership. Table 2.7 and Table 2.8 show the effect of gender on a student's likelihood of belonging to a given profile in English and maths, while holding all other socio-demographic and achievement covariates constant. Gender was dummy coded and boys served as the reference category. A significant positive coefficient plus an odds ratio (*OR*) > 1 suggested that, compared to boys, girls had an increased likelihood of belonging to the target profile (vs. the comparison profile). In line with *Hypothesis 3*, girls were more commonly found in growth-oriented profiles than boys. In English and maths, girls were more likely than boys to be found in the *Growth-Focused* profile (Profile 1), relative to the *Ability-Focused* and *Disengaged* profiles (Profiles 2 & 4), *OR*s = 1.78 to 2.85. In other words, across both subjects, boys were more likely than girls to be in the *Ability-Focused* and *Disengaged* profiles relative to the *Growth-Focused* profile. Furthermore, in English only, girls were also more likely than boys to be in the *Growth-Competitive* profile (Profile 3), relative to the Ability-Focused and Disengaged profiles (Profiles 2 & 4), *OR*s = 1.98 to 2.75.

Table 2.9 compares the gender distribution of each profile across the two subjects based on students' most likely profile membership. Chi-square tests indicated that the relationship between gender and profile membership was significant in English, χ^2 (3) = 19.75, $p < .001$, and marginally significant in maths, χ^2 (3) = 6.73, $p = .08$. The proportion of girls in each profile was largely consistent across subjects, with approximately 70% of them belonging to the *Growth-Focused* and *Growth-Competitive* profiles. In contrast, the percentage of boys in each profile varied more as a function of the subject. The proportion of boys in the *Disengaged* profile increased from 10% in maths to 24% in English, whereas the proportion of boys in the two growth-oriented profiles dropped from 64% in maths to 49% in English.

Although not the focus of the present study, interesting main effects were also observed for other covariates. For instance, students from Asian backgrounds were more likely to be in the *Growth-Competitive* profile (Profile 3) relative to all other profiles, *OR*s = 3.41 to 8.20. Students with higher prior achievement were more commonly found in the *Growth-Focused* (Profile 1) and *Growth-Competitive* profiles (Profile 3) relative to the *Ability-Focused* profile (Profile 2), *OR*s = 1.32 to 2.00. In maths only, students who received free school meals had an increased likelihood of being in the *Ability-Focused* and *Disengaged* profiles (Profiles 2 and 4), relative to the *Growth-Focused* profile (Profile 1), *OR*s = 1.32 to 1.49.

Table 2.7 Multinomial logistic regresssions for the effects of predictors on profile membership in English

Predictor	Profile 1 vs. 2		Profile 1 vs. 4		Profile 3 vs. 1		Profile 3 vs. 2		Profile 3 vs. 4		Profile 2 vs. 4	
	Coef.	OR	Coef.	OR	Coef.	OR	Coef.	OR	Coef.	OR	Coef.	OR
Female	0.72**	2.06	1.05**	2.85	–0.04	0.96	0.68*	1.98	1.01**	2.75	0.33	1.39
Asian	0.04	1.04	0.88	2.40	1.23**	3.41	1.27**	3.55	2.11**	8.20	0.84	2.31
Mixed race	0.00	1.00	0.23	1.25	0.06	1.06	0.06	1.06	0.28	1.33	0.23	1.25
EAL	0.40	1.49	0.34	1.41	–0.11	0.89	0.29	1.33	0.23	1.26	–0.06	0.94
FSM	–0.61	0.55	–0.17	0.85	0.11	1.11	–0.50	0.61	–0.06	0.94	0.44	1.55
Prior achievement	0.40**	1.49	–0.18	0.84	–0.01	0.99	0.39*	1.48	–0.19	0.83	–0.58**	0.56

Note. The coefficients and ORs reflect the effects of predictors on the likelihood of membership into the first listed profile relative to the second listed profile.

Profile 1 = Growth-Focused; Profile 2 = Ability-Focused; Profile 3 = Growth-Competitive; Profile 4 = Disengaged. EAL = English as an additional language; FSM = free school meal; Coef. = coefficient; OR = odds ratio. The black ethnic group was too small in numbers to be included as a reliable predictor. $*p < .05$. $**p < .01$.

Table 2.8 Multinomial logistic regressions for the effects of predictors on profile membership in maths

Predictor	Profile 1 vs. 2		Profile 1 vs. 4		Profile 3 vs. 1		Profile 3 vs. 2		Profile 3 vs. 4		Profile 2 vs. 4	
	Coef.	OR	Coef.	OR	Coef.	OR	Coef.	OR	Coef.	OR	Coef.	OR
Female	0.58**	1.78	0.68*	1.97	–0.37	0.69	0.21	1.23	0.31	1.36	0.10	1.10
Asian	0.15	1.16	0.64	1.89	1.25**	3.47	1.39**	4.01	1.88**	6.55	0.49	1.63
Mixed race	–0.21	0.81	1.24	3.44	0.45	1.57	0.24	1.27	1.68	5.39	1.44	4.23
EAL	0.31	1.37	0.13	1.14	0.55	1.73	0.86	2.36	0.68	1.97	–0.18	0.84
FSM	–1.32**	0.27	–1.49**	0.23	0.97*	2.65	–0.34	0.71	–0.52	0.60	–0.18	0.84
Prior achievement	0.28**	1.32	0.21	1.24	0.42**	1.52	0.69**	2.00	0.63**	1.87	–0.06	0.94

Note. The coefficients and ORs reflect the effects of predictors on the likelihood of membership into the first listed profile relative to the second listed profile.

Profile 1 = Growth-Focused; Profile 2 = Ability-Focused; Profile 3 = Growth-Competitive; Profile 4 = Disengaged. EAL = English as an additional language; FSM = free school meal; Coef. = coefficient; OR = odds ratio. The black ethnic group was too small in numbers to be included as a reliable predictor. $*p < .05$. $**p < .01$.

Table 2.9 Gender distribution across the latent profiles in English and maths

Profile	% Girls		% Boys	
	English	Maths	English	Maths
Growth-Focused	45	50	32	39
Ability-Focused	20	22	27	27
Growth-Competitive	23	21	17	25
Disengaged	13	8	24	10

Discussion

Existing mindset research focuses almost exclusively on between-mindset differences in students' outcomes. Numerous studies have shown that, on average, a growth mindset orients students towards positive effort beliefs, mastery goals, and mastery-oriented behaviours, whereas a fixed mindset predisposes students towards negative effort beliefs, performance goals, and helpless behaviours in challenging situations (Blackwell et al., 2007; Burnette et al., 2013). Nevertheless, this straightforward, one-to-one mapping may not fully capture the complex relationships between mindsets and related motivational constructs, obscuring other possible combinations of these variables within individuals. Consequently, the present study adopted a person-centred approach to investigate how mindsets, effort beliefs, achievement goals, and behaviour naturally cohere as a motivational system. The same four mindset-related profiles emerged across two subjects, with predictable relations to students' background characteristics and academic performance. In this section, I discuss the complex relations between mindsets, goals, and achievement, as well as the differences in profile membership as a function of students' background characteristics.

Mindsets, Meaning Systems, and Achievement

The meaning system framework proposed by Dweck and colleagues (Hong et al., 1999; Molden & Dweck, 2000) addresses the complexity of motivation by considering how mindsets and the corresponding effort beliefs, goals, and behaviour function together as a coherent motivational framework. Although the interconnection among this network of factors has been supported by path analysis, I contend that a person-centred approach aligns more closely with the notion that mindsets, effort beliefs, goals, and behaviour work together as a system, and can provide compelling evidence for this meaning system hypothesis. Consistent with prior research on between-mindset differences in motivation, I identified two prevalent subgroups of students in both subjects, labelled as *Growth-Focused* and *Ability-Focused*, that were characterized by distinct mindsets and opposite patterns of motivation. This finding conceptually replicated past variable-centred research, confirming that fixed and growth mindsets predispose the majority of students to interpret effort differently, to prioritise either performance or mastery goals, and to behave in either a helpless or mastery-oriented

manner. Furthermore, I identified two additional ways that mindsets and associated factors linked together, which have not been acknowledged in past research. Some growth mindset students strived for both mastery and performance goals in achievement settings (*Growth-Competitive*), whereas some fixed mindset students showed only low endorsement of performance goals (*Disengaged*). Across the four profiles, students' mindsets co-varied with effort beliefs, perseverance, and self-handicapping, but there was an interesting uncoupling between mindsets and performance goals such that any combination of these variables was possible. This finding might account for the modest correlations between mindsets and performance goals, especially the approach form, observed in the current and previous studies (for meta-analyses, see Burnette et al., 2013; Payne, Youngcourt, & Beaubien, 2007).

Since growth mindset and performance goals are often viewed as incompatible with each other, the consistent emergence of a *Growth-Competitive* profile raises the question of how students combine these factors into a coherent motivational framework. Although performance goals are traditionally defined in terms of a focus on demonstrating one's ability, people have multiple ways of conceptualising ability (Dweck & Leggett, 1988; Nicholls, 1984). When students view ability as fixed and inversely related to effort, performance goals involve putting their global and permanent ability on display, and failure or mere exertion of effort can call into question their enduring quality and thus become threatening. Indeed, *Ability-Focused* students reported low perseverance and high self-handicapping, suggesting these fixed mindset students were willing to forgo effort to avoid the implications of low ability. In contrast, when students view ability as malleable and positively related to effort, performance goals involve demonstrating their current level of ability on the task—a quality that they have strived to develop and can be improved further. Since effort is what enables them to reach their current ability, *Growth-Competitive* students showed sustained effort and perseverance when pursuing performance goals. Within a meaning system where only current, improvable ability is at stake in evaluative situations, failure to achieve performance goals does not have the same dire consequence and may even provide valuable information about one's current skill level on academic tasks. Overall, students' mindsets might systematically alter how performance goals are experienced and regulated, and individual differences in goal meaning might partly contribute to the mixed effects of performance-approach goals in the literature (Molden & Dweck, 2000; Stone, 1999).

In addition, I identified a group of fixed mindset students who lacked any achievement goal. Compared to other profiles, this group of students displayed the lowest levels of mastery goals and perseverance in the present study. This is consistent with past research linking fixed mindset to work avoidance goals among adolescents (King &

McInerney, 2014). Moreover, a recent study found that students with moderate/low goal profiles also reported lower self-efficacy (Linnenbrink-Garcia et al., 2018). Collectively, these findings indicate that the perception of one's ability as fixed and lacking may contribute to low goal pursuit.

The findings also provided insights into the underlying mindset of different goal profiles. The four profiles identified in this study map onto the commonly found goal profiles in previous research (Niemivirta et al., 2019; Wormington & Linnenbrink-Garcia, 2017). The *Growth-Focused* and *Ability-Focused* profiles indicate that a mastery goal profile may be rooted in a growth mindset, whereas a performance goal profile may stem from a fixed mindset. Mirroring past research in sport psychology (Chian & Wang, 2008; Wang et al., 2002), the Disengaged profile indicates that students displaying low all goals may hold a fixed mindset. Most important, the results clarify the type of mindset held by those who tend to pursue multiple goals. Profiles with a fixed mindset consistently failed to facilitate mastery goal pursuit (*Ability-Focused* and *Disengaged*), whereas a growth mindset posed no problem for adopting mastery and performance goals at once (*Growth-Competitive*). The findings thus support the proposal that growth mindset students may be more able to coordinate performance and mastery goals simultaneously (Molden & Dweck, 2000; Stone, 1999).

Of additional importance was the finding that profiles with dominant mastery goals and multiple goals were both underpinned by a growth mindset. This finding informs the mastery versus multiple goals debate within the achievement goal literature. Although mastery goal and multiple goal pursuits are often positioned as distinct motivational pathways to learning, my results suggest that these goal patterns may be more similar than different: they represent variations in goal deployment among those who already hold a growth mindset. Instead of following distinct learning trajectories, students with a mastery goal or multiple goal orientation may be travelling in two lanes on the same growth-oriented path.

Finally, mindset-based meaning systems predicted students' performance on high-stakes exams beyond the effects of prior achievement and background characteristics. Consistent with the idea that mindsets are core beliefs in the meaning system, the two profiles with a growth mindset consistently performed better than the two profiles with a fixed mindset. Although recent meta-analyses revealed only a modest correlation between mindsets and academic achievement (Costa & Faria, 2018; Sisk et al., 2018), this might be a conservative estimate because my results showed that mindsets activated a network of interconnected beliefs, goals, and behaviour, all of which operated interdependently to influence student achievement. As a result, mindset-based meaning system could be viewed

as a gestalt, and the components of this system may interact to produce a joint effect that is greater than the sum of its parts.

In addition to the striking between-mindset differences, there were small but interesting within-mindset differences in student achievement. Among students with a fixed mindset, the *Ability-Focused* profile appeared to be more detrimental than the *Disengaged* profile for maths performance. This might be partly explained by the higher levels of self-handicapping among the Ability-Focused students. Furthermore, this result is consistent with research on self-determination theory showing that the quality of motivation matters (Vansteenkiste et al., 2009). In this study, students who reported a greater amount of poor-quality motivation (*Ability-Focused*) fared no better or even worse than those with low levels of motivation (*Disengaged*). Among students with a growth mindset, the *Growth-Competitive* profile outperformed the *Growth-Focused* profile in maths. This might be explained by *Growth-Competitive* students' higher levels of mastery goals and perseverance in maths, and does not necessarily indicate any added benefit of endorsing performance goals. An alternative possibility is that there might be a mismatch between the study approach favoured by *Growth-Focused* students and the way knowledge is assessed in maths. Studies show that purely mastery-oriented students tend to focus on personally interesting material when studying, sometimes at the expense of other important material (Senko & Miles, 2008). This interest-based studying approach is associated with worse achievement when exams include more closed-ended questions (such as those in maths), but not when exams include more open-ended questions that require short answers or essays (such as those in English; Senko, 2019).

Gender and Other Predictors of Meaning Systems

From a variable-centred perspective, boys and girls showed little difference in the majority of variables examined in this study (see Table 2.1). When differences did emerge, they tended to be small to moderate in magnitude depending on the subject domain. Nonetheless, small differences in multiple dimensions of motivation can add up to differences in overall motivational patterns depending on how these variables are correlated and combined with each other (see Giudice et al., 2012). Butler (2014) proposed a general tendency for boys to prove and protect their abilities and for girls to try and improve their abilities. Supporting and extending this proposal, the current study observed a pattern of *male proving or disengaging* versus *female striving and improving* from a person-centred perspective. Results from multinomial logistic regressions indicated that boys were more likely than girls to belong to *Ability-Focused* and *Disengaged* profiles relative to the Growth-Focused profile, particularly in English. The findings echo person-centred studies guided by

other motivational theories, which show that girls tend to display more adaptive patterns of motivation than boys (Litalien et al., 2017; Schwinger et al., 2016; Vansteenkiste et al., 2009).

Gendered motivational tendencies documented in this study might contribute to boys' relative underachievement in schools. In England, boys make less academic progress during secondary school when compared to girls with the same prior achievement (Burgess et al., 2004). The present study found that, compared to girls, boys were more commonly found in *Ability-Focused* and *Disengaged* subgroups, and membership in these profiles hindered students' subsequent performance even after accounting for a range of covariates, including prior achievement. Therefore, the gendered tendency towards proving versus improving might partially account for the gender achievement gap in favour of girls in school. Nevertheless, girls' orientation towards effortful learning might play a role in their underrepresentation in maths-related domains. In contexts where success is believed to require fixed innate talent, female students may misinterpret their hard work as a sign that they are less able and do not belong (Smith et al., 2013; Stout & Blaney, 2017). Overall, thinking in terms of male proving or disengaging versus female striving and improving may deepen my understanding of the educational gender gaps on both sides.

In addition, the exploratory analyses indicated that compared to White students, those from Asian backgrounds showed a much higher likelihood of belonging to the *Growth-Competitive* profile. This orientation towards growth is consistent with research showing that Asian students are more motivated by self-improvement, and believe more strongly in the malleability of abilities (Heine et al., 2001). Interestingly, students from Asian backgrounds only had an increased likelihood of being in the *Growth-Competitive* profile. In other words, they tended to pursue multiple goals (vs. mastery goals) when operating under a growth mindset. This is in line with the stronger correlation between mastery and performance-approach goals ($r = 0.43$) as well as the more positive link between mastery and performance-avoidance goals ($r = 0.12$) observed in studies using Asian samples (for a meta-analysis, see Hulleman et al., 2010). As argued earlier, growth mindset might alter the meaning and outcome of performance goals. In support of this idea, performance-approach and -avoidance goals have been found to promote deep learning strategies, intrinsic motivation, and better performance in Asian contexts (Hulleman et al., 2010; King, 2016; King et al., 2012), presumably because these goals are motivated by self-improvement. Future research could test these claims by comparing students' reasons for pursuing performance goals in different cultural contexts.

Finally, there appeared to be a reciprocal relationship between mindset-based meaning systems and achievement. Although the four profiles incrementally predicted

students' exam performance beyond prior achievement, students with lower prior achievement were more likely to be in the *Ability-Focused* profile. Several longitudinal studies of primary school children similarly reported that low achievers tended to develop a stronger fixed mindset over time, but a fixed mindset at this age did not predict subsequent performance, indicating a unidirectional relationship (Gonida et al., 2006; Gunderson et al., 2018; Pomerantz & Saxon, 2001). Perhaps younger students begin to form beliefs about the nature of ability by observing their own performance, and persistent low achievement can engender a more pessimistic view about the utility of effort in increasing ability. Once beliefs about ability, effort, and goals unify into a coherent framework, this mindset-based meaning system may start to influence achievement more consistently. Cross-lagged studies that follow students over a longer period may be able to pinpoint when the relation between mindset and achievement becomes reciprocal.

In sum, the present study is among the first to map out students' mindset-based meaning systems using a person-centred approach. Although more research is needed, there is good reason to be optimistic about the generalisability of the profiles. First, they were replicable across two distinct subjects. Second, even the smallest profile consisted of around 10% of the students and was unlikely an artefact of my chosen profile solution. Third, the four profiles matched findings from previous research on mindsets and achievement goals. Fourth, they showed predictable associations with students' background characteristics and subsequent academic achievement. Therefore, the four profiles may capture important individual differences in how people organise their mindset and associated motivational constructs into a coherent motivational framework.

Implications for Practice

The finding suggests that ability performance goals are maladaptive when combined with a fixed mindset, but can lead to beneficial outcomes when pursued alongside mastery goals and a growth mindset. This has practical implications because students' motivation typically decline after the transition to secondary school, in part due to the more performance-focused motivational climate (Scherrer & Preckel, 2019). Although high-stakes testing and social comparison may be more common in secondary schools, nurturing a growth mindset among students has the potential to ameliorate the effects of ability performance goals and help buffer against the decline in motivation and performance (see Blackwell et al., 2007).

Furthermore, it may be possible to nudge students towards a stronger growth mindset by helping them to develop more adaptive goals and behaviours. From a meaning-making perspective, individual components of a coherent motivational system derive meaning from one another, and people may revise their beliefs about ability in keeping with changes in other

motivational factors (Barger & Linnenbrink-Garcia, 2017; Lou & Noels, 2019). For example, students in the *Disengaged* profile reported very low levels of mastery goals and perseverance in addition to a fixed mindset. Teachers can support these students by helping them to set learning goals, persist in schoolwork, and reflect on their progress. Progress towards achieving their goals, in turn, may promote more adaptive motivation and beliefs about growth over time.

The results also have implications for raising boys' achievement in schools. Past research shows that boys are more performance-oriented, and their performance goal pursuit is associated with increased self-handicapping, reduced persistence, and worse academic performance (Kenney-Benson et al., 2006; Yu & McLellan, 2019). My findings suggest that the maladaptive nature of boys' performance goals might be explained, in part, by their tendency to combine performance goals with a fixed mindset. Instead of changing boys' preference for competition and performance goals, instilling a growth mindset might help them move from an *Ability-Focused* profile into a *Growth-Competitive* profile, thereby facilitating their learning and achievement.

Limitations and Future Directions

There are several limitations to this study that could be addressed in the future. First, research could investigate additional predictors and outcomes of mindset-based meaning systems. For example, studies can include measures of anxiety and burnout to understand the relation between students' motivational profiles and wellbeing. Furthermore, the findings pose an intriguing question: what contributes to the within-mindset differences in motivational frameworks? Could fear of failure explain why some fixed mindset students adopt performance goals and self-handicapping, while others fall into a state of indifference? Similarly, could perceived classroom emphasis on grades explain why some growth mindset students pursue performance goals alongside mastery goals, while others remain purely mastery-oriented? Research examining both individual and contextual antecedents has the potential to enrich our understanding of the origins of these profiles.

In addition, although this study measured students' motivation and achievement in temporal sequence, the time lag between the assessment of motivation and achievement was over a year for students in Year 10. Given that there may be changes in students' motivation over time, it is impressive that a snapshot of students' motivational profiles subsequently predicted their academic achievement a year later. The association between motivational profiles and achievement might become even stronger if the assessment of the two were closer in time. That being said, future research should identify profiles across multiple time points and examine how students' meaning systems change over time.

Lastly, although I argue that there is reason to feel optimistic about the generalisability of the profiles, the results are still context- and sample-specific (i.e., 14-16 year olds from four state-funded English secondary schools). Future research should pay attention to the role of age and contexts in influencing the profile shape, size, and the relation between profiles and achievement. For example, the *Growth-Competitive* profile might be more common among younger children since they do not yet clearly distinguish between different types of achievement goals (Bong, 2009). In addition, other combinations of mindset and goals may exist. In settings where performance-approach and -avoidance goals are less strongly correlated, some students may score high on growth mindset, mastery and performance-approach goals, but low on performance-avoidance goals. Overall, whether the four profiles emerge and relate to academic achievement in the same manner across developmental stages and cultures warrant additional investigation.

Conclusion

Over the last few decades, research contrasting the effects of a growth versus a fixed mindset has been extremely generative. Numerous studies have shown that students with distinct mindsets, on average, set different goals and exhibit different patterns of behaviour. However, students with the same mindset are unlikely a homogenous group and differing patterns of motivation may exist. Notably, not all growth mindset students set only mastery goals: some of them embrace performance goals alongside mastery goals. Not all fixed mindset students automatically engage in performance goals and self-defensive behaviours: some of them lack any achievement goal and become disengaged. The findings highlight the promise of a person-centred approach for investigating the dynamic integration of motivational beliefs and goals within individuals. As illustrated, moving beyond theoretical silos and profiling students based on a broader set of variables represents one avenue to unmask the dynamic relationships among major motivational constructs.

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Appendix
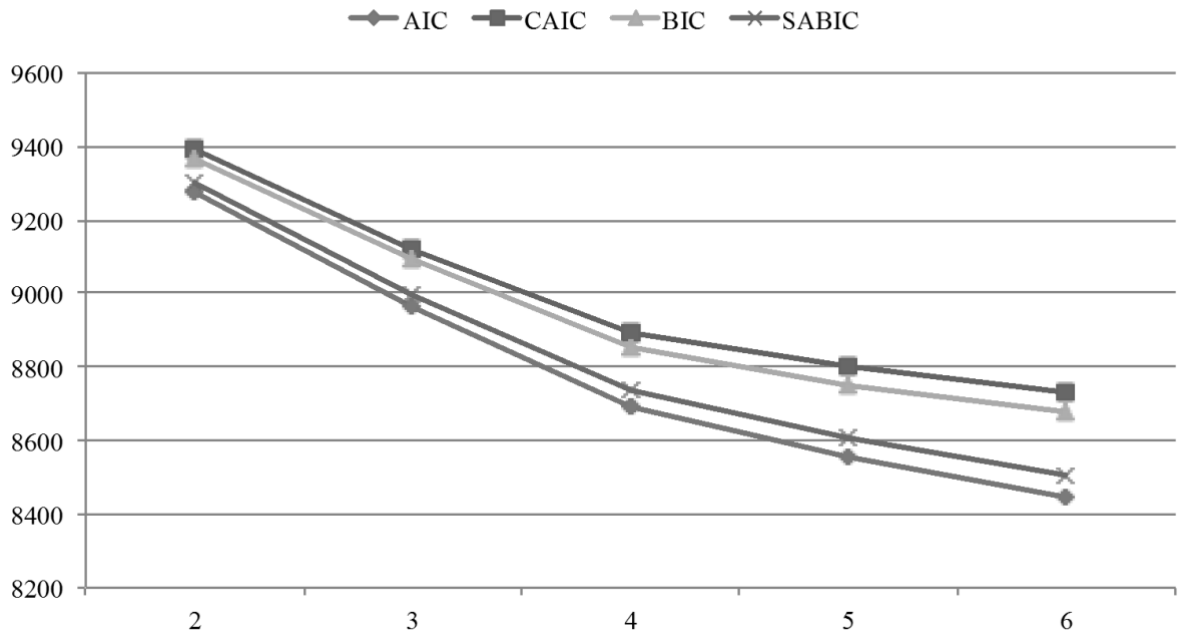
English

Figure A1. Elbow plot for latent profile analyses (English)

Maths
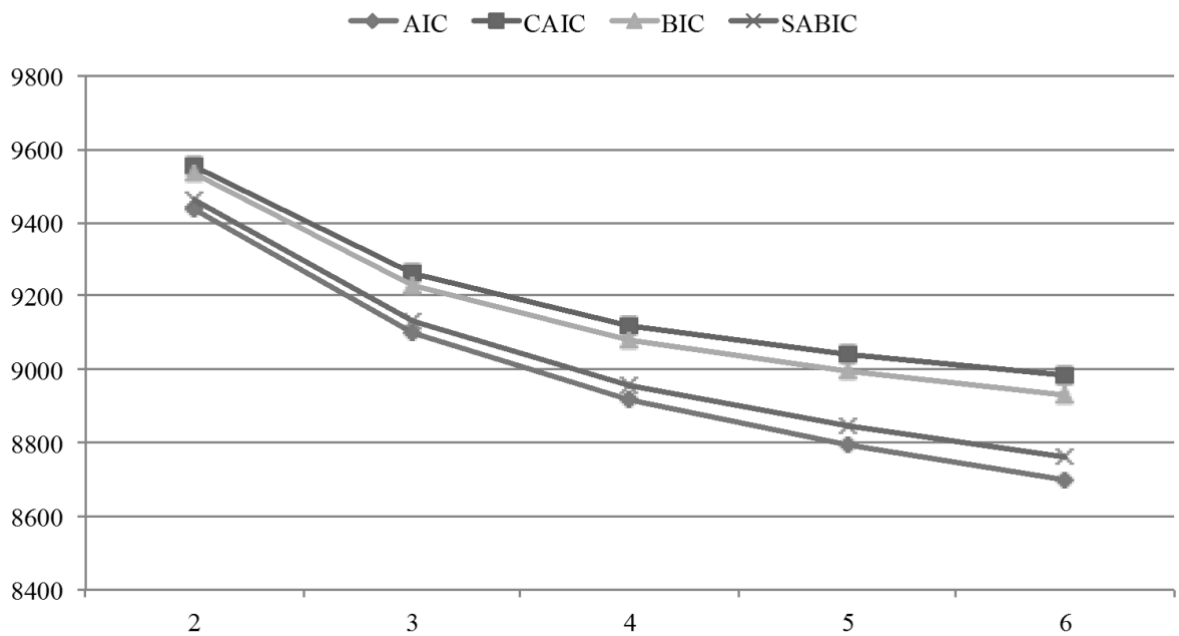
Figure A2. Elbow plot for latent profile analyses (maths)

Chapter 3 Beyond Academic Achievement Goals: The Importance of Social Achievement Goals in Explaining Gender Differences in Self-Handicapping (Study 2)

Abstract

Boys show less adaptive behaviour and engagement than girls at school. Much research has examined gender differences in academic motivation to explain gender differences in school engagement. However, students engage in schools both academically and socially, and gender differences in social motivation may further contribute to the gender gap in academic engagement. In this study, 536 secondary school students in England (ages 13-14) reported their social achievement goals, academic achievement goals, and self-handicapping behaviours. Boys were more likely to adopt social demonstration goals, performance-approach and -avoidance goals, and reported greater behavioural self-handicapping. Moreover, structural equation models showed that social demonstration goals uniquely mediated the relationship between gender and self-handicapping, beyond the effect of performance-avoidance goals. Results highlight the importance of social achievement goals in explaining gender differences in self-handicapping. The findings suggest that educators need to attend to adolescents' social goals in addition to their academic goals in secondary school.

Keywords: gender differences, motivation, social achievement goals, academic achievement goals, self-handicapping

Introduction

There are persistent gender gaps in school achievement, with girls outperforming boys around the world (OECD, 2015; Stoet & Geary, 2015). Not only are girls ahead of boys in language and literary skills, they also achieve better grades in stereotypically masculine subjects, such as maths and science (Voyer & Voyer, 2014). In addition, boys report lower levels of school engagement relative to girls in international studies (Lam et al., 2012). In the UK, the issue of underachieving boys has similarly received considerable attention (Younger, Warrington, & McLellan, 2005). The gender achievement gap is evidenced by boys' and girls' differential performance in the high-stakes General Certificate of Secondary Education (GCSE) examinations taken at the end of secondary school (Strand, 2014).

Prior work attempting to explain the gender gap in engagement or achievement has focused almost exclusively on gender differences in students' academic motivation (e.g., Kenney-Benson et al., 2006). For instance, in a study of adolescents from the UK, boys placed lower values on learning and schoolwork, and were less interested in developing their academic competence. This pattern of motivation, in turn, predicted gender differences in maladaptive classroom behaviours (Bugler et al., 2015). Yet, students' academic and social lives are closely intertwined in school (e.g., Liem, 2016; Shim & Finch, 2014). Connecting with others and feeling a sense of belonging are essential for motivation (Baumeister & Leary, 1995; Deci & Ryan, 2000), and the desire to fit in and gain peer acceptance can have powerful influences on adolescent behaviour (Wentzel, 2017). Although a small but growing number of studies have examined how academic and social motives jointly affect students' outcomes (e.g., Patrick et al., 2007; Ryan & Shin, 2011), gender is rarely the focus of these studies or is used only as a statistical control variable (for an exception, see Ben-Eliyahu et al., 2017). Are there any differences between boys and girls in their social motivation at school? If so, how do gender differences in academic and social motivation operate synergistically to influence students' academic engagement?

The present study addresses these issues by identifying differences in adolescent boys' and girls' academic and social motivation, as well as examining their joint role in explaining gender differences in one maladaptive aspect of academic engagement, namely self-handicapping. Specifically, I adopt an achievement goal approach to examine motivation (Dweck, 1986; Nicholls, 1984) as it has been applied to both academic and social domains and thus provides a unified framework to understand academic and social goal pursuits. In addition, I focus on self-handicapping as an index of (maladaptive) behavioural engagement because it has been prominently featured in qualitative research as an explanation for boys' underperformance (Jackson, 2002, 2003), and has been shown to have long-term detrimental

effects on student achievement (Schwinger et al., 2014). In the following sections, I review the literature on academic achievement goals, social achievement goals, and self-handicapping as well as consider the interplay among these constructs before outlining the present study.

Academic Achievement Goals

Academic achievement goals are defined as the underlying reasons or purposes for engaging in a learning task (Elliot, 2005). Initially, two types of achievement goals were identified: mastery goals, where students focus on developing their academic competence, and performance goals, where students focus on demonstrating their competence to others (Dweck, 1986; Nicholls, 1984). Later, Elliot and Harackiewicz (1996) introduced the approach-avoidance distinction to performance goals, resulting in a trichotomous model of achievement goals comprised of mastery, performance-approach, and performance-avoidance goals. Students with performance-approach goals aim to demonstrate high academic competence to others, and those with performance-avoidance goals aim to avoid looking incompetent relative to others. Although more complex achievement goal frameworks have been proposed and investigated in recent years (see Vansteenkiste et al., 2014), I utilise the trichotomous framework in this study to stay consistent with the research on social achievement goals.

The influence of academic achievement goals on students' motivation and engagement has been widely documented. The pursuit of mastery goals has been linked to a host of positive outcomes, including increased enjoyment, interest, engagement and well-being at school (Huang, 2011; Wormington & Linnenbrink-Garcia, 2017). In contrast, pursuing performance-avoidance goals has been consistently associated with maladaptive outcomes, such as heightened test anxiety (Huang, 2011), increased self-handicapping (Urdan, 2004), reduced feedback seeking (Payne et al., 2007), and deteriorating performance (Hulleman et al., 2010). The outcomes of adopting performance-approach goals have been mixed and partly depend on how these goals are defined. Performance-approach goals are generally maladaptive when they emphasize competence demonstration (i.e., ability performance goals), but can lead to positive outcomes when they focus on outperforming others (i.e., normative performance goals; Senko & Dawson, 2017). Given the focus of this study on motivational processes that undermine boys' learning, performance goals are conceptualised as ability performance goals rather than normative performance goals.

Despite the proliferation of research on achievement goals, only a small subset of studies have reported gender differences (Butler & Hasenfratz, 2017; Hyde & Durik, 2005), and few have examined how these differences in achievement goals may translate into gender

differences in engagement and achievement. Previous studies tend to show that adolescent girls are more mastery-oriented than boys (Bugler et al., 2015; Kenney-Benson et al., 2006; King, 2016a; Nie & Liem, 2013), though some studies found no such gender differences in maths (Friedel et al., 2007; Preckel et al., 2008). There is also a trend for adolescent boys to report higher levels of performance goal pursuit (Butler, 2006; Friedel et al., 2007; Preckel et al., 2008), although several studies observed no differences at all (King, 2016a; Nie & Liem, 2013). Given the somewhat mixed results and the importance of task domain in shaping motivation, researchers should continue to investigate gender differences in achievement goals across a variety of domains.

As mentioned, mastery and performance goals have been linked to different outcomes. Since boys tend to prioritise performance over mastery goals, gender differences in academic goal pursuit may partially underlie the gender differences in engagement and achievement. Indeed, Kenney-Benson et al. (2006) found that adolescent boys reported higher levels of performance goals, as well as lower levels of self-regulated learning and persistence. These differences in learning behaviours, in turn, predicted boys' lower grades over a two-year period. However, as with much of the literature on gender gaps in education, this study only considered differences in academic motivation to explain the gender differences in engagement and performance.

Social Achievement Goals

Social achievement goals reflect the *reasons* why people engage in interpersonal behaviours and represent broad orientations towards achieving social competence (Ryan & Shim, 2006, 2008). This is different from a focus on the specific social *outcomes* that people wish to achieve, such as affiliation, intimacy, or approval (Patrick et al., 2002). Analogous to academic achievement goals, three types of social achievement goals have been identified (Ryan & Shim, 2008): A social development goal involves developing positive peer relationships and improving social competence; a social demonstration-approach goal concerns demonstrating social competence and gaining favourable judgments from others (e.g., being seen as cool or popular); a social demonstration-avoidance goal involves hiding the lack of social competence and avoiding negative judgments from others (e.g., not being seen as socially awkward, or as a 'nerd' or 'geek').

Social achievement goals have been linked to a range of social outcomes in school settings. For example, social development goals are related to increased prosocial behaviours, a greater sense of belonging, social satisfaction, and well-being (Mouratidis & Sideridis, 2009; Ryan & Shim, 2006; Shim et al., 2013). In contrast, social demonstration-avoidance goals are primarily associated with maladaptive consequences, including anxious or avoidant

behaviour, loneliness, as well as reduced social efficacy and well-being (Mouratidis & Sideridis, 2009; Ryan & Shim, 2006, 2008; Shim et al., 2013). Social demonstration-approach goals have been linked to increased popularity but also increased aggressive behaviour and social worry (Ryan & Shim, 2008; Shim et al., 2013).

Of particular interest to the present study is that students' social achievement goals can exert cross-domain influences on their academic outcomes. A focus on building close relationships with peers has been associated with increased levels of effort, engagement, interest, and enjoyment in the classroom (Kiefer & Ryan, 2008; Shim et al., 2013). A concern with demonstrating social competence and gaining high social status has been associated with lower help-seeking tendencies (Ryan & Shin, 2011), lower academic effort, persistence and self-regulated learning (Liem, 2016), as well as increased performance goal pursuit (Anderman & Anderman, 1999). Similarly, a social demonstration-avoidance goal has been linked to primarily maladaptive academic outcomes, including lower classroom engagement (Ben-Eliyahu et al., 2017).

Studies have also reported gender differences regarding students' social goals. From middle childhood to adolescence, girls are more concerned with forming and maintaining positive peer relationships (e.g., Anderman & Anderman, 1999; Kiefer et al., 2013; Kiefer & Ryan, 2008). Boys, on the contrary, tend to focus more on gaining and maintaining social status in their peer groups (e.g., Anderman & Anderman, 1999; Ben-Eliyahu et al., 2017; Kiefer et al., 2013; Kiefer & Ryan, 2008; LaFontana & Cillessen, 2010). Given that social development and social demonstration goals show differential relations to school engagement and learning strategies, girls' stronger social development goals may be considered more adaptive. In contrast, boys' greater tendency to pursue social demonstration goals, coupled with their stronger orientation towards ability performance goals, may further exacerbate their academic engagement and achievement. Consequently, more research is needed to understand how social goals may operate in tandem with academic goals to facilitate or hinder boys' and girls' academic outcomes.

Academic Self-Handicapping

Academic self-handicapping involves intentionally creating obstacles prior to an achievement activity to provide an excuse for potential poor performance (Urdan & Midgley, 2001). This shifts the attributions for task failure away from low ability, thereby protecting a sense of self-worth and perceptions of competence (Covington & Omelich, 1979). Examples of academic self-handicapping include procrastinating, staying up late before an important task, as well as not studying for an exam or being underprepared for it. Additionally, the literature draws a distinction between behavioural and claimed self-handicapping, the latter of

which involves merely claiming an obstacle but not engaging in intentional acts that reduce the likelihood of success (Urdan & Midgley, 2001). In this paper I focus on behavioural forms of self-handicapping for two reasons. Firstly, they reflect maladaptive engagement at school and are likely to undermine academic performance directly. Indeed, a recent meta-analysis (Schwinger et al., 2014) found a negative relationship between self-handicapping and academic achievement ($r = -.23$). Secondly, there are rather robust yet puzzling gender differences: males are more likely to engage in behavioural but not claimed self-handicapping (Dietrich, 1995; McCrea, Hirt, & Milner, 2008).

Gender differences in behavioural self-handicapping have been difficult to explain. One mechanism that has received empirical support points to the differential valuing of effort between genders. In a series of studies, Hirt, McCrea and colleagues found that young women ascribed higher personal values to effort and were more critical of people who self-handicapped. This, in turn, led them to refrain from self-handicapping(Hirt et al., 2003; McCrea, Hirt, Hendrix, et al., 2008; McCrea, Hirt, & Milner, 2008).

Research has also linked academic achievement goals to self-handicapping and found rather clear and consistent patterns. In the face of potential failure, students who adopt performance-avoidance goals (vs. performance-approach goals) tend to purposely reduce effort to avoid inferences of low ability (i.e., 'I didn't try' as an excuse for failure; Leondari & Gonida, 2007; Midgley & Urdan, 2001; Urdan, 2004). Conversely, highly mastery-oriented students are less likely to engage in self-handicapping (Leondari & Gonida, 2007; Rhodewalt, 1994; Schwinger & Stiensmeier-Pelster, 2011). Interestingly, gender differences in self-handicapping are mirrored by gender differences in academic achievement goals. Therefore, the differential tendencies among boys and girls to pursue performance or mastery goals may partially explain the gender differences in self-handicapping. However, this mechanism has not yet been directly tested.

In addition to ability-related concerns, self-handicapping in the form of effort withdrawal may be further driven by students' social motives. Research has shown that academic effort is inversely related to status and popularity during adolescence, and that low effort helps young people to gain peer approval and popularity (Heyder & Kessels, 2017; Juvonen & Murdock, 1995). As a result, students who seek to attain high status or avoid a fall in peer status may be particularly likely to self-handicap or withdraw effort to preserve a 'cool' image. Initially, some researchers theorised that the link between low effort and popularity might be stronger for boys, thereby prompting them to self-handicap more (Jackson, 2002, 2003). However, both observational and experimental studies show that low effort enhanced boys' and girls' perceived popularity to the same degree, suggesting that girls

also need to withhold effort to gain high peer group status (Heyder & Kessels, 2017; Jackson, 2006; Juvonen & Murdock, 1995).

Given that both genders view strategic effort withdrawal as promoting peer approval and popularity, gender differences in self-handicapping may instead be driven by boys' greater concerns for peer status and popularity (i.e., social demonstration goals). Research suggests that boys are preoccupied with social status and peer approval during adolescence (LaFontana & Cillessen, 2010). As a result, gender differences in social achievement goals may further contribute to the gender differences in self-handicapping, especially in the form of effort withdrawal. Overall, a better understanding of the motivational processes underlying gender differences in self-handicapping is needed to pinpoint potential ways to reduce boys' maladaptive engagement at school.

The Present Study

In the present study, I investigate the joint role of academic and social achievement goals in explaining gender differences in self-handicapping. Specifically, this paper seeks to answer the following questions:

1. Are there gender differences in academic achievement goals, social achievement goals, and academic self-handicapping?

2. Can academic and social achievement goals partly explain gender differences in self-handicapping?

As discussed earlier, gender differences in academic motivation are likely to be domain-specific. Yet, existing studies tend to examine motivation with respect to school in general or in one specific domain such as maths. Thus, one contribution of the current study is that it investigates gender differences across two gender-typed subjects (i.e., English and maths) to assess the extent to which the findings are robust or limited to a particular task domain.

Based on prior literature, I expected adolescent boys to show less adaptive patterns of motivation and engagement relative to girls (*Hypothesis 1*). Specifically, boys would report higher levels of performance goals, social demonstration goals, and self-handicapping behaviours. In contrast, girls would be more likely than boys to espouse mastery goals. I also expected the gender differences to be larger in English, as it represents an area where boys are stereotypically expected to perform less well.

Furthermore, I predicted that gender differences in academic and social achievement goals would collectively explain the relationship between gender and self-handicapping (*Hypothesis 2*). As can be seen in Figure 3.1, I pitted these two competing mechanisms against each other in the same model. This enabled me to compare the strength of indirect

pathways, and to test whether each indirect effect was significant after controlling for the other. Thus, it provides a strong test of the proposal. Given the more consistent links between performance-avoidance goals and self-handicapping in past studies, I hypothesised that performance-avoidance goals, rather than performance-approach goals, would mediate the association between gender and self-handicapping. I also predicted that social demonstration goals would independently mediate the relation between gender and self-handicapping, beyond the effect of performance-avoidance goals. However, due to a lack of prior studies linking social achievement goals to academic self-handicapping, I did not have strong hypotheses about which forms of social demonstration goals might relate more strongly to self-handicapping.
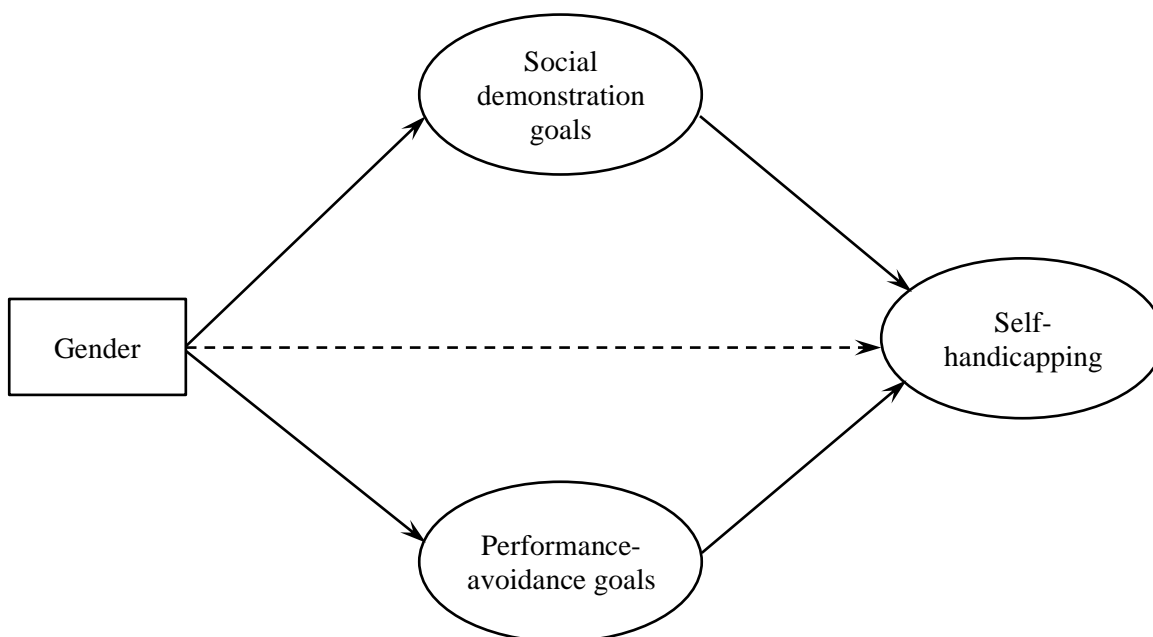
Figure 3.1 Conceptual model depicting the hypothesised relationships among variables

Method

The dataset analysed in the present study is part of a larger mixed-methods study entitled Laddishness and Self-Worth Protection (Jackson, 2008), made publicly available by the UK Data Service (an online repository for publicly-funded research data in the UK). Although the author of the original study has published several papers based on the qualitative interviews, there has been no systematic investigation of the quantitative survey data. Therefore, this paper presents a secondary analysis of the survey data from the project. The institution where the original author was based granted ethical approval for the data collection.

Participants and Procedure

Participants were Year 9 students (13-14 years old) from six secondary schools in the north of England. Of the six schools, four were co-educational, one was single-sex boys, and one was single-sex girls. Participating schools were diverse in terms of social class, ethnicity, and academic attainment. At the time of data collection, school-level statistics indicated that the percentage of students eligible for free school meals (a proxy for low income) in each school ranged from 3 to 51%; the proportion of ethnic minority students ranged from 1 to 86%; the proportion of students reaching the benchmark in national examinations (five or more GCSE passes) at age 16 ranged from 16 to 83%. A detailed breakdown of student characteristics by school can be found in Table 3.1.

Table 3.1 Student characteristics for each school at the time of data collection

School	Type	No. of participants	% Ethnic minority	% Low income	% Passing 5+ GCSEs
1	Co-educational	131	23	19	54
2	Co-educational	89	1	21	28
3	Co-educational	53	31	51	16
4	Co-educational	63	86	42	38
5	Single-sex girls	118	17	9	70
6	Single-sex boys	82	5	3	83

Participants completed a set of three scales in paper-and-pencil form during the school day. Two of the scales explored students' academic goals and self-handicapping behaviours in English and maths. A third scale assessed students' social goals in school. A sample item, along with the rating scale, was first presented to students. Students were told that the purpose of the survey was to better understand their attitudes towards school and schoolwork, that it was not a test, and that their answers would be kept confidential.

For the purposes of this study, I limited the analysis to participants who had completed all three scales. To ensure data quality, the analytic sample excluded 17 participants with more than 20% missing data and 51 participants who used the same response option for more than 10 consecutive items, which were exclusion criteria established a priori. The final sample consisted of 536 participants (285 girls) and was ethnically diverse (75.8% White, 22% Asian, 1.7% mixed race, and 0.6% Black).

Measures

The survey assessed the following: academic and social goal orientations, academic self-handicapping, and demographic information. All main items were rated on a scale that ranged from 1 (*not at all true*) to 5 (*very true*).

Academic achievement goals. Academic goal orientations were assessed domain specifically across maths and English, using a 14-item scale adapted from the Patterns of Adaptive Learning Survey (PALS; Midgley et al., 2000). Mastery goal items focus on developing academic competence (5 items; 'It's important to me that I improve my … skills this year'). Items tapping performance goals focused primarily on the ability validation component. Performance-approach items focus on demonstrating and affirming academic competence to others (5 items; 'One of my goals is to show others that … is easy for me'). Performance-avoidance goal items focus on demonstrating that one does not lack academic competence (4 items; 'One of my goals in … is to avoid looking like I have trouble doing the work').

I sought to verify the three-factor structure using confirmatory factor analyses (CFAs). Model fit was assessed using the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardised root mean-square residual (SRMR). Good model fit was indicated by a CFI value close to .95 or above, a RMSEA value close to .06 or below, and SRMR close to .08 or below (Hu & Bentler, 1999). The three-factor model provided an excellent fit to the data (CFI = .944, RMSEA = .051, SRMR = .047 for maths; CFI = .964, RMSEA = .045, SRMR = .049 for English; see Appendix D for factor loadings). An alternative two-factor model with a mastery goal and a performance goal yielded a worse fit (CFI = .922, RMSEA = .059, SRMR = .052 for maths; CFI = .949, RMSEA = .053, SRMR = .053 for English). In the three-factor model, however, there was considerable overlap between performance-approach and performance-avoidance goals (ϕ = .80 in maths and .86 in English; see also Bong et al., 2013).

Omega hierarchical coefficient (ω_h) was used to estimate the reliability of the scales. Omega hierarchical is highly advantageous because it makes more appropriate assumptions than Cronbach's alpha (McNeish, 2018) while assessing how well the items measure a single latent factor (Revelle & Zinbarg, 2009). Reliability estimates were .84 and .89 for mastery goals in maths and English; .86 and .90 for performance-approach goals in maths and English; .73 and .79 for performance-avoidance goals in maths and English.

Social achievement goals. Social goal orientations were assessed using items constructed by the author of the original study (Jackson, 2008). These items were similar to those used by Ryan and Shim (2006, 2008) and asked about social goals in school. Demonstration-approach goals focused on demonstrating social competence and status (5 items, ω_h = .92; 'It's important to me that other students in my school think I'm cool'). Demonstration-avoidance goals focused on avoiding the demonstration of social

incompetence (3 items, ω_h = .77; 'One of my goals is to keep others from thinking I'm not cool'). There was no measure of social development goals.

To further evaluate the items developed by the original author, I conducted CFAs to compare a two-factor model (approach and avoidance items loading on separate factors) with a one-factor model (approach and avoidance items loading on the same factor). Results showed that the one-factor model fitted the data very well (CFI = .954, RMSEA = .071, SRMR = .034; see Appendix D for factor loadings). Although the two-factor model showed a slight improvement in fit (CFI = .960, RMSEA = .068, SRMR = .031), a closer inspection revealed an extremely high correlation between the two factors (ϕ = .93). This suggests that participants in this study did not distinguish between approach and avoidance forms of social goals. To avoid multicollinearity and interpretation problems, I collapsed all eight items in subsequent analyses to form a general social demonstration goal (ω_h = .92).

Academic self-handicapping. Self-handicapping in maths and English was assessed using the six-item Academic Self-Handicapping Scale from the PALS (Midgley et al., 2000). This scale measures the use of active, behavioural forms of self-handicapping to provide a priori excuses for possible failures. A sample item of the scale is: 'Some students put off doing their … work until the last minute so that if they don't do well they can say that is the reason. How true is this of you?' Omega hierarchical coefficients were .88 and .92 for self-handicapping in maths and English.

Covariates. The present study investigates the extent to which academic and social goals might mediate the relationship between gender and self-handicapping. Thus, it is important to include appropriate covariates to identify the unique variance attributable to gender. Ethnicity was reported by students at the beginning of the survey and was included as a covariate in latent variable models. Furthermore, as can be gleaned from Table 3.1, there was a strong connection between school type (single-sex vs. co-educational) and the school's average level of socio-economic status (SES) and achievement, such that students attending single-sex schools tended to come from more affluent backgrounds and perform better in secondary school. Since the dataset did not contain students' SES and prior achievement at the individual level, I decided to include the type of school that students attended as another covariate. I argue that this approach provides some, albeit imperfect, control over the effects of SES and prior achievement. The effects of ethnicity and school type are also reported along with the central findings. However, the effects of school type should be interpreted with caution, as it is unclear whether these effects were driven by gender composition of peers, school average SES, or school average achievement.

Statistical Analyses

Latent variable modelling was performed in Mplus Version 8.1 (Muthén & Muthén, 1998-2017) using the robust likelihood estimator (MLR). Additionally, missing data was handled with the full information maximum likelihood estimation provided by Mplus. The analysis proceeded in three steps. First, I examined whether the measurement models were equivalent across gender. Based on these results, I then compared gender differences in latent means. Lastly, I tested the hypothesised relationships between gender, academic and social goal orientations, as well as self-handicapping using structural equation modelling (SEM).

Measurement invariance. I sought to establish measurement invariance to ensure that comparisons of group means are valid. Evidence of measurement invariance can be established by fitting a series of multigroup CFA models with increasing levels of cross-group equality constraints (Gregorich, 2006). Configural invariance is examined first and is supported if the factor structure of a measure is the same across groups. The next step is to test for weak (or metric) invariance by constraining factor loadings to be equal across groups. This is followed by strong (or scalar) invariance, which is established by introducing equality constraints on the item intercepts and indicates that response differences across groups are directly related to differences in the latent variables. If a given level of full measurement invariance is untenable, partial invariance may be tested by freeing some of the constraints, and comparisons of means are restricted to those items meeting the invariance criteria. It is important to note that comparisons of group means are meaningful only if strong or partial strong invariance holds (Gregorich, 2006).

To determine invariance, I evaluated whether changes in model fit statistics were within acceptable ranges. According to the cutoff criteria defined by Chen (2007), weak invariance is supported if ΔCFI < .010, ΔRMSEA < .015, and ΔSRMR < .030, and strong invariance is supported if ΔCFI < .010, ΔRMSEA < .015, and ΔSRMR < .010.

Latent mean differences. After establishing measurement invariance, I compared mean differences in latent constructs between genders. Girls were set as the reference group and the latent means for boys were freely estimated to produce the relative differences, correcting for measurement error. Mean differences for multiple latent variables were estimated simultaneously with other parameters, thereby avoiding the problem of inflated Type I error rates associated with conducting multiple comparisons.

Mediational pathways. Prior to testing the main mediation model, I sought to replicate previous findings and confirm the relative importance of performance-avoidance goals (vs. performance-approach goals) in predicting the use of self-handicapping strategies. Given the strong correlations between approach and avoidance forms of academic goals in the

current study and in previous research (Bong et al., 2013; Linnenbrink-Garcia et al., 2012), I conducted commonality analysis in R to gauge the relative contribution of each type of performance goal to self-handicapping. Commonality analysis has advantages over multiple regression because it explicitly addresses the problem of multicollinearity. Specifically, commonality analysis partitions the explained variance in the outcome variable into portions uniquely explained by a given predictor as well as jointly explained by all predictors (Nimon, Lewis, Kane, & Haynes, 2008). As a result, it quantifies the contribution of each predictor and helps to determine the most important predictor in the presence of highly correlated factors.

Next, I estimated a parallel mediator model where both performance-avoidance goals and social demonstration goals were included as potential mediators (see Figure 3.1), and tested the proposal that social demonstration goals would account for gender differences in self-handicapping beyond the effects of performance-avoidance goals. To formally assess the indirect relations between gender and self-handicapping via social and academic goals, I used a bootstrapping procedure with 10,000 bootstrap samples and 95% bias-corrected confidence intervals (CIs). I relied on bootstrap CIs to determine the significance of mediated effects because, unlike p values, bootstrap CIs do not impose the rigid assumption of normality and have been shown to yield greater power to detect indirect effects (Preacher & Hayes, 2008). Significant mediation is indicated by a CI that does not contain zero (Fritz & MacKinnon, 2007).

Results

Preliminary Analyses of Means and Correlations

Table 3.2 presents the means and standard deviations among the observed variables separately for each gender. Mean level differences between boys and girls were observable for performance goals (both approach and avoidance forms), social demonstration goals, and self-handicapping. Thus, I proceeded to test measurement invariance and formally compare the latent means across gender.

Table 3.2 Means and standard deviations for observed variables by gender

	Girls		Boys	
	M	SD	M	SD
English mastery goal	4.00	0.88	3.90	0.89
English performance-approach goal	2.00	0.93	2.48	1.01
English performance-avoidance goal	2.30	0.99	2.52	0.94
English self-handicapping	1.68	0.81	1.92	0.89
Maths mastery goal	3.87	0.87	3.89	0.79
Maths performance-approach goal	2.01	0.88	2.48	1.00
Maths performance-avoidance goal	2.34	0.91	2.61	0.95
Maths self-handicapping	1.79	0.79	2.03	0.90
Social demonstration goal	1.93	0.80	2.33	0.92

Table 3.3 shows the intercorrelations among the observed variables for boys and girls. As is clear from the table, self-handicapping was inversely related to mastery goals, but positively associated with performance and social demonstration goals. Furthermore, the associations between performance and social demonstration goals were only moderate (rs = .28 to .39), suggesting that students' goals in academic and social domains were relatively distinct.

Table 3.3 Intercorrelations among observed variables by gender

	1	2	3	4	5	6	7	8	9
1. English mastery goal		.18	.16	−.31	.71	.19	.17	−.25	−.03a
2. English performance-approach goal	.30		.72	.20	.11	.71	.54	.17	.39
3. English performance-avoidance goal	.25	.70		.21	.09a	.53	.64	.19	.40
4. English self-handicapping	−.30	.12	.20		−.28	.15	.20	.78	.31
5. Maths mastery goal	.62	.21	.23	−.15		.24	.14	−.26	−.09a
6. Maths performance-approach goal	.40	.62	.58	.16	.29		.57	.22	.34
7. Maths performance-avoidance goal	.26	.54	.63	.23	.17	.61		.25	.42
8. Maths self-handicapping	−.21	.12	.20	.80	−.20	.14	.21		.35
9. Social demonstration goal	.00a	.39	.35	.19	−.07a	.37	.28	.20	

Note. Values for girls are above the diagonal and for boys below the diagonal. All correlations are significant at $p < .05$ unless otherwise indicated.
a Nonsignificant correlation, $p > .05$.

Measurement Invariance

Multigroup CFAs were performed for the three questionnaires separately to determine measurement invariance across boys and girls. Fit indices for these models are shown in Table 3.4. For academic goals and self-handicapping in English, the unconstrained model (Model 1a) provided a good fit for the data. A series of increasingly restrictive constraints on the measurement models did not lead to significant decreases in model fit (Models 1b and 1c). In particular, the changes in CFI were small and well below the .010 margin suggested by Chen (2007). Collectively, the results suggested that academic goal orientations and self-handicapping in English were fully invariant across gender at the configural, metric, and scalar levels.

For academic goal orientations and self-handicapping in maths, the unconstrained and loading-invariant models (Models 2a and 2b) exhibited satisfactory fit and the changes in fit indices were negligible (ΔCFI = .001, ΔRMSEA = .001, ΔSRMR = −.003). The model fit was also adequate when item intercepts were held equal across groups (CFI = .939, RMSEA = .041, SRMR = .062), but the drop in CFI (ΔCFI = .012) slightly exceeded the .010 threshold, suggesting that the condition of full scalar invariance was not met. I thus examined modification indices and assessed partial scalar invariance. One mastery goal item ('It's important to me that I improve my maths skills this year') had high modification indices and,

as such, the intercept constraint on this item was freed. The resulting model (Model 2c) had a good fit to the data as well as acceptable changes in fit indices (ΔCFI = .009, ΔRMSEA = –.003, ΔSRMR = –.002), thus passing the test of partial scalar invariance.

Table 3.4 Summary of model fit statistics for measurement invariance across gender

Model	χ^2	df	CFI	RMSEA	SRMR	$\Delta\chi^2$	Δdf	ΔCFI	ΔRMSEA	ΔSRMR
English										
1a Configural	511.50	328	.947	.046	.062					
1b Metric	535.58	344	.944	.046	.067	24.08	16	.003	.000	–.005
1c Full scalar	573.60	360	.938	.047	.069	38.02	16	.006	–.001	–.002
Maths										
2a Configural	454.53	328	.952	.038	.057					
2b Metric	472.76	344	.951	.037	.060	18.23	16	.001	.001	–.003
2c Partial scalar	509.96	359	.942	.040	.062	37.20	15	.009	–.003	–.002
Social										
3a Configural	73.30	38	.971	.059	.033					
3b Metric	86.94	45	.966	.059	.053	13.64	7	.005	.000	–.020
3c Partial scalar	102.53	51	.958	.061	.051	15.59	6	.008	–.002	.002

The invariance of the social goal measure was assessed next. Fit indices for the unconstrained and loading-invariant models (Models 3a and 3b) were excellent and the equality constraints did not lead to a significant worsening in fit (ΔCFI = .005, ΔRMSEA = .000, ΔSRMR = –.020). The model fit was good when equality constraints were imposed on item intercepts (CFI = .952, RMSEA = .065, SRMR = .053), but the change in CFI (ΔCFI = .014) slightly exceed the .010 criterion, indicating that the full form of scalar invariance may not be appropriate. I thus examined modification indices and subsequently relaxed the intercept constraint on one social demonstration-approach item ('One of my goals is to show others that I'm cool'). The resulting model (Model 3c) was a good fit and the changes in fit indices remained in an acceptable range (ΔCFI = .008, ΔRMSEA = –.002, ΔSRMR = .002). The condition of partial scalar invariance was therefore met.

Overall, the results showed that measures of academic goals, social goals, and self-handicapping were largely invariant across gender, providing a sound psychometric basis for comparing latent means between boys and girls.

Gender Differences in Academic Goals, Social Goals, and Self-Handicapping

Latent means were estimated based on the items that achieved strong factorial invariance. Girls were set as the reference group, and the latent means of boys represented differences in means relative to girls (see Table 3.5). Furthermore, I computed effect sizes (Cohen's *d*) to demonstrate the magnitude of gender differences. Cohen (1992) suggested that a value of .20 be considered a small effect, .50 a medium effect, and .80 a large effect.

Table 3.5 Latent mean differences for boys and girls (positive values indicate higher scores for boys)

Variable	Latent mean	p	Cohen's d
English mastery goal	−.15	.139	.15
English performance-approach goal	.58	<.001	.55
English performance-avoidance goal	.27	.008	.29
English self-handicapping	.36	.001	.33
Maths mastery goal	.09	.364	.09
Maths performance-approach goal	.58	<.001	.51
Maths performance-avoidance goal	.37	.001	.37
Maths self-handicapping	.35	.002	.30
Social demonstration goal	.48	<.001	.57

I hypothesised that girls were more mastery-oriented and less performance-oriented than boys. As hypothesised, boys endorsed more performance-approach goals in English ($d =$ .55) and maths ($d = .51$). They were also more oriented towards performance-avoidance goals in English ($d = .29$) and maths ($d = .37$). Inconsistent with the hypothesis, however, I did not find any significant gender differences in mastery goal pursuit. Additionally, I hypothesised that boys were more concerned with social status and endorsed social demonstration goals more than girls. Indeed, boys, on average, did report higher levels of social demonstration goals ($d = .57$). I also expected that boys reported more self-handicapping behaviours. In line with the prediction, boys scored higher on the Academic Self-Handicapping Scale than girls, regardless of the school subjects ($d = .33$ for English, $d = 30$ for maths).

Overall, I found consistent differences between boys and girls in their academic goals, social goals, and self-handicapping. The size of these differences did not vary systematically across different domains[2].

Relations Between Gender, Academic and Social Goals, and Self-Handicapping

I proposed that boys' stronger demonstration goals and performance-avoidance goals would jointly explain their greater tendency to self-handicap. Prior to testing this new proposal, however, it is necessary to confirm the relative importance of performance-avoidance goals (vs. performance-approach goals) in predicting self-handicapping. Table 3.6 presents the results of commonality analysis in support of this prediction. Altogether, performance-approach and -avoidance goals accounted for 11.1% of the variance in maths self-handicapping. A substantial proportion of this variance (61.3%) was explained by what both forms of performance goals had in common. However, performance-avoidance goals

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[2] Auxiliary analyses were also performed to examine whether school type moderated any of the gender differences. ANOVAs revealed significant gender × school type interaction effects on mastery goals only, such that boys attending the single-sex school were less mastery-oriented in maths and English.

uniquely accounted for another 38.6% of the explained variance in maths self-handicapping, whereas performance-approach goals contributed only 0.1%. Similarly, the analysis predicting self-handicapping in English showed a sizeable unique contribution of performance-avoidance goals relative to performance-approach goals. Therefore, the results showed that self-handicapping was indeed primarily guided by avoidance rather than approach motives.

Furthermore, it was predicted that social demonstration goals would mediate gender differences in self-handicapping beyond the effects of performance-avoidance goals. To disentangle the unique contribution of each mechanism, I tested a parallel mediator model including both performance-avoidance goals and social demonstration goals as potential mediators, while controlling for the correlation between them as well as the effects of covariates (i.e., ethnicity and school type). Furthermore, to compare the relative magnitude of each mechanism, I reported effect sizes for specific indirect pathways using the proportion of the mediated effect relative to the total effect (Wen & Fan, 2015).

Table 3.6 Commonality analyses with performance-approach and -avoidance goals predicting self-handicapping in maths and English

Variable	Maths self-handicapping		English self-handicapping	
	Explained variance	% of R^2	Explained variance	% of R^2
Unique to PAp	<.001	0.1	.001	1.5
Unique to PAv	.043	38.6	.030	37.3
Common to PAp and PAv	.068	61.3	.049	61.2
Total	.111	100.0	.081	100.0

Note. PAp = performance-approach goal, PAv = performance-avoidance goal.

The first model assessed whether gender differences in maths self-handicapping were mediated by students' general social goals and their maths-specific academic goals (see Figure 3.2A). The model fitted the data well, CFI = .934, RMSEA = .047, SRMR = .038. Results showed that boys endorsed more social demonstration goals (β = .23, $p < .001$) and performance-avoidance goals in maths (β = .16, p = .001). In turn, higher social demonstration goals (β = .23, $p = .001$) and performance-avoidance goals (β = .21, $p = .006$) were related to increased self-handicapping behaviours in maths. Table 3.7 presents all other coefficients for covariates.
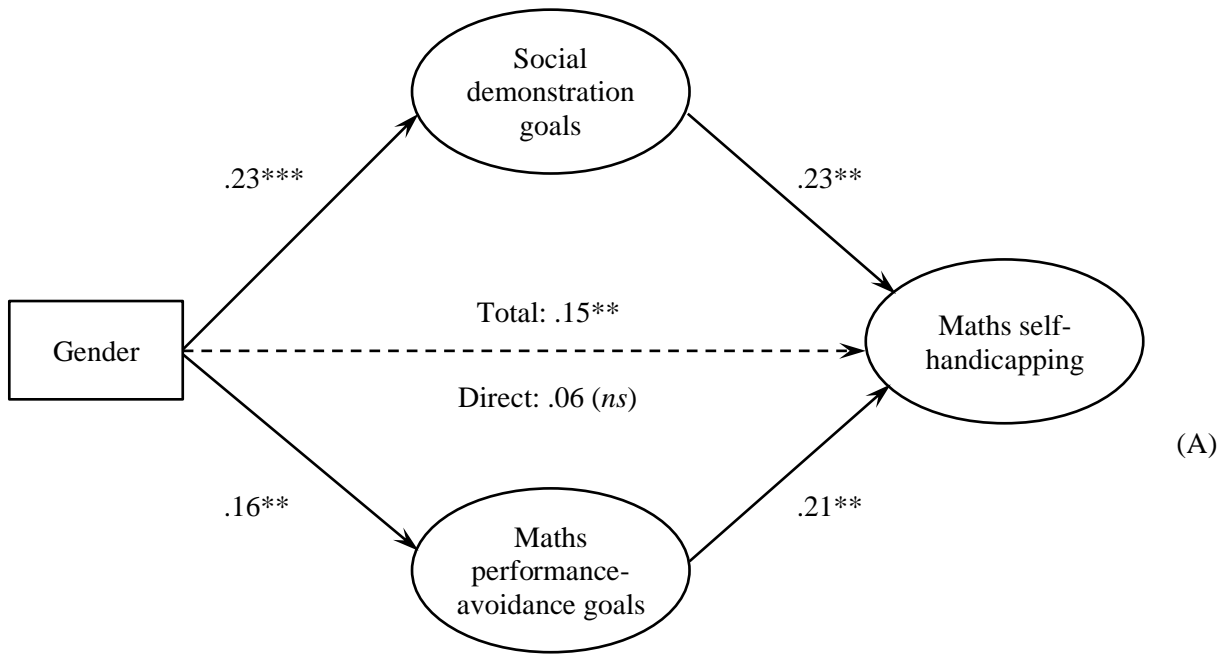
(A)

Indirect effect:
1) Specific indirect effect via social demonstration goals (β = .053, CI [.023, .099], p = .005)
2) Specific indirect effect via maths performance-avoidance goals (β = .034, CI [.009, .076], p = .04)
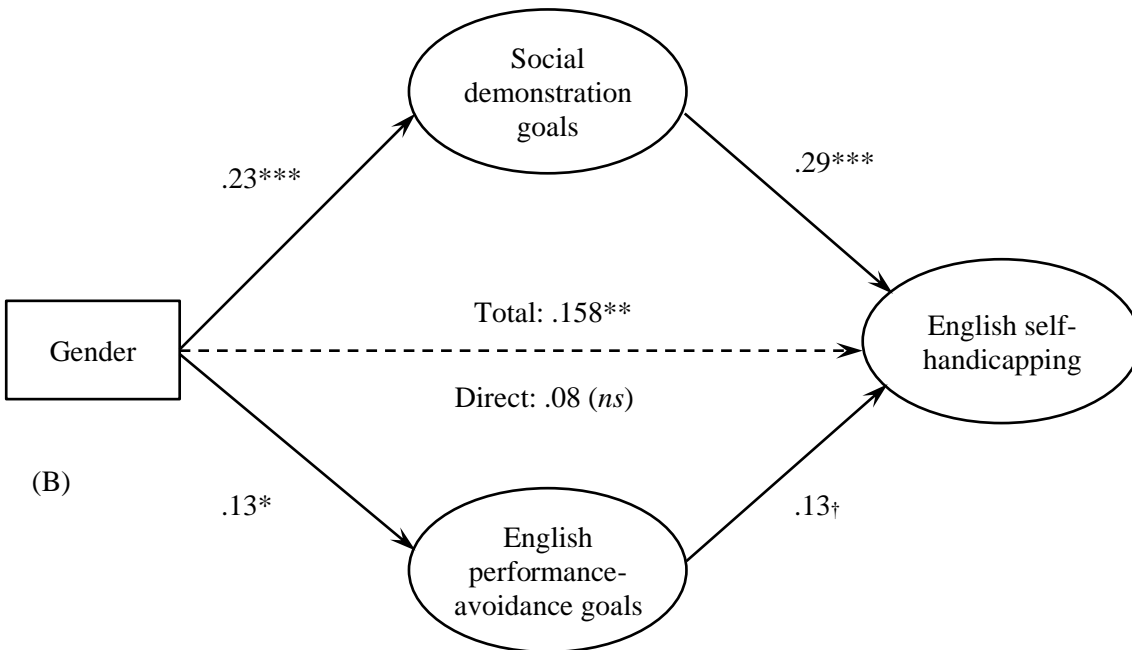
(B)

Indirect effect:
1) Specific indirect effect via social demonstration goals (β = .066, CI [.034, .112], p = .001)
2) Specific indirect effect via English performance-avoidance goals (β = .017, CI [.002, .049], p = .13)

Figure 3.2 Structural equation models showing the mediating role of academic and social achievement goals between gender and self-handicapping. *Note*. †p < .06, *p < .05, **p < .01, ***p < .001.

Once social and academic achievement goals were included in the model, the link between gender and maths self-handicapping (β = .15, p = .002) was reduced to nonsignificance (β = .06, p = .22). Bootstrap tests of indirect effects supported both proposed mediational pathways. Social demonstration goals significantly mediated the relationship between gender and maths self-handicapping (β = .053, 95% CI [.023, .099], p = .005). This indirect path accounted for 36.3% of the total effect of gender on self-handicapping. Independent of this mechanism, students' maths performance-avoidance goals also mediated the relationship between gender and self-handicapping (β = .034, 95% CI [.009, .076], p = .04), accounting for an additional 23.3% of the total effect.

Next, I assessed whether students' general social goals and English-specific academic goals would jointly mediate the link between gender and English self-handicapping (see Figure 3.2B). The model had a good fit to the data, CFI = .936, RMSEA = .050, SRMR = .039. Results showed that in addition to higher social demonstration goals (β = .23, p < .001), boys adopted more performance-avoidance goals in English (β = .13, p = .013). These social and academic goals were, in turn, associated with higher levels of self-handicapping in English (β = .29, p < .001 for social demonstration goals; β = .13, p = .057 for English performance-avoidance goals). Table 3.7 presents all other coefficients for covariates.

Table 3.7 Standardised beta coefficients for mediation models predicting maths and English self-handicapping

Variable	SD goal	Maths		English	
		PAv goal	Self-handicapping	PAv goal	Self-handicapping
Gender	.23***	.16**	.06	.13*	.08
School type					
Single-sex	.03	−.10†	−.10*	−.04	−.10*
Ethnicity					
Asian	−.08	.00	.07	−.02	.12**
Black	−.06*	−.09*	.01	−.07	.04
Mixed	.02	.04	−.03	.03	.00
Goals					
SD goal			.23**		.29***
PAv goal			.21**		.13†

Note. SD goal = social demonstration goal, PAv goal = performance-avoidance goal. †p < .06, *p < .05, **p < .01, ***p < .001

Once social goals and English-specific academic goals were taken into account, the link between gender and English self-handicapping (β = .16, p = .001) was no longer significant (β = .08, p = .11). Social demonstration goals again significantly mediated the relationship between gender and self-handicapping (β = .066, 95% CI [.034, .112], p = .001). This indirect path accounted for 41.8% of the total effect of gender on self-handicapping in

English. Independent of this mechanism, performance-avoidance goals in English also mediated gender differences in self-handicapping ($\beta = .017$, 95% CI [.002, .049], $p = .13$), indicated by a bootstrapped CI that was entirely above zero. However, the strength of this indirect path was much smaller, accounting for only 10.8% of the total effect.

In summary, I found evidence that demonstration and performance-avoidance goals collectively mediated the effect of gender on self-handicapping[3]. Notably, the size of the indirect effects through social demonstration goals was consistently stronger.

Discussion

A large body of research has examined if gender differences in school engagement can be explained by gender differences in academic motivation. Yet, students engage in schools both academically and socially, and they pursue a range of social goals that may subsequently influence their academic motivation and learning. As a result, a near-exclusive focus on academic motivation risks overlooking important gender differences in social motivation, which may further contribute to the gender gaps in school engagement and achievement. The current study addressed this issue by investigating how social goals worked alongside academic goals to explain boys' and girls' differential tendencies to self-handicap. As will be discussed, I identified gender differences in adolescents' social goals, academic goals, and self-handicapping behaviours, as well as showed the importance of social goals in accounting for gender differences in self-handicapping.

Gender Differences in Adolescents' Social Goals, Academic Goals, and Self-Handicapping

In line with the prediction, I found a sizeable gender difference in students' social achievement goals. Specifically, boys focused more on attaining popularity or avoiding being seen as socially undesirable. This finding adds to growing evidence that peer group status is of high priority to boys in adolescence (Ben-Eliyahu et al., 2017; LaFontana & Cillessen, 2010; Rose & Rudolph, 2006). This heightened need to gain peer approval may reflect that boys who deviate from group norms and values are more likely than girls to be excluded or rejected (Killen et al., 2002). Dittrick et al. (2011) found that boys were more often harassed or bullied due to their level of popularity or lack of characteristics valued by peers. In contrast, prioritising popularity over other social goals has been shown to reduce the risk of peer rejection and victimization among unpopular boys but not girls (Breslend et al., 2018). Collectively, these studies indicate that social demonstration goals may be more normative for

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[3] I tested alternative mediation models where the performance-avoidance goal was replaced by either a composite performance goal or a performance-approach goal. In these alternative models, the indirect effects via academic goals were either smaller or non-significant.

boys and that seeking positive or minimizing negative evaluations from peers can have protective effects for boys, especially against social exclusion in adolescence. Nevertheless, demonstration-oriented social goals are often linked to maladaptive social adjustment, and can exert cross-domain influences and hinder students' academic adjustment (Shim et al., 2013). As a result, boys' heightened concerns about popularity and social status may also leave them more vulnerable to the maladaptive consequences of social demonstration goals.

I also replicated previous studies showing that boys are more performance-oriented than girls (Butler, 2014). In the present study, boys sought to demonstrate their ability or avoid showing a lack of ability, and these ability validation goals have been shown to predict rather maladaptive learning behaviours (Grant & Dweck, 2003). Given that performance-avoidance goals and social demonstration goals relate consistently to less adaptive academic outcomes, boys' joint pursuit of these goals may present a 'double jeopardy' that undermines their school engagement and achievement. Furthermore, consistent with past findings, the results replicated gender differences in self-handicapping and found that boys felt a greater need to protect their academic self-worth (Jackson, 2002). Notably, gender differences in performance goals and self-handicapping emerged consistently in maths and English—two domains with different gender stereotypes. This robust finding supports and extends Butler's (2014) proposal that boys tend to be more oriented than girls towards proving and protecting their abilities in general, and not just in stereotypically masculine domains. Although most studies measure motivation either generally or domain specifically in one particular subject, simultaneously considering motivational constructs across different domains extends our understanding of the generality or specificity of motivational processes.

Inconsistent with the prediction, however, there were no significant gender differences in the endorsement of mastery goals, despite a trend for girls to be more mastery-oriented in English but not in maths. These results do not entirely contradict past research since gender differences in mastery goals did not consistently emerge, and when they did, girls were more likely than boys to hold mastery goals. Furthermore, contextual influences (e.g., stereotypes of the task domain) may interact with individual dispositions to shape one's goal orientations. In their review on gender and motivation, Hyde and Durik (2005) found that gender differences in mastery goals emerged more consistently in studies of language arts. In contrast, most studies that reported no gender differences in mastery goals focused on maths or athletics, where girls' ability is negatively stereotyped. The present results fit this pattern and suggest that there is much to be gained by investigating the extent to which patterns of gender differences are robust or limited to a specific task domain.

Given the consistent gender differences observed in this study, it is important to consider factors contributing to gender differences in adolescents' academic and social goals. Differences between boys and girls in goal orientations may be shaped by beliefs and behaviours of important socializers including parents and teachers. For example, in a study of early adolescents in the US, not only did boys espouse more personal performance goals, they also perceived a greater emphasis on performance goals from their parents (Friedel et al., 2007). Similarly, Butler (2012, Study 2) found that in addition to adopting personal performance goals, boys perceived a greater use of performance-oriented instructional practices by their teachers. In the social domain, Kiefer et al. (2013) showed that among sixth grade students, boys tended to perceive their teachers' instructional approach to be more performance-oriented, and they were more likely than girls to endorse social goals focusing on peer status and popularity. Nevertheless, these studies relied on self-reports from a common source. As a result, it is unclear whether the gender differences in perceptions were due to genuine differences in how adults interacted with boys and girls, or were simply a reflection of boys' and girls' own goal orientations. Future studies should utilise more appropriate design and methods to unpack how contextual influences may contribute to gender differences in adolescents' academic and social goals.

The Importance of Social Goals in Explaining Gender Differences in Self-Handicapping

Most importantly, I found that performance-avoidance and social demonstration goals collectively mediated the link between gender and self-handicapping. In other words, boys self-handicapped more than girls because of their stronger desire to preserve their image in both academic and social domains. By utilising commonality analysis and parallel mediator models, the present study pitted theoretically plausible mechanisms against each other (i.e., performance-approach vs. -avoidance goals; performance-avoidance vs. social demonstration goals). This approach is effective for building theories to explain motivational phenomena when multiple processes are at work, and provides strong support for the importance of social demonstration goals in mediating gender differences in self-handicapping.

The findings indicate that boys self-handicapped more than girls, in part, to avoid the appearance of incompetence in an academic domain. Although previous research has revealed positive associations between performance-avoidance goals and self-handicapping (e.g., Midgley & Urdan, 2001), the current study provides direct evidence that it was performance-avoidance, not performance-approach, goals that explained gender differences in the use of self-handicapping strategies to externalise failure. As discussed earlier, boys were more oriented towards proving and protecting their ability. This hyper concern with affirming academic competence might lead them to view potential failures as more indicative of their

ability (or lack thereof) and thus more threatening. As a result, boys were more motivated to engage in self-handicapping behaviours to shift attributions for poor performance from low ability to external factors (e.g., 'I failed the exam because I didn't revise'). Additionally, situations where a student self-handicaps but still performs well provide strong evidence of one's superior ability. Thus, self-handicapping represents a win-win situation for boys who are motivated to validate their ability (see Jackson, 2002).

In addition to ability-related concerns, boys made more frequent use of self-handicapping strategies as a result of their greater social status concerns. In the present study, social goals were examined with respect to school in general whereas academic goals and self-handicapping were assessed domain specifically. The close correspondence between measures of performance-avoidance goals and self-handicapping would suggest greater shared variance between the two constructs. However, the fact that social demonstration goals consistently accounted for more of the effect of gender on self-handicapping provided strong support for the hypothesis. The findings suggest that the primary motivation underlying academic self-handicapping may be to preserve one's social image, with the benefit of protecting one's intellectual ability as an additional but secondary motivation. Given that boys were more preoccupied with gaining and protecting peer group status, they might be particularly motivated to self-handicap or purposely withdraw effort because academic effort is inversely related to social status during adolescence. Juvonen and Murdock (1995) found that high-ability, low-effort students were considered among the most popular students in secondary school. Interestingly, low-ability, low-effort students were perceived as popular as those with high ability and low effort, and more popular than their high effort peers. Similarly, Heyder and Kessels (2017) found that low-effort boys, whether high or low achievers, were rated as more popular and masculine than those displaying high effort. Once again, boys are strongly incentivised to self-handicap by withdrawing effort: it increases their popularity and perceptions of their masculinity, regardless of academic performance (see Jackson, 2003).

Although not central to this study, interesting associations were also observed between covariates and key variables in the model. For example, students attending single-sex schools were less likely to self-handicap. This effect might be driven by the higher average achievement of students attending single-sex schools, as the relationship between self-handicapping and achievement may be reciprocal (Martin et al., 2001). Additionally, there was no correlation between students' social demonstration goals and the type of school they attended. The fact that demonstration goals did not vary with the gender composition of peers

or average levels of SES and achievement points to the ubiquity of peer status concerns during adolescence.

Results further inform the debate over the empirical distinctiveness of performance-approach and -avoidance goals (Linnenbrink-Garcia et al., 2012). A strong correlation was found between the two performance goals (ϕs = .80 and .86), which was comparable to those reported in recent studies (e.g., ϕ = .88 in Bong et al., 2013). Nevertheless, distinguishing between performance-approach and -avoidance goals improved the model fit of CFAs in the current study. Additionally, performance-approach and -avoidance goals differentially predicted self-handicapping as well as differentially mediated the relationship between gender and self-handicapping. These results provide clear support for the distinction between the two performance goals, and the overlap between them may be explained by shared concerns about ability validation or their joint activation in achievement settings (see Law et al., 2012).

Together, these findings advance our understanding of both self-handicapping and gender-related influences on motivational variables and processes. Past studies have shown that gender differences in self-handicapping can be partially explained by the different value males and females ascribe to effort (McCrea, Hirt, & Milner, 2008). Drawing on a social cognitive approach to motivation, the current study identified additional factors that predispose boys to self-handicap more than girls, that is, gender differences in performance-avoidance and social demonstration goals. This suggests that the gendered tendencies to self-handicap are potentially changeable and amenable to interventions that target students' academic and social achievement goals.

Educational Implications

The present study has implications for teachers and their classroom practices. Although primary school teachers tend to view themselves as facilitators of both knowledge and social development, secondary school teachers focus much more on content instruction (Roeser et al., 2002). This study highlights the importance of attending to students' social goals even in secondary school settings. In addition, research on classroom goal structures has shown that students construct their academic and social goals within the broader classroom environment. In contexts where teachers make greater use of performance-oriented instructional practices (e.g., emphasis on grades, ability, and social comparison), students are more likely to adopt performance goals (Meece et al., 2006). Similarly, Shim et al. (2013) found that students were also more oriented towards social demonstration goals when they perceived high levels of competition and social comparison of performance in their classroom. These findings suggest that teachers can simultaneously promote adaptive academic and social goal pursuits among all students (not just boys) by creating a more

mastery-oriented learning environment (e.g., emphasis on effort, cooperation, improvement and the value of mistakes).

Strengths, Limitations, and Future Directions

The present study tested hypotheses using a diverse, well-powered sample. In addition, I used domain-specific measures of academic goals and self-handicapping to assess the generality of the results in two gender-typed subjects. This enhances the validity and generalizability of the study, and suggests that the findings are not limited to a specific subject area or a particular sample from one school.

However, the study is not without its limitations. First, although the effect of ethnicity was statistically controlled for in the analyses, it is important that future research verify the current results in other cultural contexts, given that adopting performance-avoidance and demonstration-avoidance goals seems to be less maladaptive in Asian contexts (King, 2016b; Liem, 2016). Second, this study is cross-sectional in nature and thus can only provide evidence for associations rather than causation. Future research should measure mediators and outcomes at different time points to strengthen the causal inference. Additionally, only measures of social demonstration goals were included, and students did not distinguish between demonstration-approach and -avoidance goals. Future studies should incorporate social development goals as well as more sensitive measures of social demonstration goals to clarify which form of the demonstration goals mediates the relationship between gender and self-handicapping. Although no gender differences in mastery goals were found in the current study, future studies should continue to probe whether gender differences in mastery goals could further explain why girls tend to refrain from self-handicapping (Schwinger & Stiensmeier-Pelster, 2011). Finally, the present study focused squarely on the relationship between gender, academic and social goals, and self-handicapping. Future studies can include and control for other important predictors of self-handicapping, such as self-esteem, to strengthen the conclusion of this study. In addition, a broader range of self-reported or objectively measured academic outcomes can be used to examine the cross-domain influences of social achievement goals.

Moreover, it may be fruitful for researchers to continue reaching across the boundaries between academic and social motivation to understand gender gaps in performance and participation. For example, boys are less likely than girls to seek help with their academic work when needed, even though help-seeking behaviour is positively associated with academic achievement. Previous research has shown that performance goals and social demonstration goals are linked to perceived threats and avoidance of help-seeking (Ryan et al., 1997). Thus, gender differences in social and academic goals may also account for the

gender differences in help-seeking behaviour. Additionally, research drawing on expectancy-value theory has investigated gender differences in competence and value beliefs to understand gendered subject choices (e.g., Watt et al., 2012). It is possible that students' social achievement goals may further contribute to gender differences in the selection of different subjects. To the extent that boys and young men are oriented towards gaining social status and recognition in their social groups (i.e., demonstration-approach goals), they may be more motivated to engage in maths-related subjects, which often lead to well-paid, high-status future careers. To the extent that boys and young men are sensitive to or concerned about signs of disapproval from peers (i.e., demonstration-avoidance goals), they may be less likely to study education or nursing, which are associated with lower-status, stereotypically female professions. Future work can include measures of social achievement goals to test these claims. Overall, simultaneously considering the influence of social and academic motivation may extend our understanding of the gender gaps in education.

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Chapter 4 Which Boys and Which Girls Are Falling Behind? Linking Adolescents' Gender Role Profiles to Motivation, Engagement, and Achievement (Study 3)

Abstract

Research on gender gaps in school tends to focus on average gender differences in academic outcomes, such as motivation, engagement, and achievement. The current study moved beyond a binary perspective to unpack the variations within each gender. It identified distinct groups of adolescents based on their patterns of conformity to different gender norms and compared group differences in motivation, engagement, and achievement. Data were collected from 597 English students (aged 14-16 years) on their conformity to traditional masculine and feminine norms, growth mindset, perseverance, self-handicapping, and their English and maths performance at the end of secondary school. Latent profile analysis identified seven groups of adolescents (resister boys, cool guys, tough guys, relational girls, modern girls, tomboys, ladettes) and revealed the prevalence of each profile. Within-gender variations showed that two thirds of the boys were engaged and performed well in school. In contrast, half of the girls showed maladaptive patterns of motivation, engagement, and achievement, and could be considered academically at risk. By shifting the focus from 'boys versus girls' to 'which boys and which girls', this study reveals the invisibility of well-performing boys and underachieving girls in educational gender gap research.

Keywords: masculinities, femininities, gender roles, latent profile analysis, motivation, academic achievement

Introduction

Boys lag behind girls in school across many western industrialised countries (OECD, 2015). On average, not only do boys report poorer quality motivation (Butler, 2014), they also tend to be less engaged and perform worse than girls in secondary school (Lam et al., 2012; Voyer & Voyer, 2014). However, research on binary gender differences risks treating boys and girls as two homogenous groups, masking considerable variation in motivation, engagement, and achievement within each gender. To unpack within-gender heterogeneity, some studies examine the extent to which adolescents conform to traditional gender roles, and reveal that greater gender role conformity is associated with lower academic motivation, engagement and achievement (McKenney & Bigler, 2016; Santos et al., 2013; Ueno & McWilliams, 2010). Although this is an important step forward, I argue that adolescents within each gender group may vary not only in their *degree* of gender role conformity, but also in their overall *patterns* of conformity to different gender roles. Distinct patterns of gender role conformity may in turn differentially predict students' academic outcomes.

The current study has two aims. First, it aims to identify subgroups of adolescent boys and girls based on their emergent patterns of gender role conformity. Second, it links adolescents' gender role profiles to motivation, engagement, and achievement in English and maths. Therefore, this study goes beyond merely documenting different types of boys and girls in school and demonstrates the educational consequences of these typologies. By shifting the focus from 'boys versus girls' to 'which boys and which girls', the present study can provide a fresh look at the extent of boys' problems and draw attention to underachieving girls in school. In the following, I provide a brief overview of the central tenets of traditional masculinity and femininity as well as their implications for student learning. I then discuss the merits of examining people's gender role conformity from a pattern perspective, before outlining the specific academic outcomes of interest to the present study.

Gender Role Conformity and Academic Outcomes

Gender roles are widely shared beliefs about what constitutes gender-appropriate behaviours in a given society at a given time (Wood & Eagly, 2012). The study of gender role conformity thus concerns the extent to which individuals conform to normative expectations of how to be a 'real' man or woman. Although adolescents may express less rigid views about what men and women in general should do, many of them conform to traditional gender roles in their personal lives (Whitehead, 2003). Therefore, the present study focused on the impact of adolescents' own gender role conformity on their school success.

Although various dimensions of masculine gender norms in western cultures have been identified (Mahalik et al., 2003), this study focused on the norms of restrictive

emotionality, competitiveness, physical aggression, extreme self-reliance, and risk-taking. These five norms have been repeatedly identified as salient aspects of traditional masculinity (Munsch & Gruys, 2018; Parent et al., 2020), and adherence to these restrictive gendered norms can undermine boys' and young men's academic success. Male students who feel pressured to appear emotionally detached and self-reliant have been found to adopt a surface approach to learning (Marrs, 2016), avoid seeking help in the classroom (Leaper et al., 2019), and show lower levels of academic engagement and achievement (A. A. Rogers, DeLay, et al., 2017; Santos et al., 2013). Boys who display physical aggression, competitiveness, and risky behaviours may also experience more interpersonal conflict with their teachers and peers, thereby reducing their odds of success in school (Ueno & McWilliams, 2010). Previous studies show that male students who endorse the physical aggression norm tend to have lower levels of intrinsic motivation and school enjoyment (Marrs, 2016; A. A. Rogers, Updegraff, et al., 2017). Furthermore, by conceptualising conformity as ranging along a continuum, prior studies show that boys and young men who resist traditional masculine norms tend to be more academically successful.

Similarly, a range of traditional feminine norms has been identified (Mahalik et al., 2005). Salient aspects of traditional femininity encompass a focus on thinness, appearance, romantic relationships, and domestic duties (Bordo, 1993; Holland & Eisenhart, 1990; Parent et al., 2020), and rigid adherence to these four feminine norms can hinder girls' and young women's academic success. Adolescent girls who are preoccupied with their appearance and body image tend to report lower academic self-efficacy, fewer learning goals, and greater scepticism towards school, and show lower effort and academic performance (C. S. Brown, 2019; McKenney & Bigler, 2016; Nelson & Brown, 2019). In contrast, those who rejected these feminine norms showed higher levels of motivation and performance. Additionally, young women who are more invested in romantic relationships tend to report lower educational goals and less interest in stereotypically masculine domains such as maths and science (Park et al., 2011; Rudman & Heppen, 2003). Adolescent girls who expect to take up the homemaker role have also been found to perform worse academically (Whitehead, 1994).

Studies reviewed above show that young people's rigid adherence to their own gender's norms can influence motivation, engagement, and achievement. However, expression of masculinity or femininity is not restricted to a single gender. Many preadolescent girls self-identify as tomboys and enact stereotypically masculine behaviours (Paechter, 2010), and some teenage boys attend to their appearance to maintain a cool 'laddish' image (Jackson, 2006a). In addition, conforming to traditional masculine/feminine norms appears to influence boys and girls in similar ways. Adolescent girls who adhere to

masculine norms such as restrictive emotionality and physical aggression also show lower levels of behavioural self-regulation and school belonging (Huyge et al., 2015; Liang et al., 2019), and young men who possess more romantic fantasies report lower educational aspirations (Rudman & Heppen, 2003). The present study therefore examined adolescents' adherence to both their own gender's and the other gender's norms to understand the complex patterns and implications of gender role conformity among contemporary youth.

Patterns of Gender Role Conformity

Studies discussed earlier show that greater adherence to traditional gender norms can undermine students' learning and achievement. However, people may adhere to multiple facets of gendered norms simultaneously and to varying degrees, which produces different patterns of gender role conformity. For instance, Schrick et al. (2012) used cluster analysis to identify subgroups of female undergraduate students based on their orientations towards thinness, romance, perfectionism, self-objectification, and contingent self-worth. Four distinct profiles were identified, ranging from a group of 'Other-Focused' women who strongly endorsed thinness, perfectionism, and self-objectification, to a group who rejected the thinness norm and also scored low on the other dimensions. In addition, Other-Focused women had the lowest level of academic engagement and the highest psychological distress, whereas women who rejected the thin ideal showed the highest academic engagement and the lowest distress. These findings illustrate the utility of adopting a pattern perspective to understand how conformity or resistance to multiple gender norms can work in tandem to influence students' academic success.

The current study aimed to quantitatively identify subgroups of adolescent boys and girls based on their personal conformity to a range of masculine and feminine norms. This approach has conceptual parallels to ethnographic studies that identify subgroups of boys and girls based on their 'doing of gender' (West & Zimmerman, 1987). This line of qualitative enquiry has consistently identified a group of schoolboys who conform to conventional ideals of masculinity, labelled as 'lads' in the UK or 'jocks' in the US (Jackson, 2006a; Pascoe, 2003). Similarly, several images of schoolgirls have been identified, ranging from 'tomboys' who reject conventional femininity (Paechter, 2010), to disruptive 'wild girls' or 'laddettes' who enact stereotypically masculine behaviours while emphasising their sexualised appearance (Jackson, 2006b). Although this body of work provides a nuanced understanding of various masculinities and femininities in school, these typologies are often based on small samples in a particular setting, and it remains unclear whether they represent common ways for boys and girls to 'do gender' in school. In contrast, the current study aimed to identify emergent gender role profiles in a large sample of adolescents across multiple schools and

investigated the prevalence of each profile. In doing so, it can provide critical information on which gender role profiles typically emerge during adolescence and are therefore meaningful to study in research.

Motivation, Engagement, and Achievement

To understand the impact of gender role conformity on school success, it is crucial to examine the link between different gender role profiles and students' academic performance. Prior studies show that the perceived fit between one's gender role and the image of a school subject can powerfully shape students' achievement (Kessels et al., 2014). For example, girls' conformity to traditional masculinity has been associated with better performance in stereotypically masculine domains such as maths, but worse performance in stereotypically feminine domains such as English (Leaper et al., 2019). The current study thus examined students' performance in both English and maths to fully gauge the impact of gender role conformity on academic achievement.

Beyond achievement outcomes, it is important to investigate students' motivation and engagement, which are both influenced by gender role beliefs and can predict academic performance (Wigfield et al., 2015). Factors of interest to the present study are growth mindset, perseverance, and self-handicapping. As will be discussed, these constructs appear especially relevant for understanding why some boys and girls underperform in school. Growth mindset refers to the belief that one's ability is malleable and can be developed through effort. This is in contrast to a fixed mindset, or the belief that one's ability is mostly innate and cannot be changed (Dweck & Leggett, 1988). Students with a growth mindset tend to show adaptive engagement such as greater perseverance as well as better academic performance (Burnette et al., 2013). Students with a fixed mindset, on the other hand, may deliberately withhold effort to create face-saving excuses for potential poor performance (Rhodewalt, 1994). This type of maladaptive engagement is termed self-handicapping and can lead to poorer academic achievement (Schwinger et al., 2014).

An understanding of students' mindset, perseverance, and self-handicapping may reveal key processes contributing to some boys' underachievement. Drawing upon qualitative interviews with boys, Jackson (2002, 2006a) found that many 'laddish' boys aspired to effortless achievement in school: they espoused the belief that achievement without effort signalled high ability, and failure without trying could be attributed to a lack of effort rather than a lack of ability. Based on their effort beliefs and attributional style, it is possible that boys adhering to traditional masculinity might perceive ability as fixed, view effortful perseverance as an indication of low ability, and purposely withhold effort to avoid the

implications of failure. These maladaptive beliefs and behaviours may, in turn, undermine boys' achievement.

Similarly, these constructs may provide insights into why some girls perform less well in school, especially in stereotypically masculine subjects. Girls who adhere to traditional femininity may be more likely to endorse the gender stereotype that they lack the fixed innate talent to succeed in maths (Leslie et al., 2015). In addition, despite the general perception of girls as diligent students, a 3-year longitudinal study revealed a steady increase of disengagement among adolescent girls. Specifically, girls reported a greater tendency to give up and self-handicap in schoolwork after the transition to secondary school (Burns et al., 2019). These findings suggest that examining perseverance and self-handicapping has the potential to capture the quiet disengagement among some girls that might otherwise go unnoticed by their teachers.

Study Overview and Hypotheses

The present study transcended the traditional gender binary to examine which boys and which girls were falling behind in school. Specifically, it addressed the following two research questions:

1. What are the emergent gender role profiles during adolescence and how common are these profiles?
2. How do the emergent gender role profiles relate to students' motivation, engagement, and achievement?

Although previous research has studied boys and girls with different degrees of gender role conformity, quantitative researchers have not yet accounted for different types of masculinity and femininity in school. The current study employed latent profile analysis to identify emergent gender role profiles based on adolescents' varying degrees of conformity to multiple gendered norms. Latent profile analysis has advantages over traditional cluster analysis because it is a model-based technique and offers statistical criteria to determine the number of clusters (Collins & Lanza, 2010). Furthermore, expression of masculinity or femininity is not restricted to a single gender, but existing studies have largely overlooked the implications of girls' adherence to masculine norms and boys' adherence to feminine norms. The present study therefore created holistic profiles based on adolescents' adherence to both their own gender's and the other gender's norms.

This study focused on nine salient aspects of traditional gender norms that had been shown to undermine students' learning. Five of them reflected traditional masculinity, including restrictive emotionality, competitiveness, physical aggression, extreme self-reliance, and risk-taking, while the other four represented traditional femininity, including

thinness, appearance orientation, romantic relationships, and domesticity. Since no studies to my knowledge have created profiles based on adolescents' simultaneous adherence to a range of masculine and feminine norms, it was difficult to predict what profiles would emerge. Nevertheless, it was reasonable to expect that some emergent profiles might match the various images of boys and girls already documented in qualitative studies.

Adherence to traditional gender norms may shape students' motivation and engagement, which in turn influence their academic performance. Therefore, to answer the second research question, this study first examined the cross-sectional associations between gender role profiles and students' mindset, perseverance, and self-handicapping in English and maths. Furthermore, the longitudinal associations between gender role profiles and students' performance in English and maths were investigated, while controlling for their prior achievement. Significant differences in motivation, engagement, and achievement across different profiles would provide evidence of validity for the obtained profiles.

Since conformity to traditional masculinity and femininity has been negatively associated with school success for boys and girls alike, I expected profiles endorsing multiple aspects of traditional gender norms to be less academically successful. In contrast, profiles showing resistance to traditional gender norms were expected to display more adaptive motivation and engagement, as well as better academic performance.

Method

Participants and Procedure

The sample consisted of 597 students from four state secondary schools in England (291 girls, aged 14-16 years). Participants were in the last two years of compulsory education (Year 10: $n = 395$, Year 11: $n = 202$) and were working towards the national high-stakes General Certificate of Secondary Education (GCSE) exams taken at the end of Year 11. The average level of student achievement was diverse across schools: the proportion of students obtaining a pass grade in GCSE English and maths ranged from 42% to 74% in each school. The majority of participants identified as White (82.6%), which matched the ethnic composition of English schools at the time of data collection.

The study was approved by the departmental ethics committee. Prior to data collection, parents were informed of the study and given the opportunity to withdraw their child. Questionnaires assessing gender role conformity, motivation, and engagement were group administered to students during regular school hours and took approximately 20 minutes to complete. Teachers responsible for administering the questionnaire were provided with an instruction sheet containing the purpose, ethics, and procedures of the study. Students were told that their participation was completely voluntary and that no one at home or school

would see their answers. Participants subsequently took the GCSE exams at the end of Year 11, and their achieved grades in English and maths were gathered directly from schools. The time lag between self-report measures and achievement outcomes allowed us to observe how students' patterns of gender role conformity influenced their subsequent academic performance.

Measures

The questionnaire contained three sections: adherence to traditional gender roles (48 items), motivation and engagement in English (13 items), and motivation and engagement in maths (13 items). The order of the sections was counterbalanced and the items within each section were randomised. A copy of the distributed questionnaire is available in Appendix F.

Gender role conformity. Students' conformity to traditional masculinity was assessed by five subscales from the Conformity to Masculine Norms Inventory-46 (Parent & Moradi, 2009): Emotional Control ("I tend to keep feelings to myself"), Winning ("It is important for me to win"), Violence ("I am willing to get into a physical fight if necessary"), Self-reliance ("I hate asking for help"), and Risk-taking ("I enjoy taking risks"). Conformity to traditional femininity was measured by four subscales: Thinness ("I would like to lose a few pounds"), Appearance Orientation ("I check my appearance in a mirror whenever I can"), Romantic Relationship ("Being in a romantic relationship is important"), and Domestic ("I clean my home on a regular basis"). The Appearance Orientation subscale was adapted from the Multidimensional Body-Self Relations Questionnaire (Brown, Cash, & Mikulka, 1990), and the other three subscales were taken from the Conformity to Feminine Norms Inventory-45 (Parent & Moradi, 2010). All statements were phrased in the first-person to assess participants' personal conformity to traditional gender roles. Consistent with the original conceptualisation (Mahalik et al., 2003), items were rated on a 4-point scale (0 = *Disagree strongly*, 3 = *Agree strongly*) to capture extreme nonconformity to extreme conformity. Appropriate items were reverse scored so that higher scores represented greater conformity to a given aspect of the traditional gender norm.

Mindset, perseverance, and self-handicapping. Students' mindset, perseverance, and self-handicapping were measured separately for English and maths. These items were rated on a 6-point scale ranging from 1 (*Disagree a lot*) to 6 (*Agree a lot*). Students' mindset was assessed by a 3-item scale adapted from De Castella and Byrne (2015). Items reflected a fixed mindset and students' responses were reverse scored so that higher scores corresponded to a stronger growth mindset ("To be honest, I don't think I can really change how good I am at …"). Perseverance and self-handicapping were captured to reflect adaptive and maladaptive academic engagement. Perseverance was assessed with a 4-item scale adapted

114

from Elliot, McGregor, and Gable (1999). It measured the extent to which students maintained effort when tasks became difficult or boring ("If a particular topic or problem confuses me in my … lesson, I go back and try to figure it out"). Participants also reported the frequency of self-handicapping behaviour on a 6-item scale adapted from the Patterns of Adaptive Learning Scale (Midgley et al., 2000). This scale measured intentional effort withdrawal to create excuses for potential poor performance ("Sometimes I purposely get involved in lots of activities. Then if I don't do so well in … as I hoped, I can say it is because I was too involved in other things.").

      Achievement. Academic achievement was operationalised as English and maths performance in the national GCSE exams at the end of secondary school. Grades ranged from 1 (the lowest) to 9 (the highest) and were standardised before analyses to ease interpretation. Since the current study focused on the independent influence of gender role profiles on students' performance beyond prior achievement, students' English and maths grades on National Curriculum Tests were gathered as indicators of prior achievement and were included as a covariate in analyses. These tests are taken by all students in England at the end of primary school and represent the only national test data available prior to GCSE.

Analytic Strategy

      Data analysis proceeded in three steps. Measurement invariance and factor structure of the scales were first evaluated using exploratory structural equation modelling (ESEM; Asparouhov & Muthén, 2009). Next, factor scores saved from the best fitting measurement models were used to conduct latent profile analyses. Once the optimal profile solution was determined, differences in mindset, engagement, and achievement were compared across profiles. All analyses were conducted in Mplus 8.3 (Muthén & Muthén, 1998-2017).

      Measurement models. Simulation studies show that it is inappropriate to treat ordinal scales with fewer than five categories as continuous variables (Rhemtulla et al., 2012). Consequently, the gender role measures were modelled as categorical variables using the weighted least square estimator (WLSMV), and the mindset and engagement scales as continuous variables using the robust maximum likelihood estimator (MLR).

      Since prior studies tend to validate measures of traditional masculinity among males and measures of traditional femininity among females, the present study first examined measurement invariance of the gender role measures to ensure that salient dimensions of masculinity and femininity had the same meaning to boys and girls. Four levels of invariance were tested: configural, weak, strong, and strict (Gregorich, 2006). Multigroup ESEMs were initially estimated to test whether the factorial structural was the same across gender (configural invariance). Equality constraints were then added to the factor loadings (weak

invariance), thresholds (strong invariance), and residual variances (strict invariance). Each level of invariance was established if the more restricted model did not show significant deterioration in fit compared to the previous model. According to Chen (2007), weak invariance is supported if ΔCFI < .010, ΔRMSEA < .015, and ΔSRMR < .030. Strong or strict invariance is supported if ΔCFI < .010, ΔRMSEA < .015, and ΔSRMR < .010. Factor scores from the most invariant model were saved as input for latent profile analyses.

Next, the factor structure of mindset and engagement scales was verified in ESEM models. Items were specified to load on their respective factors and cross-loadings were targeted to be as close to zero as possible using target rotation. Model fit was assessed using the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardised root mean-square residual (SRMR). Good model fit was indicated by a CFI value close to .95 or above, RMSEA close to .06 or below, and SRMR close to .08 or below (Hu & Bentler, 1999). Factor scores ($M = 0$, $SD = 1$) from the ESEM models were saved and used as outcomes of latent profile membership.

Latent profile analyses. Models with two to six profiles were computed separately for boys and girls to identify subgroups of adolescents who showed similar patterns of gender role adherence. The optimal number of profiles to retain was guided by several criteria (Nylund et al., 2007). First, the Akaike information criteria (AIC), the consistent AIC (CAIC), the Bayesian information criteria (BIC), and sample-size adjusted BIC (SABIC) were used to assess the model fit, with lower values suggesting a better fitting model. These indices were plotted in a scree-like plot to identify the elbow point after which adding additional profiles led to minimal gains in model fit. Additionally, the bootstrap likelihood ratio test (BLRT) was computed for each solution, and a non-significant BLRT test supports a model with one less profile. Theoretical interpretability of the profiles was also considered. Lastly, I inspected the entropy (ranging from 0 to 1) as an indicator of classification accuracy, with high values representing greater precision in classification.

Outcomes of latent profile membership. Differences in academic outcomes across profiles were compared using the BCH method introduced by Bolck, Croon, and Hagenaars (2004), which is conceptually equivalent to a weighted ANOVA. To test the cross-sectional associations between gender role profiles and students' mindset and engagement, a default version of this method was performed in Mplus. To examine the longitudinal associations between gender role profiles and students' English and maths performance, a manual BCH was performed to allow for the inclusion of prior achievement as a covariate. Profile-specific means were then compared to test whether gender role profiles had an independent influence on students' academic performance after accounting for prior achievement.

<div align="center">

Results

</div>

Preliminary Analyses

Multigroup-ESEM models supported the strict invariance of the gender role measures, as all changes in CFI, RMSEA, and SRMR fell within acceptable ranges (see Table 4.1; see Appendix G for factor loadings). This suggests that measures of traditional masculinity and femininity carried the same meaning and functioned equivalently for boys and girls. In addition, a 6-factor ESEM model showed that items assessing mindset, perseverance, and self-handicapping in English and maths loaded highly on their respective factors, demonstrating an excellent fit to the data (CFI = .966, RMSEA = .039, SRMR = .022; see Appendix G for factor loadings).

Table 4.1 Fit indices for the measurement invariance models

Model	χ^2	df	CFI	RMSEA	SRMR	ΔCFI	ΔRMSEA	ΔSRMR
1 Configural	2252.96	1464	.962	.042	.031			
2 Weak	2432.74	1815	.970	.034	.043	.008	−.008	.012
3 Strong	2560.27	1902	.968	.034	.045	−.002	.000	.002
4 Strict	2674.69	1950	.965	.035	.046	−.003	.001	.001

Table 4.2 Descriptive statistics and reliability estimates for variables

Variable	Cronbach's α	Girls Mean (SD)	Boys Mean (SD)	Cohen's d
Emotional control	.87	1.72 (0.73)	1.72 (0.67)	0.01
Winning	.90	1.35 (0.75)	1.62 (0.70)	−0.38***
Violence	.82	1.54 (0.64)	1.89 (0.61)	−0.55***
Self-reliance	.84	1.28 (0.74)	1.17 (0.64)	0.15
Risk-taking	.86	1.25 (0.67)	1.50 (0.70)	−0.36***
Thinness	.88	1.62 (0.86)	1.03 (0.71)	0.75***
Appearance orientation	.82	1.90 (0.60)	1.37 (0.70)	0.81***
Romantic relationship	.71	1.33 (0.61)	1.43 (0.59)	−0.16
Domestic	.86	1.99 (0.72)	1.73 (0.70)	0.36***
English mindset	.82	4.23 (1.09)	4.21 (1.17)	0.02
English perseverance	.79	4.11 (1.00)	3.88 (0.92)	0.24**
English self-handicapping	.86	2.09 (0.91)	2.14 (0.92)	−0.05
English achievement	/	5.96 (1.56)	5.28 (1.68)	0.42***
Maths mindset	.80	4.22 (4.16)	4.58 (1.03)	−0.32***
Maths perseverance	.81	4.16 (1.01)	4.27 (0.92)	−0.12
Maths self-handicapping	.83	2.18 (0.90)	2.07 (0.93)	0.12
Maths achievement	/	5.48 (1.78)	5.93 (1.99)	−0.24**

Note. Positive Cohen's d values indicate higher scores for girls. *$p < .05$, **$p < .01$, ***$p < .001$

Means, standard deviations, and reliability estimates for all variables are presented in Table 4.2. Reliable gender differences were found for the majority of gender role measures. Boys conformed more strongly to masculine norms such as winning, violence, and risk-taking, whereas girls adhered more strongly to feminine norms such as thinness, appearance orientation, and domesticity. Although this study focused on variations within gender, average

gender differences consistent with prior studies were also observed in academic outcomes: girls reported greater perseverance and performed better in English, whereas boys endorsed a stronger growth mindset and earned better grades in maths.

Intercorrelations among the observed variables (Table 4.3) showed that when significant correlations were found, adherence to traditional gender norms (except for domesticity) tended to associate with a weaker growth mindset, reduced perseverance, and increased self-handicapping. This is true for both subjects and for boys and girls alike. Furthermore, in both subjects, growth mindset and perseverance were positively associated with academic achievement, whereas self-handicapping was negatively associated with achievement.

Gender Role Profiles Among Adolescent Boys and Girls

Fit indices for the 2- to 6-profile solutions among boys and girls can be found in Table 4.4. BLRT tests were significant for all the solutions and provided limited information to determine the optimal number of profiles. Changes in information criteria were also plotted to aid the model selection (see Figures A1 and A2 in the Appendix at the end of this chapter). These plots showed a clear inflection point at three profiles for both boys and girls. Inspection of the 3-profile solution among boys confirmed that these profiles were distinct and theoretically interpretable. Furthermore, the classification accuracy was reasonably high for the 3-profile solution (entropy = .81). Therefore the 3-profile solution was retained as the final solution for boys.

Although the scree-like plot similarly pointed to a 3-profile solution among girls, entropy values indicated that the classification quality was suboptimal for the 3-profile model (entropy = .67), and that moving to a 4-profile solution substantially improved classification accuracy (entropy = .76). Comparing the 3- and 4-profile solutions confirmed the added value of the 4-profile model, which resulted in an additional group with a unique pattern of gender role adherence. Consequently, the 4-profile model was retained as the final solution for girls.

Table 4.3 Intercorrelations among variables for boys (below the diagonal) and girls (above the diagonal)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Emotional control		**.15**	**.21**	**.56**	**.23**	**.17**	.00	**-.15**	-.07	**-.15**	**-.12**	.06	-.07	**-.19**	**-.17**	.08	-.07
2 Winning	**.17**		**.27**	.10	**.22**	.06	.08	-.01	-.06	-.11	-.07	.03	.06	.00	-.08	-.06	.05
3 Violence	**.28**	**.30**		**.17**	**.33**	.11	.05	-.02	**-.29**	**-.16**	**-.31**	**.16**	-.05	-.11	**-.37**	**.20**	-.06
4 Self-reliance	**.44**	**.18**	**.14**		**.20**	**.18**	-.03	.03	**-.18**	**-.23**	**-.22**	**.22**	-.03	**-.30**	**-.30**	**.21**	-.03
5 Risk-taking	**.22**	**.33**	**.35**	**.16**		**.15**	.04	-.07	**-.22**	-.05	-.11	**.21**	-.06	-.05	**-.19**	**.18**	-.07
6 Thinness	.07	-.03	.06	.11	-.02		**.34**	**.27**	-.09	-.06	-.03	.11	.02	-.05	-.11	.09	-.08
7 Appearance orientation	**-.13**	**.23**	.06	-.02	**.12**	**.20**		**.35**	**.19**	.00	.01	.11	.03	.02	.00	.09	**-.13**
8 Romantic relationship	**-.20**	.07	-.05	-.06	.06	.05	**.31**		.04	-.02	-.07	**.18**	-.07	.00	-.04	**.22**	**-.17**
9 Domestic	**-.15**	.01	**-.16**	**-.14**	-.08	.00	**.20**	**.17**		.06	**.18**	**-.24**	-.05	.00	**.16**	**-.18**	**-.19**
10 English mindset	**-.13**	.04	**-.15**	**-.12**	-.09	**-.15**	-.07	-.01	.07		**.38**	**-.39**	**.14**	**.33**	**.17**	**-.19**	-.04
11 English perseverance	**-.23**	-.08	**-.27**	**-.33**	**-.19**	-.06	.07	.02	**.21**	**.42**		**-.46**	**.18**	**.13**	**.46**	**-.33**	-.11
12 English self-handicapping	**.14**	**.17**	.10	**.30**	**.27**	**.17**	**.14**	**.19**	-.11	**-.31**	**-.40**		**-.15**	**-.18**	**-.33**	**.67**	-.03
13 English achievement	**-.14**	.04	-.08	-.03	**-.15**	**-.13**	-.08	-.08	-.02	**.19**	**.14**	**-.26**		**.17**	**.17**	**-.23**	**.55**
14 Maths mindset	**-.13**	.06	-.03	**-.23**	-.08	**-.17**	-.07	-.03	.11	**.34**	**.21**	**-.27**	**.28**		**.40**	**-.34**	**.27**
15 Maths perseverance	**-.18**	-.07	**-.15**	**-.28**	-.11	-.07	-.03	.07	**.21**	.06	**.41**	**-.35**	**.28**	**.39**		**-.52**	**.14**
16 Maths self-handicapping	**.18**	**.17**	.10	**.31**	**.23**	**.14**	**.18**	**.15**	**-.13**	**-.17**	**-.27**	**.65**	**-.30**	**-.45**	**-.55**		**-.20**
17 Maths achievement	-.07	.00	-.03	.00	-.09	**-.13**	**-.21**	-.06	**-.13**	**.14**	.06	**-.21**	**.61**	**.35**	**.41**	**-.39**	

Note. Significant correlations at the .05 level are shown in bold.

Table 4.4 Fit indices for latent profile analyses

Profile	LL	#fp	AIC	CAIC	BIC	SABIC	*p*BLRT	Entropy
Boys								
2	-3823.50	28	7703.00	7835.26	7807.26	7718.45	<.001	.77
3	**-3779.18**	**38**	**7634.35**	**7813.85**	**7775.85**	**7655.33**	**<.001**	**.81**
4	-3753.39	48	7602.77	7829.51	7781.51	7629.27	<.001	.81
5	-3730.84	58	7577.68	7851.65	7793.65	7609.70	<.001	.81
6	-3708.86	68	7553.72	7874.93	7806.93	7591.26	<.001	.83
Girls								
2	-3632.20	28	7320.40	7451.25	7423.25	7334.46	<.001	.61
3	-3579.40	38	7234.80	7412.38	7374.38	7253.88	<.001	.67
4	**-3545.84**	**48**	**7187.68**	**7411.99**	**7363.99**	**7211.78**	**<.001**	**.76**
5	-3513.67	58	7143.33	7414.38	7356.38	7172.45	<.001	.79
6	-3486.28	68	7108.55	7426.34	7358.34	7142.70	<.001	.77
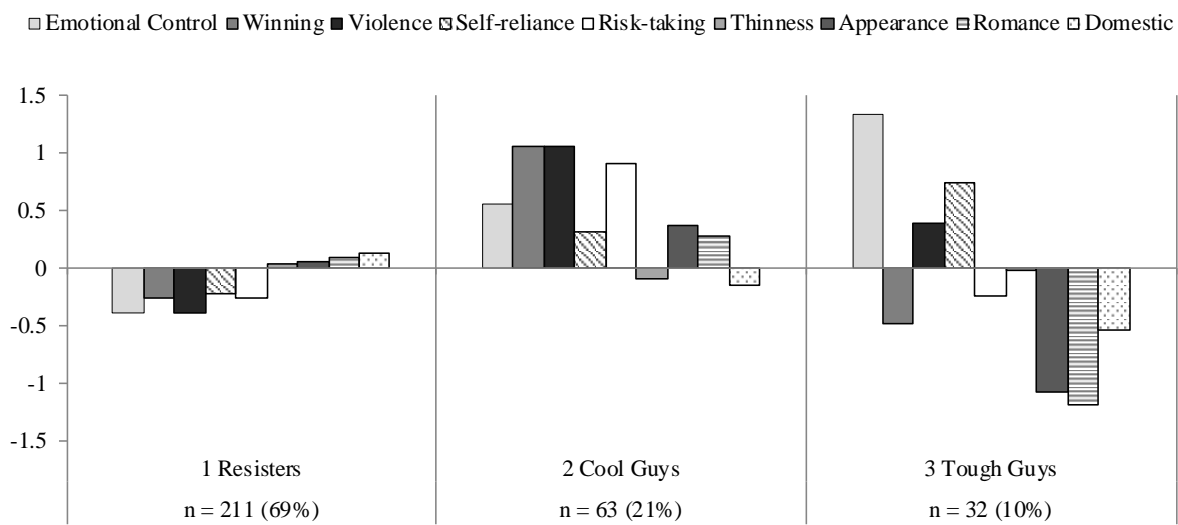
Figure 4.1 Final profile solution among boys
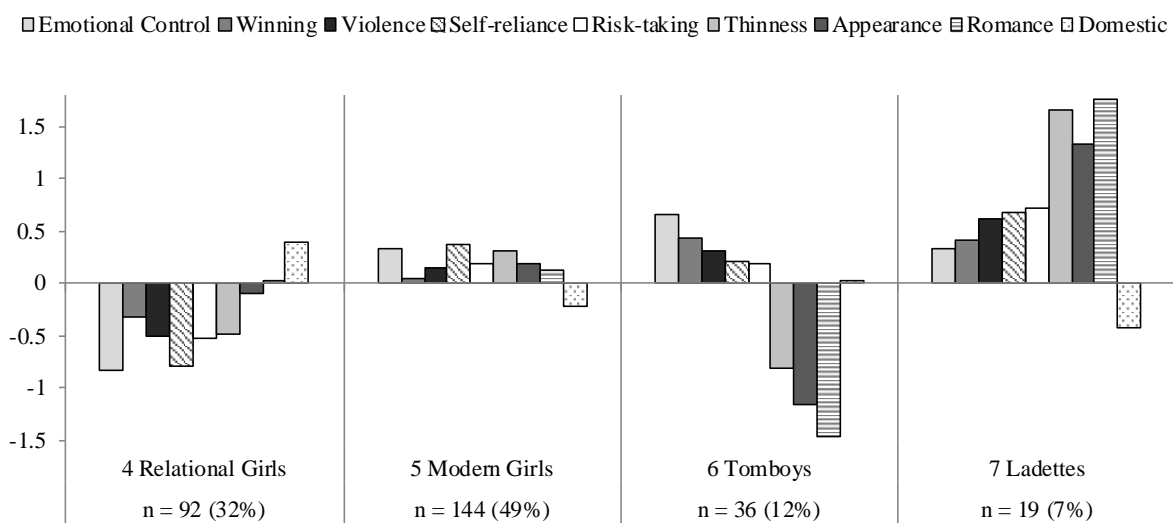
Figure 4.2 Final profile solution among girls

Gender role profiles for boys and girls are graphically presented in Figure 4.1 and Figure 4.2, and the means of each indicator for different profiles are reported in Table 4.5 and Table 4.6. When naming the profiles, I compared the quantitatively derived profiles to various images of boys and girls previously identified in qualitive studies and drew on existing labels whenever possible. Overall, three groups of boys were identified—resisters, cool guys, and tough guys—each displaying a distinct pattern of gender role adherence. Boys in Profile 1 were the most prevalent group of boys in this study (69%). They could be distinguished from all other boys by their resistance to traditional masculinity and ambivalence toward traditional femininity. Boys in Profile 2 were characterised by a macho and cool image. They strongly endorsed conventional ideals of masculinity, especially winning, violence, and risk-taking. Furthermore, they placed importance on appearance and romance. A fifth of the adolescent boys displayed this cool masculinity. Lastly, boys in Profile 3 portrayed an emotionally tough and 'hard' image. Not only did they uphold the masculine norms of emotional stoicism, extreme self-reliance, and physical aggression, they were also the only group of boys who distanced themselves from stereotypically feminine qualities. This was the smallest profile and comprised only 10% of the boys.

Table 4.5 Mean differences in profile indicators among subgroups of boys

Variable	1 Resisters	2 Cool	3 Tough
Emotional control	-0.39_b	0.55_a	1.33_a
Winning	-0.26_b	1.05_a	-0.48_b
Violence	-0.40_b	1.05_a	0.38_a
Self-reliance	-0.22_b	0.32_a	0.75_a
Risk-taking	-0.25_b	0.91_a	-0.25_b
Thinness	0.04	-0.10	-0.02
Appearance orientation	0.05_a	0.36_a	-1.07_b
Romantic relationship	0.10_a	0.28_a	-1.19_b
Domestic	0.13_a	-0.14_{ab}	-0.54_b

Note. Numbers that do not share a letter are significantly different at $p < .05$.

Table 4.6 Mean differences in profile indicators among subgroups of girls

Variable	4 Nice	5 Modern	6 Tomboys	7 Ladettes
Emotional control	-0.82_b	0.33_a	0.66_a	0.32_a
Winning	-0.32_b	0.04_a	0.43_a	0.42_a
Violence	-0.49_b	0.16_a	0.32_a	0.63_a
Self-reliance	-0.78_b	0.37_a	0.22_a	0.68_a
Risk-taking	-0.52_b	0.20_a	0.19_a	0.72_a
Thinness	-0.49_c	0.31_b	-0.80_c	1.66_a
Appearance orientation	-0.10_b	0.19_b	-1.16_c	1.33_a
Romantic relationship	0.01_b	0.14_b	-1.46_c	1.77_a
Domestic	0.41_a	-0.22_b	0.00_{ab}	-0.43_b

Note. Numbers that do not share a letter are significantly different at $p < .05$.

Four groups of girls were identified, namely relational girls, modern girls, tomboys, and ladettes. Girls in Profile 4 (32%) were labelled as relational because they strongly rejected the norms of restrictive emotionality and extreme self-reliance. In other words, these girls were comfortable with connecting with others emotionally and asking others for help. Compared with other groups, relational girls also dismissed the majority of traditional gender norms, including the thin body ideal. Girls in Profile 5 embodied a hybrid version of femininity. They attached moderate importance to looking thin, attractive, and romantically desirable. Meanwhile, they endorsed the masculine norms of emotional control and extreme self-reliance. Put differently, these modern girls experienced discomfort in openly expressing feelings or seeking help from others. This group was the most prevalent profile and consisted of 49% of girls. Profile 6 (12%) corresponded to a group of boylike girls who are commonly thought of as tomboys: they were completely uninterested in traditional feminine qualities and enacted stereotypically masculine behaviours. Lastly, I identified a small group of girls who could be labelled as ladettes or wild girls (7%). Similar to modern girls, ladettes embodied both masculine and feminine qualities but in a more extreme manner. They fully embraced traditional masculine norms while presenting themselves as romantically desirable and overtly feminine in appearance.

In sum, based on adolescents' overall patterns of gender role conformity, this study identified seven emergent subgroups of adolescents (resister boys, cool guys, tough guys, relational girls, modern girls, tomboys, ladettes) and revealed the prevalence of each profile.

Associations Between Gender Role Profiles and Academic Outcomes

The next aim was to examine whether students' patterns of gender role conformity were associated with their concurrent mindset and engagement in English and maths. Figure 4.3 and Figure 4.4 display the patterns of mindset, perseverance, and self-handicapping for the seven profiles, and the mean values of these outcomes are reported in Table 4.7 and Table 4.8. Consistent with the expectations, profiles resisting traditional gender norms were more academically successful than profiles conforming to these restrictive norms. Among the three groups of boys, resisters showed the most adaptive patterns of mindset and engagement. Compared with other boys, resisters consistently showed the highest levels of growth mindset and perseverance, as well as low levels of self-handicapping in English and maths. In contrast, cool guys showed arguably the least adaptive patterns of mindset and engagement. They reported low levels of perseverance and the highest levels of self-handicapping, especially in English. They were also the only group who held different mindsets for different subjects: they reported a fixed mindset in English but a growth mindset in maths. Tough guys displayed a somewhat mixed pattern of mindset and engagement. Across both subjects, they

showed equally low levels of self-handicapping as resister boys. However, similar to cool guys, tough guys reported a reduced tendency to persevere in learning, especially in English.

Among the four groups of girls, relational girls consistently displayed the most adaptive patterns of mindset and engagement. They reported the highest levels of growth mindset and perseverance, as well as the lowest levels of self-handicapping across both subjects. In contrast, ladettes and modern girls could be considered at risk academically. Compared with other girls, these two groups were characterised by low levels of growth mindset and perseverance, and high levels of self-handicapping, especially in maths. Tomboys showed a somewhat mixed pattern. Across both subjects, tomboys reported equally low levels of self-handicapping as relational girls, but were much less likely to hold a growth mindset or persist through challenges. This was particularly the case in maths.

Lastly, I investigated the longitudinal associations between students' gender role profiles and their academic achievement at the end of secondary school. Students' prior achievement was included as a covariate to understand the independent effect of gender role profiles on students' subsequent performance. Differences in English and maths performance across different profiles of boys and girls are reported in Tables 3 and 4. Among the three groups of boys, tests of overall mean differences were significant for English achievement, χ^2 (2) = 14.29, $p < .001$, and marginally significant for maths achievement χ^2 (2) = 5.13, $p = .08$. Pairwise comparisons indicated that resister boys obtained the highest scores in English and maths, whereas cool guys obtained the lowest scores in both subjects. Tough guys achieved somewhat mixed results. Compared with cool guys, tough guys performed equally poorly in English but showed a trend towards better performance in maths.

Among the four groups of girls, a test of overall mean differences was marginally significant for English achievement, χ^2 (3) = 6.53, $p = .09$. Pairwise comparisons indicated that relational girls outperformed all other girls in English. The four groups of girls, however, did not differ significantly from each other on maths achievement, χ^2 (3) = 2.78, $p = .43$. This was somewhat surprising given that the four profiles displayed distinct patterns of mindset and engagement in maths.
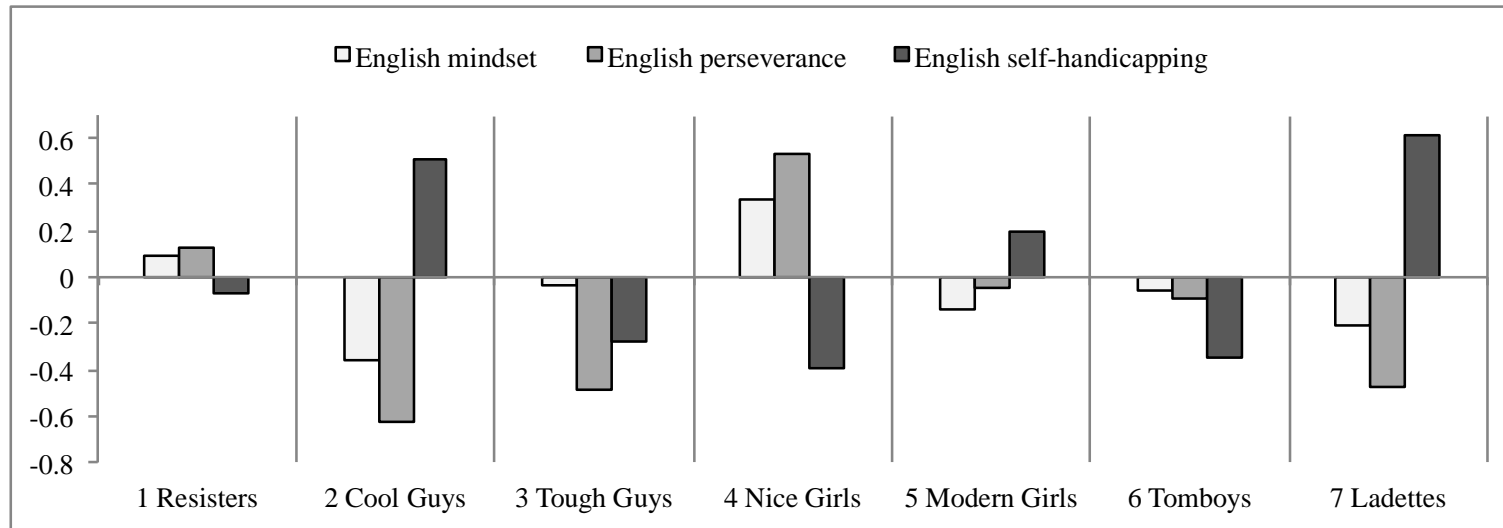
Figure 4.3 Patterns of English mindset and engagement across profiles
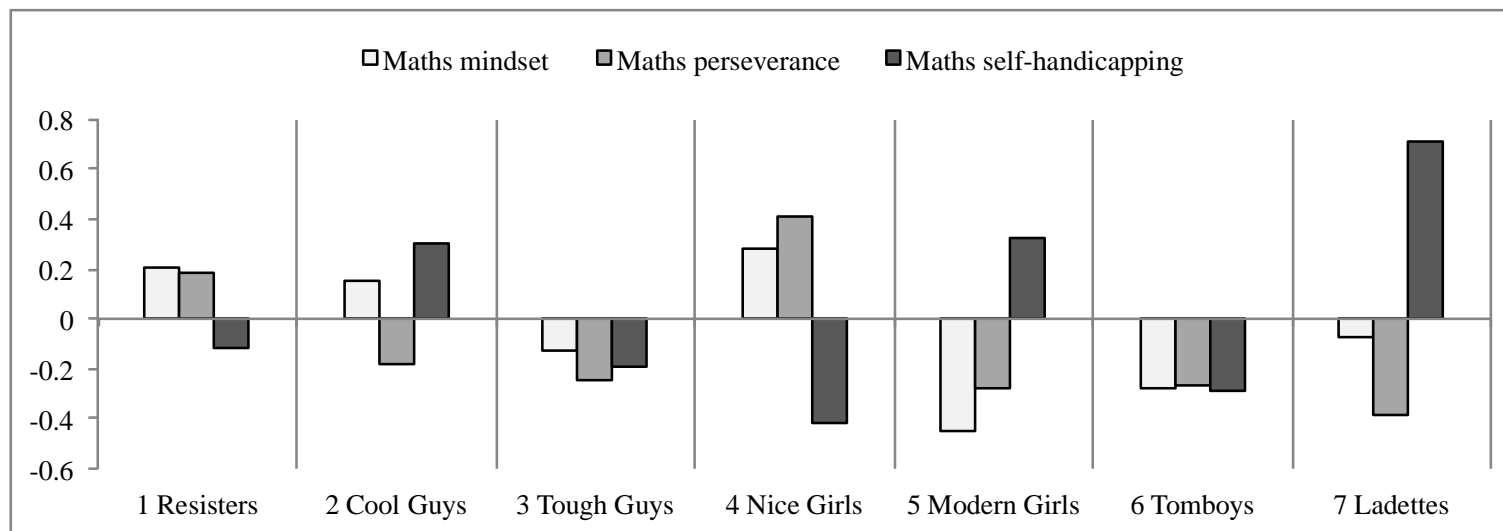
Figure 4.4 Patterns of maths mindset and engagement across profiles

Table 4.7 Differences in academic outcomes among profiles of boys

Variable	1 Resisters	2 Cool	3 Tough
Cross-sectional			
English mindset	.09$_a$ (.07)	-.36$_b$ (.16)	-.03$_{ab}$ (.20)
English perseverance	.13$_a$ (.06)	-.63$_b$ (.13)	-.48$_b$ (.16)
English self-handicapping	-.07$_b$ (.07)	.51$_a$ (.15)	-.28$_b$ (.18)
Maths mindset	.20 (.06)	.15 (.12)	-.13 (.22)
Maths perseverance	.18$_a$ (.06)	-.18$_b$ (.14)	-.25$_b$ (.16)
Maths self-handicapping	-.11$_b$ (.07)	.30$_a$ (.16)	-.19$_b$ (.20)
Longitudinal			
English achievement	-.07$_a$ (.06)	-.56$_b$ (.12)	-.42$_b$ (.17)
Maths achievement	.15$_a$ (.05)	-.13$_b$ (.10)	.12$_{ab}$ (.15)

Note. Means with different subscripts in the same row are significantly different at p < .05. Values in parentheses are standard errors. Prior achievement was included as a covariate when predicting achievement outcomes.

Table 4.8 Differences in academic outcomes among profiles of girls

Variable	4 Nice	5 Modern	6 Tomboys	7 Ladettes
Cross-sectional				
English mindset	.33$_a$ (.10)	-.14$_b$ (.09)	-.05$_b$ (.20)	-.21$_b$ (.27)
English perseverance	.54$_a$ (.10)	-.05$_b$ (.09)	-.09$_b$ (.22)	-.48$_b$ (.25)
English self-handicapping	-.40$_b$ (.11)	.20$_a$ (.08)	-.35$_b$ (.17)	.61$_a$ (.31)
Maths mindset	.29$_a$ (.10)	-.45$_b$ (.10)	-.28$_b$ (.20)	-.07$_{ab}$ (.23)
Maths perseverance	.41$_a$ (.10)	-.28$_b$ (.09)	-.27$_b$ (.21)	-.38$_b$ (.29)
Maths self-handicapping	-.42$_b$ (.10)	.33$_a$ (.09)	-.29$_b$ (.16)	.71$_a$ (.29)
Longitudinal				
English achievement	.44$_a$ (.10)	.13$_b$ (.08)	.10$_b$ (.16)	.10$_b$ (.14)
Maths achievement	-.11 (.08)	-.11 (.07)	.08 (.12)	-.22 (.17)

Note. Means with different subscripts in the same row are significantly different at p < .05. Values in parentheses are standard errors. Prior achievement was included as a covariate when predicting achievement outcomes.

To sum up, this study replicated mean-level differences in mindset, engagement, and achievement between boys and girls. However, by focusing on variations within gender, this study further showed that two thirds of the boys were motivated, engaged, and performed well in school. In contrast, while girls as a group are often considered diligent and high achieving students, the findings highlighted the worrying patterns of motivation, engagement, and achievement among ladettes and modern girls.

Discussion

Research on educational gender gaps has primarily focused on average gender differences in school motivation, engagement, and achievement. The nuanced findings from the present study illustrate the importance for quantitative researchers to move beyond a binary perspective and pinpoint which boys and which girls are falling behind in school. Using latent profile analysis, the present study identified seven emergent profiles of gender role conformity among adolescents and documented each profile's prevalence. Further, these gender role profiles showed differential relations with students' motivation, engagement, and

achievement in English and maths. A focus on within-gender variations indicated that two thirds of the boys were doing fine in school, while a sizable proportion of girls could be considered at risk. These results counter the near invisibility of well-performing boys and underachieving girls in academic discourse. In the following, I compare the quantitatively derived profiles to existing images of boys and girls in the literature and discuss how rigid adherence to traditional gender norms can limit the academic potential of both boys and girls.

Subgroups of Adolescent Boys and Girls in School

Three groups of boys (resisters, cool guys, tough guys) and four groups of girls (relational girls, modern girls, tomboys, ladettes) emerged in the study, each showing a unique pattern of gender role conformity. These profiles map well onto existing images of boys and girls documented in prior studies, suggesting that the profiles identified here are likely to be robust.

Among boys, I identified a group of cool guys who behaved in a macho manner while placing importance on appearance and romance. Since physical dominance, attractiveness, and heterosexual success are robustly linked to boys' popularity in adolescence (Adler et al., 1992; Rose et al., 2011), cool guys are likely to be a socially visible, high-status group in school. Adolescents similar to this profile have been widely studied under a number of different labels, notably the 'laddish boys' in the UK (Francis, 1999; Jackson, 2006a) and the 'jocks' in the US (Pascoe, 2003). Additionally, I identified a profile consistent with the image of tough guys described in previous studies. In a study of adult men in the US, Smiler (2006) similarly found a connection between a tough guy identity and endorsement of emotional stoicism, extreme self-reliance, and physical aggression. Although both cool guys and tough guys in this study displayed aggressive and macho behaviour, these two profiles could be distinguished by their differential endorsement of feminine norms. This finding speaks to the importance of examining young people's adherence to both their own gender's and the other gender's norms to fully understand how they 'do gender' in school.

Furthermore, I identified a group of boys who showed an inclusive masculinity: they resisted the norms of emotional stoicism, competitiveness, violence, extreme self-reliance, and risk-taking. Although research has predominantly focused on boys and men who conform to conventions of masculinity, this study showed that resistance to traditional masculinity was prevalent among adolescent boys (69%), and boys upholding traditional male gender norms were in the minority. This pattern is strikingly similar to the findings of Way et al. (2014) in their qualitative study in the US. Following a group of boys from 6th to 11th grades, Way et al. concluded that 71% of the boys resisted conventions of masculinity in early and mid-adolescence. Additionally, in a study of US adult men, Smiler (2006) found that 'average

126

Joe', 'family man', and 'sensitive new man' were the most frequently endorsed identities, and identification with these images were associated with nonadherence or resistance to traditional masculine norms. Taken together, findings across these diverse samples indicate that the prevalence of resistance to traditional masculinity may not be limited to a particular developmental stage or context. Despite the clear academic and socio-emotional benefits associated with resistance to traditional masculinity during adolescence (Gupta et al., 2013; A. A. Rogers, DeLay, et al., 2017; Santos et al., 2013), there is a lack of research into the factors that may support boys' resistance to traditional masculine norms (for an exception, see Way, 2011). Future research should be careful in labelling boys and men who demonstrate nonconformity to gendered norms as subordinate or marginal (Paechter, 2012), and instead examine what facilitates their healthy resistance to traditional masculinity.

Among girls, tomboys' emergent pattern of gender role conformity supports previous findings and suggests that a tomboy identity is characterised by simultaneously embracing masculinity while rejecting femininity (Paechter, 2010). Ladettes similarly enacted stereotypically masculine behaviours, but also invested heavily in an overtly feminine appearance and romantic relationships. Previous studies show that teachers and students in England schools are able to distinguish between tomboys and ladettes: while the former are viewed as part of the boys, ladettes are portrayed as wearing heavy makeup and tight clothing, and being attractive to boys (Jackson, 2006b). Since physical appearance and romantic success are closely tied to girls' popularity during adolescence (Adler et al., 1992; Holland & Eisenhart, 1990), ladettes are likely to have a high social standing in school. In addition, I found a group of relational girls who rejected the majority of gendered norms and showed the opposite pattern of gender role conformity to ladettes. Not only did relational girls shun competitiveness and aggression, they also rejected the thin body ideal that was highly valued among ladettes. This is consistent with the findings of Paechter and Clark (2016), who similarly reported that some girls in their study positioned themselves in opposition to the 'cool girls' in school.

Finally, nearly half of the girls were classified as modern girls. Similar to ladettes, the modern girl profile was characterised by a juxtaposition of masculinity and femininity but in a less extreme manner. In a recent study, adolescent girls claimed that 'we're supposed to look like girls, but act like boys' (L. O. Rogers et al., 2020). Echoing this sentiment, modern girls subscribed to conventional ideals of feminine beauty, while striving for an appearance of strength by keeping problems to themselves and disconnecting from others emotionally. Given the crucial role of interpersonal connection in human thriving (Baumeister & Leary, 1995), this pattern of gender role conformity is likely to engender tensions for modern girls

(and ladettes): they might be simultaneously constrained by traditional norms about feminine appearance while unable to exercise the feminine strength of building connections with others.

Overall, the quantitatively derived profiles map well onto existing images of schoolboys and schoolgirls in the literature. This provides some evidence for the validity of the seven profiles, and enhances the generalisability of masculinity and femininity typologies developed in small-scale research. Additionally, I showed the relative size of each profile in a large sample of English secondary students, and suggest that prior studies may have focused on a small subset of young people who are socially visible, while overlooking the voice and experience of those in the majority.

Which Boys and Which Girls Are Falling Behind?

By moving beyond a binary perspective on gender, the current study demonstrates that adherence or resistance to a range of masculine and feminine norms can work in tandem to influence adolescents' academic success. Specifically, boys and girls who conformed to multiple gendered norms were less academically successful than those who rejected multiple norms. This result is consistent with prior studies showing the academic costs of adhering to traditional gender expectations (Ueno & McWilliams, 2010).

Among boys, cool guys—who strongly endorsed all masculine norms—showed reduced perseverance, heightened self-handicapping, and the poorest performance in English and maths. Previous studies show that traditional masculinity can undermine boys' achievement by reducing their likelihood of seeking help in academic contexts (Kessels & Steinmayr, 2013; Leaper et al., 2019). The findings suggest that reduced task persistence and defensive effort withdrawal may represent additional pathways through which traditional masculinity affects boys' achievement. This is consistent with qualitative studies documenting boys' low effort as a self-worth protection strategy, as failure without trying does not imply low ability, and success without effort can signal true talent (Jackson, 2002). Nevertheless, this study qualified previous findings by showing that these maladaptive behaviours were only limited to a small group of cool guys. In fact, the largest profile of boys, namely resisters, reported a growth mindset and willingness to persevere with schoolwork, and were performing well in English and maths. These results challenge the simplistic framing of the underachieving boys debate and present a more accurate picture of boys' problems in education.

Although girls on average outperform boys in secondary school (Voyer & Voyer, 2014), the results highlight the continuing disadvantage of some girls. Ladettes and modern girls—who made up half of the girls in the sample—could be considered academically at risk:

they reported a fixed mindset, reduced perseverance, and heightened self-handicapping in English and maths. A recent study revealed that girls were increasingly likely to give up and self-handicap after transitioning to secondary school (Burns et al., 2019). The results suggest that the growing disengagement among girls is likely driven by ladettes and modern girls. In contrast, the female advantage in school is primarily attributed to relational girls. They exhibited the most adaptive patterns of mindset and engagement in both subjects, and considerably outperformed other girls in English. Compared to other groups of girls, relational girls firmly rejected physical aggression and risky behaviours. As a result, they may have more positive relationships with their teachers and peers, which can protect them against the decline in motivation and engagement in secondary schools (Burns et al., 2019).

The four groups of girls, however, did not differ significantly in their maths achievement. This is the case even though the four groups varied in their gender role profiles as well as in mindset and engagement. This finding aligns with previous studies showing that adolescent girls' degree of gender role conformity were unrelated to their maths performance (Yavorsky & Buchmann, 2019). This suggest that some other factors, such as gender stereotypes or gender differences in self-efficacy, might suppress girls' maths achievement across the board (Plante et al., 2013). Future research could investigate multiple factors known to inhibit girls' maths performance and evaluate their relative contributions to the gender gap. This knowledge is critical for fine-tuning interventions designed to ameliorate gender disparities in maths.

Prior studies investigating within-gender variability in achievement often rely on male-only or female-only samples, and provide gender-specific explanations as to why some boys or girls perform less well academically. By studying both genders together and assessing adolescents' conformity to their own gender's and the other gender's norms, the current study reveals two general mechanisms through which gender role adherence undermines boys' and girls' achievement. First, adherence to traditional gender roles can interfere with boys' and girls' academic success when the task or domain is experienced as incongruent with their gender roles (Elmore & Oyserman, 2012; Kessels et al., 2014). Among the seven profiles identified in this study, tough guys and tomboy girls adhered to masculine norms and rejected feminine norms. These two groups also performed well in maths but not in English, suggesting that doing well in a stereotypically feminine subject might be viewed as inappropriate for their gender roles. In contrast, resister boys and relational girls rejected rigid constructions of gender, and this gender role expansion was associated with positive academic adjustment. These two groups were willing to display effort and engagement even in subjects that could be viewed as counter-stereotypical to their gender.

Second, young people who adhere to gendered ideals of behaviour and appearance may experience greater conflict between peer status and academic commitment. Cool guys, modern girls, and ladettes all displayed gender-normative behaviours, a focus on appearance, and a desire for opposite-sex attention, which have been associated with increased peer status during adolescence (Mayeux & Kleiser, 2019). These three groups also showed problematic patterns of motivation, engagement, and achievement across both subjects. This is consistent with prior studies showing that adolescents who are preoccupied with peer approval tend to withhold effort in school (Yu & McLellan, 2019), as high effort can detract from both boys' and girls' popularity (Heyder & Kessels, 2017).

In sum, findings from the present study challenge the practice of treating boys and girls as two uniform groups in gender gap research. The findings further suggest that explanations that have been traditionally used for boys' underachievement, including (a) the incompatibility between gender roles and the image of certain subjects and (b) the conflict between schoolwork and popularity, apply to both genders.

Implications for Practice

Given the academic costs associated with rigid adherence to traditional gender norms and the benefits associated with resistance, fostering resistance to traditional masculinity and femininity may reduce the gender role conflict experienced by some young people and increase their school engagement and achievement. One recent study found that even when young men rejected traditional masculine norms privately, they felt pressure to conform to these norms because they overestimated their peers' support for such norms (Van Grootel et al., 2018). However, as discussed earlier, findings from the current research and several other studies indicate that resistance to masculine ideals may be the rule rather than the exception. Highlighting the prevalence of resistance can debunk some students' false beliefs and allow them to act more in line with the real norm and their true self (Van Grootel et al., 2018).

In addition, young people's peer relationships are key developmental contexts that shape their gender role attitudes (Kågesten et al., 2016). Although peer groups can create pressure for gender role conformity (Adler et al., 1992), reliable and trusting friendships can provide young people with a safe space to challenge traditional gender norms. Studies show that boys with close male friendships are more likely to maintain their resistance to emotional stoicism, physical aggression, and extreme self-reliance (Way, 2011). Likewise, girls who are secure and confident in their friendships tend to be less concerned about striving for feminine beauty, romance, or popularity (Gulbrandsen, 2003). Cultivating positive and trusting friendships in adolescence may therefore provide young people with the necessary social capital to resist gender norms.

Limitations and Future Directions

This study has several limitations that could be addressed in future research. First, although this study utilised a large sample drawn from four different schools, the identified profiles are still sample-specific and the generalisability of the profiles warrants additional investigation. Studies using a different sample may reveal additional gender role profiles. Even when similar profiles emerge in other studies, the size of these profiles is likely to differ across contexts and developmental stages. For instance, there may be age-related changes in how students construct their masculinities or femininities. Research suggests that many girls cease to be tomboys when they enter adolescence (Carr, 2007; Paechter, 2010). As a result, a longitudinal study that identifies gender role profiles across multiple time points may show that some girls gradually move out of the tomboy profile and into other profiles.

Additionally, although parallels have been drawn between the profiles identified in this study and existing images of boys and girls in the literature, these links are tentative. Future research would benefit from adopting a mixed-method approach, and conducting follow-up interviews with prototypical members of each profile. Data generated from this qualitative phase can also provide a richer understanding of the processes by which young people accommodate or resist traditional gender expectations.

Conclusion

The majority of research on gender gaps in school focuses on average differences between genders, rendering many well-performing boys and low-achieving girls invisible. To unpack the vast variability within each gender, the present study quantitatively mapped out the different ways adolescents enacted their gender and pinpointed which boys and girls were most at risk academically. The findings illustrate the promise of shifting the focus from 'boys versus girls' to 'which boys and which girls' in educational gender gap research.

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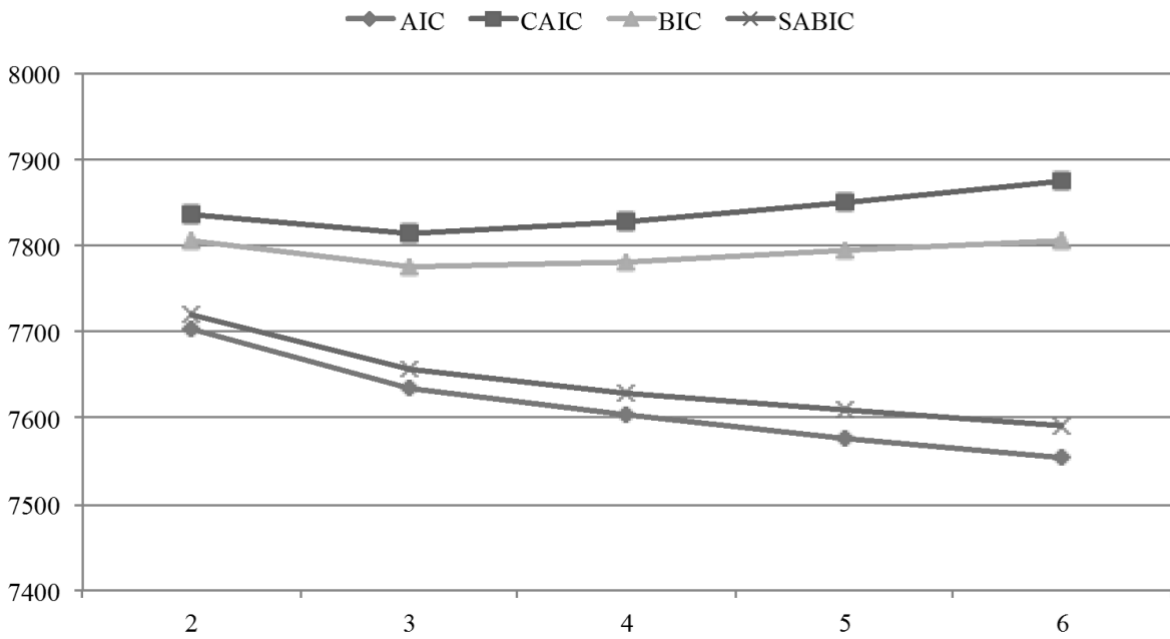
Boys

Figure A1. Elbow plot for latent profile analyses (boys)

Girls
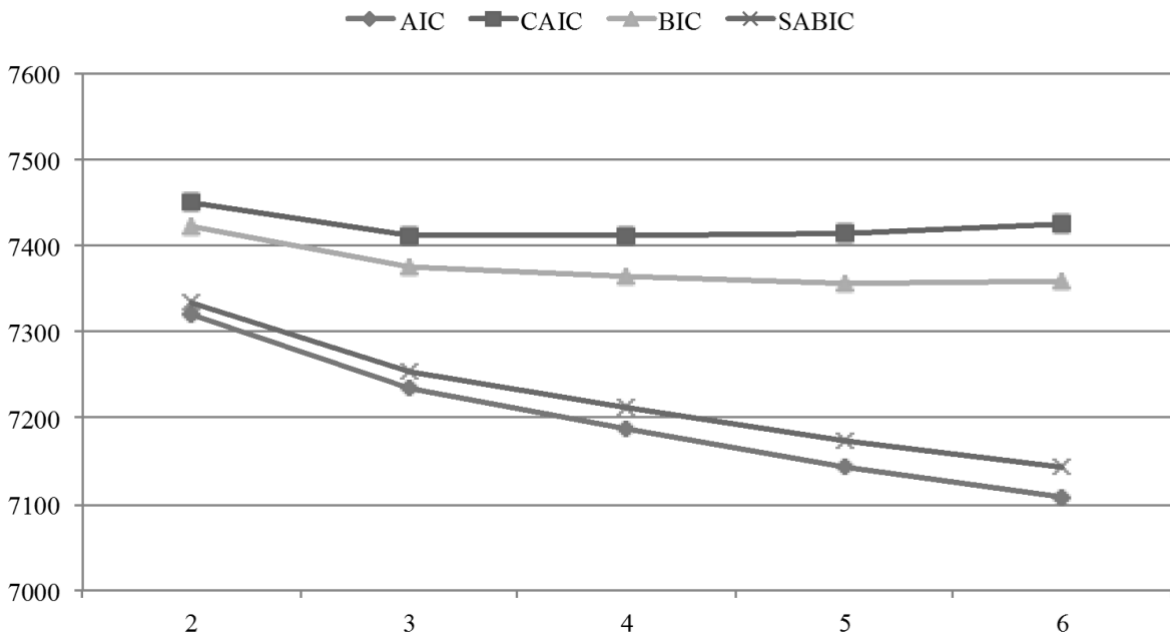
Figure A2. Elbow plot for latent profile analyses (girls)

Chapter 5 General Discussion

In the UK and many other countries, girls show higher levels of school engagement and achievement than boys, and gender differences in motivation may underlie these trends. The purpose of this thesis is to provide a comprehensive understanding of the motivational processes contributing to the gender gap in school engagement and achievement. To this end, three empirical studies were conducted. This chapter first presents a summary of findings from the three studies to frame the discussion that follows. As key findings have been discussed within each paper, this chapter focuses on integrating the findings across studies and highlighting their collective contributions. Practical implications for improving boys' and girls' school outcomes are considered. Limitations and future directions are also outlined, followed by concluding remarks.

Summary of Findings: Studies 1-3

Study 1 identified naturally occurring mindset-related motivational profiles as well as the predictors and achievement outcomes of these profiles among 535 students in Years 10 and 11. Latent profile analyses revealed four motivational profiles, labelled as *Growth-Focused*, *Ability-Focused*, *Growth-Competitive*, and *Disengaged*. Girls were more commonly found in the *Growth-Focused* profile and boys in the *Ability-Focused* and *Disengaged* profiles. In addition, the four profiles differentially predicted student performance on high-stakes exams at age 16. The two profiles underpinned by a growth mindset consistently performed better than the two profiles underpinned by a fixed mindset.

Study 2 investigated gender differences in academic and social goals among 536 Year 9 students and tested whether these differences mediated the link between gender and self-handicapping. The results indicated higher performance goals, higher social demonstration goals, and a greater self-handicapping tendency among boys. Although both performance-avoidance and social demonstration goals independently predicted self-handicapping, social demonstration goals uniquely accounted for the relationship between gender and self-handicapping, beyond the effects of performance-approach goals.

Study 3 explored adolescents' gender role profiles as well as their implications for academic motivation, engagement, and achievement among 597 students in Years 10 and 11. Profile analyses identified three groups of boys (resisters, cool guys, tough guys) and four groups of girls (relational girls, modern girls, tomboys, ladettes), each displaying a unique pattern of gender role conformity. In addition, these gender role profiles were differentially associated with students' motivation, engagement, and achievement. Two thirds of the boys showed resistance to traditional masculinity and were doing fine in school, whereas half of the girls, namely modern girls and ladettes, displayed problematic patterns of motivation,

engagement, and achievement. These findings transcend the often-binary understanding of the gender gap and provide nuances to the debate on boys' underachievement in school.

Contributions to Knowledge

In addition to a common focus on gender and motivation, the three studies share several key motivational constructs. Mindsets and achievement goals were examined in two studies, and self-handicapping were assessed in all three studies. In this section, I synthesise the findings across the three studies and discuss their collective contributions to the following areas of research: (a) mindsets and achievement goals, (b) self-handicapping, and (c) gender, motivation, and school success.

Mindsets and Achievement Goals

There has been an explosion of research and interest in students' mindsets in recent years. The appeal of Dweck's mindset theory partly lies in its parsimony. The growth versus fixed mindset distinction closely corresponds to her earlier work on mastery versus performance goals (Dweck, 1986), as well as mastery-oriented versus helpless patterns of behaviour in achievement settings (Dweck, 1975). Path analyses support that growth mindset students tend to hold positive effort beliefs, pursue mastery goals, and respond to challenges in a mastery-oriented manner; in contrast, fixed mindset students hold negative effort beliefs, pursue performance goals, and show signs of helplessness when encountering setbacks (Blackwell et al., 2007; Robins & Pals, 2002). Taken together, Dweck's programmatic research spanning achievement-related beliefs, goals, and behaviour outlines two distinct motivational frameworks or 'meaning systems' rooted in people's beliefs about the stability of their ability. Despite its simplicity and elegance, the one-to-one correspondence between mindsets, goals, and behaviour may not tell the full story. Study 1 shows that students holding the same mindset can differ in their goals and motivational frameworks. Fixed mindset may orient students to approach school tasks in either a defensive (*Ability-Focused*) or a low-effort (*Disengaged*) manner to avoid putting one's ability to the test. Growth mindset, on the other hand, enables students to focus on learning (*Growth-Focused*) or to engage in social comparison unencumbered by ability concerns (*Growth-Competitive*). These findings extend Dweck's original conceptualisations and point to a more dynamic set of relations between mindsets, achievement goals, and behavioural responses to setbacks.

Additional appeal of the mindset construct pertains to its far-reaching effects on student achievement. Studies 1 and 3 consistently demonstrate a longitudinal association between growth mindset and student performance on high-stakes examinations. These studies also allude to three potential moderators of the mindset effect implied in the literature. First, mindsets about intelligence may not have motivational value until it creates a system of

meaning with other beliefs and goals (Dweck, 2003). Children's mindsets begin to link with other beliefs, goals, and behavioural tendencies at around age 11 (Bempechat et al., 1991; Cain & Dweck, 1995; Pomerantz & Saxon, 2001) and do not reliably predict academic performance in primary school years (Gonida et al., 2006; Gunderson et al., 2018). As shown in Study 1, mindsets and related constructs coalesce into coherent motivational systems in adolescence to exert systematic influence on student achievement.

Second, the effect of mindset may only be visible when there is pressure. Typical procedures of Dweck's experiments include first manipulating a sense of success or failure via feedback before administering the focal tasks. Although fixed and growth mindset students act similarly in the success condition, their reactions diverge when they are confronted with setbacks (Hong et al., 1999). Studies 1 and 3 in this thesis successfully replicated the beneficial effects of growth mindset among a large group of adolescents ($n = 1,132$) in the last two years of compulsory secondary education—a period fraught with exam stress and anxiety (Putwain, 2009).

Third, measurement instruments may moderate the predictive utility of self-reported mindsets. In the original validation study, growth mindset questions were already plagued by social desirability responding when mindset was a new concept (Dweck et al., 1995). Studies 1 and 3 retained only fixed mindset questions to combat response bias given the current ubiquity of growth mindset language in schools. In addition, Studies 1 and 3 are among the few studies that compare students' mindsets across subjects. The modest latent correlations between students' English and maths mindsets ($\varphi = 0.29$ in Study 1; $\varphi = 0.36$ in Study 3) suggest that a general intelligence mindset might be too broad to be useful in the prediction of specific academic outcomes. Overall, more explicit attention should be paid to these three potential moderators in future research to understand when does a growth mindset predict student outcomes.

Study 1 also provides insights into when and for whom performance goals might be energising or debilitating. Although mastery goals are firmly rooted in a growth mindset, performance goals can be combined with either a growth or a fixed mindset. A combination of fixed mindset and ability performance goals is associated with maladaptive outcomes, whereas a combination of growth mindset and ability performance goals is linked to adaptive outcomes. These results parallel findings from research integrating achievement goal theory and self-determination theory. This line of enquiry demonstrates that performance goals are associated with positive outcomes when pursued for more autonomous reasons, but are associated with negative outcomes when pursued for more controlled reasons (Vansteenkiste et al., 2010). Taken together, these findings suggest that knowing students' levels of

performance goals alone provides relatively little information about their quality of motivation, because mindsets or types of motivational regulation may systematically alter the meaning of performance goals. As a result, researchers interested in students' underlying motivational differences may want to (a) examine people's dominant goals within a goal profile, or (b) bypass performance goals and instead measure mindsets or types of motivational regulation directly.

Lastly, findings from Studies 1 and 2 contribute to debate on the overlapping versus distinct nature of performance-approach and -avoidance goals. On the one hand, collapsing the two performance goals into a general factor resulted in worse model fit in both studies. In addition, performance-approach and -avoidance goals differentially predicted self-handicapping in Study 2, pointing to divergence between these constructs. On the other hand, latent correlations between the two goals exceeded .80 in both studies. Correlations of similar magnitude have been reported in the past (Bong et al., 2013; Linnenbrink-Garcia et al., 2012), and the strength of the association is only somewhat reduced among people who distinguish approaching success from avoiding failure ($r \approx .60$; Hangen et al., 2019). At a practical level, this means that achievement goal researchers should, at the very least, consider how to best handle the large correlation between the two goals in analysis. Study 2 illustrates the utility of commonality analysis as an alternative in the presence of two highly correlated predictors. At a theoretical level, our field needs to consider what it means to routinely observe these large correlations between the two performance goals. Although avoiding negative outcomes and approaching positive outcomes often represent independent end-states (e.g., not getting an F ≠ getting an A), these two goals might be increasingly aligned and confounded with each other in a competitive schooling system. When assessment is norm-referenced and success is framed in zero-sum terms, striving to be better than others also requires one to avoid doing worse than their peers. The context of high-stakes testing in Study 1 might partly explain why the two performance goals co-activated across motivational profiles in English and maths. Future studies can assess performance-approach and -avoidance goals in both core and non-core subjects or across multiple year groups to examine the role of context in shaping the strength of the relation between the two performance goals.

Overall, studies included in this thesis indicate (a) a more nuanced set of relations between mindsets and achievement goals, (b) three possible boundary conditions for the effects of mindset on achievement, (c) potential reasons for the mixed effects of performance-approach goals, and (d) a need to examine factors that might influence the association between performance-approach and -avoidance goals.

Self-Handicapping

Findings presented in this thesis advance our understanding of (a) the goals of self-handicapping behaviour, (b) the interpersonal benefits and costs associated with such behaviour, and (c) the mechanisms underlying gender differences in self-handicapping.

Goals of self-handicapping. Self-handicapping, as originally formulated by Jones and Berglas (1978), is a face-saving strategy guided by a desire to protect one's sense of competence against the threat of potential failure. In keeping with this original formulation, prior studies linking achievement goals to self-handicapping tend to reveal a positive association between self-handicapping and performance-avoidance goals (i.e., a desire to avoid incompetence; Midgley & Urdan, 2001; Urdan, 2004). Some studies, however, show that self-handicapping is associated with both performance-approach and -avoidance goals (Elliot & Church, 2003; Leondari & Gonida, 2007). To clarify the motivation underlying self-handicapping behaviour, commonality analysis was performed in Study 2 to quantify the contributions of both performance goals to self-handicapping. The results indicate that performance-approach goals accounted for little to no unique variance in self-handicapping beyond performance-avoidance goals. This finding supports that one important goal of self-handicapping is to protect one's perceived competence in a threatened domain.

In addition, Study 2 shows that students' social motives represent another reason that predisposes them towards self-handicapping. Young people who wanted to look cool or not like a nerd reported a greater tendency to self-handicap. This echoes the findings of an early study by Midgley and Urdan (1995) that investigated multiple correlates of middle school students' self-handicapping behaviour. This study reveals that concerns about peer rejection emerged as the strongest predictor of self-handicapping among a range of factors known to elicit such behaviour, such as low-esteem or a perceived ability focus in the classroom. Despite this intriguing finding, later research has focused primarily on the relationships between academic goals and self-handicapping. Findings from Study 2 indicate that adolescents may use self-handicapping strategies to present themselves in a favourable light in front of peers. This supports the view that self-handicapping may serve as an impression management strategy (Kolditz & Arkin, 1982). Taken together, Study 2 highlights the role of self-handicapping in both self-protection (ability maintenance) and self-presentation (impression management).

Interpersonal benefits and costs. At first glance, the finding that students self-handicap to create a favourable image of themselves might stand in contrast to studies showing the ineffectiveness of self-handicapping as an impression management strategy. Research in laboratory settings indicates that self-handicappers suffer negative interpersonal

consequences in spite of attributional benefits. In experimental vignette studies, observers show less favourable impressions and greater dislike for hypothetical self-handicappers (Hirt et al., 2003; Rhodewalt et al., 1995; Smith & Strube, 1991), as well as rate self-handicappers as less desirable study partners (Luginbuhl & Palmer, 1991). In light of these negative reactions from observers, findings from laboratory studies would predict greater social isolation and lower peer acceptance for self-handicappers.

Results of field studies, however, contradict findings from laboratory settings. In a series of three studies, Milner (2007) found that real-life handicappers had a greater number of friends and more frequent interpersonal interactions. In fact, self-handicappers were considered equally likeable or even more likeable than non-self-handicappers by their peers. Similarly, Studies 2 and 3 in this thesis show that self-handicapping behaviour was most commonly found among young people who aspired to or held high peer status in school (see also Midgley & Urdan, 1995). Collectively, these findings in naturalistic settings point to possible interpersonal benefits conferred by self-handicapping.

What can explain this apparent disconnect between findings from field and vignette studies? It is plausible that the divergent reactions to self-handicappers may reflect judgment of effort (or lack thereof) from two different perspectives. On the one hand, effort is highly valued. Seminal works by Bernard Weiner and Martin Covington show that teachers punish low effort and reward high effort regardless of students' ability levels or achievement outcomes (Harari & Covington, 1981; Weiner & Kukla, 1970). This simple covariation between effort and reward independent of other factors provides a heuristic for evaluating effort withdrawal. On the other hand, effort is costly. Although students value achievement through hard work, they increasingly view excessive effort as an indication of insufficient ability in adolescent years (Covington & Omelich, 1979; Nicholls, 1984) as well as counterproductive for achieving peer approval (Heyder & Kessels, 2017; Juvonen & Murdock, 1995). This three-way trade-off between effort, ability, and peer status provides a more nuanced inference rule for evaluating effort withdrawal.

In vignette studies stripped of contextual information, observers may rely on levels of effort as the sole cue to evaluate hypothetical and unknown self-handicappers. This may activate the effort-reward heuristic and lead to unambiguous negative reactions to effort withdrawal in laboratory settings. In contrast, when evaluating friends who intentionally reduce effort in field studies, observers are likely to consider the balance among effort, ability, and peer status to form holistic impressions of real-life handicappers. Previous studies reveal that by early adolescence students place greater value on ability and social status (Covington & Omelich, 1979; LaFontana & Cillessen, 2010), and that low effort can boost the

perceptions of one's ability and popularity (Harari & Covington, 1981; Heyder & Kessels, 2017). These findings might explain why observers view real-life self-handicappers as equally likeable or more likable than non-handicappers (Milner, 2007). In addition, Studies 2 and 3 in this thesis suggest that young people may be cognisant of the interpersonal benefits conferred by self-handicapping: those who wish to maintain or enhance their peer status reported more frequent use of self-handicapping strategies. Overall, instead of incurring severe social costs, self-handicapping in the real world may function sufficiently as an impression management technique.

Gender and self-handicapping. Research has consistently found gender differences in self-handicapping. That is, men and boys are more likely to behaviourally self-handicap (Dietrich, 1995; Midgley & Urdan, 2001). One explanation for the gender differences concerns the differential values placed upon effort by the two genders. In a series of studies, Edward Hirt and Sean McCrea showed that female students placed higher value on putting forth effort, which led them to react more negatively to effort withdrawal and to refrain from self-handicapping (Hirt et al., 2003; McCrea, Hirt, Hendrix, et al., 2008; McCrea, Hirt, & Milner, 2008). Personal valuing of effort thus orients girls and women *away* from self-handicapping. Study 2 in this thesis further reveals that gender differences in self-handicapping could be explained by boys' greater desire to maintain or enhance peer status. As discussed earlier, excessive effort can reduce peer liking and approval (Heyder & Kessels, 2017; Juvonen & Murdock, 1995). Social costs associated with effort may orient boys and young men *towards* self-handicapping. Overall, these two mechanisms appear to complement each other, indicating that the perceived values and costs of effort may underlie gender differences in self-handicapping.

Gender, Motivation, and School Success

This thesis consists of three empirical studies that pinpoint key motivational factors and processes contributing to the gender gap in school. With the exception of effort beliefs (Study 1) and social demonstration goals (Study 2), most variables were measured in at least two different samples. To provide an overall indication of the gender differences in motivation and achievement, an internal meta-analysis was conducted by computing the weighted mean effect sizes across studies (see Table 5.1).

The meta-analytic results indicate that the gender gap in English performance widened considerably over the course of secondary school. Boys and girls at age 11 had identical levels of English achievement ($d = 0.04$), but by age 16 girls outperformed boys considerably ($d = 0.40$). In contrast, boys obtained better grades in maths than girls at age 16 ($d = -0.22$), but this gap was already present at the start of secondary school ($d = -0.16$). These results add

nuance to existing findings, which show that girls make more progress than boys between ages 11 and 16 in England based on aggregate measures of school performance (Strand, 2014). The subject breakdown presented here suggests that efforts to raise boys' achievement in English may need to target secondary education, whereas efforts to improve girls' maths performance need to target primary education.

Table 5.1 Meta-analysed effect sizes (Cohen's *d*) for gender differences in motivation and achievement across samples

Variable	Study 1 *n* = 535	Study 2 *n* = 536	Study 3 *n* = 597	ES1	95% CI	ES2	95% CI
Growth mindset	✓		✓	0.03	[–0.09, 0.15]	**–0.19**	[–0.31, –0.07]
Mastery goals	✓	✓		**0.26**	[0.14, 0.39]	0.09	[–0.03, 0.22]
PAp goals	✓	✓		**–0.21**	[–0.34, –0.09]	**–0.36**	[–0.49, –0.24]
PAv goals	✓	✓		–0.07	[–0.19, 0.05]	–0.11	[–0.24, 0.01]
Perseverance	✓		✓	**0.33**	[0.21, 0.45]	0.07	[–0.05, 0.18]
Self-handicapping	✓	✓	✓	**–0.15**	[–0.25, –0.06]	–0.08	[–0.18, 0.02]
Achievement at 11	✓		✓	0.04	[–0.10, 0.19]	–0.16	[–0.36, 0.03]
Achievement at 16	✓		✓	**0.40**	[0.29, 0.52]	**–0.22**	[–0.34, –0.10]

Note. PAp = performance-approach, PAv = performance-avoidance. ES1 = effect size in English, ES2 = effect size in maths, 95% CI = 95% confidence interval. Positive values indicate higher scores for girls. Bolded numbers indicate significant gender differences at *p* < .05.

Comparing findings from this internal meta-analysis to those from Study 1 shows the advantages of a person-centred approach for studying global differences in boys' and girls' academic motivation. The meta-analytic results mirror past findings from variable-centred studies (e.g., Bugler et al., 2015), suggesting that gender differences in academic motivation are small and vary by domains. Yet students are often motivated by a range of beliefs, goals, and values. An exclusive focus on univariate differences may mask important differences in boys' and girls' overall patterns of academic motivation (i.e., multivariate differences). By classifying young people into homogenous subgroups, Study 1 shows that boys and girls had different probabilities of belonging to various motivational profiles. Across both English and maths, Study 1 found a higher proportion of girls in the *Growth-Focused* profile and a higher proportion of boys in the *Ability-Focused* profile. It further recovered a *Growth-Competitive* profile and a *Disengaged* profile, which would not be evident in variable-centred analysis. These findings demonstrate the added value of adopting a person-centred approach for understanding gendered patterns of academic motivation. In addition, consistent with variable-centred analyses, gender differences in profile membership were more pronounced in English than in maths, indicating the value of studying motivation from a domain-specific perspective. Taken together, profile analyses show that small mean differences on individual variables can add up to more gender differentiated patterns of motivation. Girls may be more

oriented towards striving and improving their ability, whereas boys may be more oriented towards proving and protecting their ability (Butler, 2014). Given the differential impact of motivational profiles on student achievement, gendered tendencies 'to prove' versus 'to improve' hold implications for the gender gap in school.

Study 2 extends the focus by investigating how social and academic motivation work in tandem to explain gender differences in school engagement. Research on social and academic motivation tends to proceed in parallel, such that those who are interested in academic motivation focus on academic-related outcomes, and those who study social motivation investigate social-related outcomes. Nonetheless, there is a renewed and growing recognition that learning does not happen in a social vacuum (Wang & Hofkens, 2019), and that students' social goals can exert cross-domain influences on their academic behaviour (Liem, 2016; Ryan & Shin, 2011). Against this backdrop, Study 2 revealed sizable gender differences in students' social goals in addition to their academic goals. Relative to girls, boys were more concerned with popularity and social status in peer relationships. These status-oriented social goals, in turn, predicted self-handicapping in the form of effort withdrawal, presumably because putting forth too much effort could detract from one's peer status (Heyder & Kessels, 2017; Jackson & Dempster, 2009). The most important insight comes from parallel mediation analyses, which showed that gender differences in self-handicapping was primarily driven by differences in boys' and girls' social goals rather than their academic goals. Without incorporating students' social goals, this study would conclude prematurely that boys' greater tendency to self-handicap was driven by their higher performance goals. Comparing the results from Study 2 to the counterfactual suggests that researchers interested in processes underlying boys' maladaptive behaviour in school may need to move beyond a sole focus on academic motivation to incorporate social motivation.

Although Studies 1 and 2 look beyond mean differences in academic motivational variables to explain the gender gap, both studies treat gender as a binary category. Study 3 moves one step forward by asking which boys and which girls are falling behind in school. Previous research suggests that students differ in their *degree* of gender role conformity, and those who adhere rigidly to traditional gender roles tend to perform worse academically (Ueno & McWilliams, 2010). Study 3 would reach similar conclusions if variable-centred analyses were performed. Nonetheless, students may simultaneously conform to (or resist) multiple gender norms and to varying degrees, resulting in distinct *patterns* of gender role conformity. To more accurately reflect people's complex ways of enacting their gender, Study 3 adopted a person-centred approach. Latent profile analysis revealed seven gender role profiles, and these profiles were differentially associated with students' academic motivation,

engagement, and achievement. The results show that two thirds of the boys were in fact doing fine in school, whereas half of the girls had problematic patterns of motivation, engagement, and achievement. These nuanced findings would not have been possible without applying a person-centred perspective. Given that not all boys are underperforming and not all girls are doing well in school, the findings underscore the importance of adopting a 'which boys and which girls' approach in educational gender gap research.

Collectively, this thesis illustrates three promising directions to better understand the motivational processes underlying the gender gap in school. In addition to investigating mean differences in academic motivational variables, the next generation of gender gap research can (a) map out gendered patterns of academic motivation, (b) explore gender differences in social motivation and its implications for academic outcomes, and (c) identify which boys and which girls are not achieving and why. Later in the future research section, I elaborate on how to build upon these areas of research.

Implications for Educational Practice

Findings from the three studies provide concrete suggestions on what factors to target and who to target in educational interventions to narrow the gender gap. Studies 1-3 indicate that to maximise effectiveness, interventions should foster (a) a mastery-oriented and autonomy-supportive climate, and (b) positive peer connection, particularly among young people who enact traditional gender roles.

Study 1 reveals that girls tend to show higher quality motivation (*Growth-Focused*), whereas boys report poorer quality and lower quantity of motivation (*Ability-Focused* and *Disengaged*). Teachers can cultivate higher quality motivation among all students by adopting mastery-oriented and autonomy-supportive instructional practices. Specifically, teachers can create a mastery-oriented environment by emphasising effort, improvement, and the value of mistakes in learning, while avoiding public evaluations of students and downplaying social comparison in the classrooms (Ames, 1992). In addition, teachers can offer autonomy support to students by providing choice and rationale for tasks, explaining the relevance and usefulness of course content, and being responsive to students' questions and comments (Reeve, 2009; Stefanou et al., 2004). A mastery-oriented and autonomy-supportive climate (vs. a performance-oriented and controlling climate) has been linked to a stronger growth mindset (Ommundsen, 2001; Park et al., 2016), more mastery goals (Ciani et al., 2011; Lüftenegger et al., 2017), and higher achievement among students (Urdan & Midgley, 2003). Research further suggests that while autonomy support matters more for boys' school engagement, boys tend to view their teachers as less autonomy-supportive (Lietaert et al.,

2015). Taken together, a mastery-oriented and autonomy-supportive climate can lead to increased motivation, engagement, and achievement among all students, especially for boys.

Study 2 shows that in additional to academic goals, boys and girls differ in their social goals and that boys' preoccupation of social status is related to greater self-handicapping behaviour. Status-oriented social goals have also been linked to more disruptive behaviour, increased help avoidance, and lower academic achievement (Kiefer & Ryan, 2008; Ryan et al., 1997). This underscores the importance of attending to students' social goals even in secondary school settings. Fortunately, teachers can simultaneously promote adaptive social goals alongside academic goals by creating a mastery-oriented motivational climate. When students perceive an emphasis on cooperation and improvement in the learning context, they tend to endorse more social development goals and have more satisfying connection with peers; in contrast, when students perceive an emphasis on competition and social comparison, they tend to adopt more social demonstration goals and experience more negative peer interaction (Kiefer et al., 2013; Madjar, 2017; Roseth et al., 2008; Shim et al., 2013). In light of boys' and girls' differential tendency to adopt social demonstration goals, a mastery-oriented climate may function particularly as a protective factor for boys.

In addition, research shows that young people who have close and trusting friendships are more likely to resist traditional gender norms (Gulbrandsen, 2003; Way et al., 2014). As a result, within a mastery-oriented learning context, students may have higher quality academic motivation, more positive social goals and peer relationships, and experience less pressure to conform to traditional gender roles. Resistance to rigid gendered norms, in turn, may enhance students' motivation and performance, as illustrated in Study 3. Promoting a mastery-oriented classroom climate may therefore set in motion a cycle of adaptive potential.

Limitations and Future Directions

Since limitations specific to each study has been discussed within each paper, here I focus on two broad issues that cut across the three studies. First, despite the inclusion of objective performance data in Studies 1 and 3, all studies relied heavily on self-reports of motivation and behaviour. At the very least, common method variance may arise from administering several self-report measures at the same time, resulting in larger observed correlations between variables (e.g., performance-approach and -avoidance goals). As discussed earlier, explicit measures of mindset are also susceptible to social desirability bias, especially when the questions are phrased in a positive manner. Given the growing awareness of growth mindset among students and teachers, future research may want to utilise stealthier methods to capture individuals' ability mindset, such as metaphor-based measures or implicit

association tests (Mascret et al., 2015). Furthermore, future research can supplement student reports of behaviour with peer or teacher reports to strengthen the validity of findings.

Second, all three studies provide only a snapshot of student motivation, precluding any knowledge about change over time. Repeated measures and longitudinal designs are needed to better understand the causal mechanisms contributing to the gender gap. For example, is the widening gender gap between ages 11 and 16 preceded by growing differences in boys' and girls' academic and social motivation? There is some evidence suggesting that this might be the case. Studies investigating changes in academic goals found that boys show a steeper increase in ability performance goals (Middleton et al., 2004; Shim et al., 2008) or a greater decline in mastery goals after the transition to secondary school (Duchesne et al., 2014). Studies examining changes in social goals during adolescence reveal that boys demonstrate a steeper increase in social demonstration goals (LaFontana & Cillessen, 2010) whereas girls show a steeper increase in social development goals (Makara & Madjar, 2015). Future studies may wish to test whether the intensification of gendered motivational patterns might partially account for the differential progress of boys and girls in secondary school.

Researchers are also encouraged to extend the three areas of research explored in this thesis. First, future research could continue to examine profiles of academic motivation based on constructs from different theoretical traditions and probe gender as a predictor of profile membership. Studies that identify students' motivational profiles tend to work within a particular theoretical framework (e.g., achievement goal profiles). As demonstrated in Studies 1 and 2, students are often simultaneously motivated by a range of beliefs and goals. Moving beyond theoretical silos can advance our understanding of individuals' integrated systems of motivation. In a similar vein, the gender gap in school achievement is likely a complicated and multi-causal phenomenon. Gender differences in overall patterns of motivation are more likely to account for the gender gap in achievement than differences in any individual motivational construct.

Second, the interplay of academic and social motivation remains an interesting question in educational gender gap research. Not only are there gender differences in social goals, but also there are gender differences in perceived relatedness with peers and teachers. Although peer relatedness is more closely linked to boys' school enjoyment and adjustment (Boulton et al., 2011; Rueger et al., 2008), boys tend to report lower levels of peer relatedness throughout secondary education (Ratelle & Duchesne, 2014). In addition, studies routinely show that girls perceive closer relationships with their teachers (Furrer & Skinner, 2003; Rueger et al., 2008), but teacher relatedness is more predictive of boys' academic engagement

151

(for a meta-analysis, see Roorda et al., 2011). Since students develop their academic interest, values, and goals in social contexts, boys' lower perceived relatedness with peers and teachers may further influence their motivation, such as reducing their tendency to seek help in the classrooms. By simultaneously incorporating social and academic motivational factors, future studies can unpack the role of social motivational processes in contributing to the gender gap in school.

Lastly, the time is ripe for quantitative researchers to specify which boys are at stake when discussing boys' underachievement in school. Since gender can interact with other social identities to shape student motivation and achievement, researchers can incorporate an intersectional lens in future work. For example, within a variable-centred perspective, studies can utilise stratified sampling and compare working-class boys' motivation and achievement with other groups of students using a 2 (gender) × 2 (social class: working-class and middle-class) factorial design. If working-class boys differ from other groups on some motivational variables but not others, this knowledge can inform what factors to target in interventions to raise their motivation and achievement (e.g., Berrington et al., 2016). Within a person-centred approach, future research can extend Study 3 by examining ethnicity or social class as a predictor of profile membership, before testing the associations between gender role profiles and academic achievement. Overall, by shifting the focus from between-gender to within-gender variations, the next generation of gender gap research can provide a more nuanced assessment of the barriers to boys' (and girls') learning and achievement.

Concluding Remarks

Taken together, the programme of research reported in this thesis highlights key motivational pathways that contribute to gender gaps in school and reveals the subgroups of boys and girls who are at the greatest risk of underachievement. These findings provide concrete suggestions to educators and policy makers in terms of what factors to target as well as who to target in interventions to close the gender gap in school.

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Appendices

Appendix A: Study 1 Parental Consent Form

UNIVERSITY OF CAMBRIDGE
Faculty of Education

Student Voice Counts: Understanding students' attitudes to school and learning

Dear Parent/Guardian,

I would like to tell you about a research study that will be taking place with Year 10 and 11 students in the Spring Term.

This research will involve students completing a questionnaire about their attitudes towards school and learning. Completing the questionnaire will take around 20 minutes. The school will also pass on students' attainment data to the researcher, which will include: students' English Language and mathematics GCSE grades and KS2 English and mathematics results.

Your son/daughter's data will be kept confidential and in a secure location. Their name or the name of the school will not appear in any report arising from the research. The information provided will be used to help the researcher and the school to develop a better understanding of the relationship between student perceptions, motivation, and attainment.

What you need to do:

Please read through this information and do not hesitate to contact Mr Junlin Yu (Doctoral Researcher) via email at jy318@cam.ac.uk if you have any questions or concerns. Taking part in this research is completely voluntary. If you decide, after reading the information and discussing it with your son/daughter, that you **DO NOT** wish for them to participate, then please complete the enclosed opt-out consent form and return it to your son/daughter's form tutor by Friday 27st January. If you are happy for your son/daughter to take part in the study then you do not need to do anything, but please keep a copy of the information sheet for your records.

Yours sincerely,

Junlin Yu
Faculty of Education
University of Cambridge

--✂--

I .... (parent / guardian name) **DO NOT** give my permission for my son/daughter .... (full name) to take part in the **Student Voice Counts** study.	
Signature	
Date	

160

Appendix B: Study 1 Student Questionnaire

Instructions

<u>(Please read before completing the survey)</u>

Hello!

Welcome to the Student Perception Survey.

We're researchers from Cambridge University, and we need your help. We want to find out more about **your attitudes towards learning maths and English.** Your answers will help us understand what schools and teachers can do to enhance your learning experience and learning outcomes in these subjects.

Your answers will be used for research purposes only. Your teachers and your school will not see your answers.

There are some questions that are a bit similar to each other. This is not a trick. They truly all look at different things so just answer them in a way that shows what you really think about yourself.

Thank you for helping us!

Before you start, here is an example:

For the question below, **circle** the response that best represents how you feel about the statement.

	Disagree A Lot	Disagree	Disagree A Little	Agree A Little	Agree	Agree A Lot
1. Maths is interesting.	1	2	3	(4)	5	6

There are two main sections to the survey and each contains 40 statements. It should take about 20 minutes to respond to them all. Ask your teacher, tutor or the person who administered this survey if you have any questions. You can now begin.

First Name _____   **Surname** _____

Grade/Year (Circle)   10   11   **Gender (Circle)**   Female   Male

1. How Do You Feel About English?

Disagree A Lot	Disagree	Disagree A Little	Agree A Little	Agree	Agree A Lot
1	2	3	4	5	6

Here are some questions about yourself as a student in your English class.
How much do you agree with the following statements? There are no right or wrong answers. Just make sure that your answers show what you really think about yourself.

PLEASE CIRCLE ONE NUMBER FOR EACH STATEMENT	Disagree A Lot					Agree A Lot
1. To be honest, I don't think I can really change how good I am at English.	1	2	3	4	5	6
2. One of my goals is to look clever in comparison to other students in my English class.	1	2	3	4	5	6
3. I sometimes fool around the night before an English test so that if I don't do so well, I can say that is the reason.	1	2	3	4	5	6
4. I can overcome any challenges in English if I work hard enough.	1	2	3	4	5	6
5. If I'm not doing well in English, it's better to direct my efforts towards a subject I'm better at.	1	2	3	4	5	6
6. One of my goals in English is to avoid looking like I have trouble doing the work.	1	2	3	4	5	6
7. With enough time and effort I could significantly improve my ability in English.	1	2	3	4	5	6
8. One of my goals in English is to learn as much as I can.	1	2	3	4	5	6
9. When something that I study in English gets difficult, I spend extra time and effort trying to understand it.	1	2	3	4	5	6
10. I sometimes let my friends distract me in English class. Then if I don't do as well as I hoped, I can say my friends kept me from working.	1	2	3	4	5	6
11. It's important to me that other students think I am good at English.	1	2	3	4	5	6
12. It doesn't matter how hard I work—if I am not good at English, I won't do well.	1	2	3	4	5	6
13. One of my goals is to show others that I'm good at English.	1	2	3	4	5	6

PLEASE CIRCLE ONE NUMBER FOR EACH STATEMENT	Disagree A Lot				Agree A Lot
14. The harder I work at English, the better I get at it.	1	2	3	4	5	6
15. It is important to me that I learn a lot of new skills in English.	1	2	3	4	5	6
16. Sometimes I purposely don't try hard in English so that if I don't do well, I can say it is because I didn't try.	1	2	3	4	5	6
17. Regardless of my current ability in English, I think I have the capacity to change it quite a bit.	1	2	3	4	5	6
18. It's important to me that I look clever compared to others in my English class.	1	2	3	4	5	6
19. I try and learn all the material being examined in my English test, even if it's boring.	1	2	3	4	5	6
20. I don't think I can do much to make me better at English.	1	2	3	4	5	6
21. It's important to me to really understand my English work.	1	2	3	4	5	6
22. I sometimes put off doing my English homework until the last minute so I have an excuse if I don't do so well.	1	2	3	4	5	6
23. Nothing could keep me from doing well in English if I put in enough effort.	1	2	3	4	5	6
24. One of my goals is to show others that English is easy for me.	1	2	3	4	5	6
25. If I am bad at English, working hard won't make me better at it.	1	2	3	4	5	6
26. One of my goals in English is to improve my skills.	1	2	3	4	5	6
27. If a particular topic or problem confuses me in my English lesson, I go back and try to figure it out.	1	2	3	4	5	6
28. I believe I can always substantially improve my ability in English.	1	2	3	4	5	6
29. It's important to me that I don't look stupid in my English class.	1	2	3	4	5	6
30. I look for reasons to keep me from studying English (not feeling well, having to help my parents, taking care of a brother or sister, etc.). Then if I don't do well on my English work, I have an excuse.	1	2	3	4	5	6
31. Learning a lot of new things in English is important to me.	1	2	3	4	5	6
32. If I find English difficult now, it probably means I'll never be good at it.	1	2	3	4	5	6
33. One of my goals is to keep others from thinking I'm not clever in English.	1	2	3	4	5	6

PLEASE CIRCLE ONE NUMBER FOR EACH STATEMENT	Disagree A Lot					Agree A Lot
34. The best predictor of how well I will do in English is how much effort I put in.	1	2	3	4	5	6
35. Sometimes I purposely get involved in lots of activities. Then if I don't do as well on my English work as I hoped, I can say it is because I was too involved in other things.	1	2	3	4	5	6
36. My ability in English is something I can't change very much.	1	2	3	4	5	6
37. Whether or not I like the material in English class, I try my best to learn it.	1	2	3	4	5	6
38. I believe I can change my overall ability in English considerably over time.	1	2	3	4	5	6
39. It's important to me that my English teacher doesn't think I know less than others.	1	2	3	4	5	6
40. To be honest, trying hard in English makes me feel stupid.	1	2	3	4	5	6

Thank You

Here are two **optional** questions. Think of them as an opportunity to tell us more about your experiences with English. Your thoughts may help improve the learning experience of current and future students at your school.

Feel free to skip ahead if you don't have enough time.

41. Are there things you particularly like about your English class and why?

42. If you had a chance, would you rather not study English in school? Why?

2. How Do You Feel About Maths?

Disagree A Lot	Disagree	Disagree A Little	Agree A Little	Agree	Agree A Lot
1	2	3	4	5	6

Here are some questions about yourself as a student in your maths class.
How much do you agree with the following statements? There are no right or wrong answers.
Just make sure that your answers show what you really think about yourself.

PLEASE CIRCLE ONE NUMBER FOR EACH STATEMENT	Disagree A Lot					Agree A Lot
1. I believe I can change my overall ability in maths considerably over time.	1	2	3	4	5	6
2. It's important to me to really understand my maths work.	1	2	3	4	5	6
3. When something that I study in maths gets difficult, I spend extra time and effort trying to understand it.	1	2	3	4	5	6
4. One of my goals is to keep others from thinking I'm not clever in maths.	1	2	3	4	5	6
5. Sometimes I purposely get involved in lots of activities. Then if I don't do as well on my maths work as I hoped, I can say it is because I was too involved in other things.	1	2	3	4	5	6
6. If I find maths difficult now, it probably means I'll never be good at it.	1	2	3	4	5	6
7. The best predictor of how well I will do in maths is how much effort I put in.	1	2	3	4	5	6
8. One of my goals is to look clever in comparison to other students in my maths class.	1	2	3	4	5	6
9. To be honest, I don't think I can really change how good I am at maths.	1	2	3	4	5	6
10. I sometimes put off doing my maths homework until the last minute so I have an excuse if I don't do so well.	1	2	3	4	5	6
11. One of my goals in maths is to improve my skills.	1	2	3	4	5	6
12. If a particular topic or problem confuses me in my maths lesson, I go back and try to figure it out.	1	2	3	4	5	6

PLEASE CIRCLE ONE NUMBER FOR EACH STATEMENT	Disagree A Lot					Agree A Lot
13. With enough time and effort I could significantly improve my ability in maths.	1	2	3	4	5	6
14. One of my goals in maths is to avoid looking like I have trouble doing the work.	1	2	3	4	5	6
15. If I'm not doing well in maths, it's better to direct my efforts towards a subject I'm better at.	1	2	3	4	5	6
16. I sometimes let my friends distract me in maths class. Then if I don't do as well as I hoped, I can say my friends kept me from working.	1	2	3	4	5	6
17. The harder I work at maths, the better I get at it.	1	2	3	4	5	6
18. It's important to me that I look clever compared to others in my maths class.	1	2	3	4	5	6
19. To be honest, trying hard in maths makes me feel stupid.	1	2	3	4	5	6
20. One of my goals in maths is to learn as much as I can.	1	2	3	4	5	6
21. I sometimes fool around the night before a maths test so that if I don't do so well, I can say that is the reason.	1	2	3	4	5	6
22. I believe I can always substantially improve my ability in maths.	1	2	3	4	5	6
23. I don't think I can do much to make me better at maths.	1	2	3	4	5	6
24. It's important to me that my maths teacher doesn't think I know less than others.	1	2	3	4	5	6
25. If I am bad at maths, working hard won't make me better at it.	1	2	3	4	5	6
26. Sometimes I purposely don't try hard in maths so that if I don't do well, I can say it is because I didn't try.	1	2	3	4	5	6
27. I can overcome any challenges in maths if I work hard enough.	1	2	3	4	5	6
28. One of my goals is to show others that maths is easy for me.	1	2	3	4	5	6
29. Whether or not I like the material in maths class, I try my best to learn it.	1	2	3	4	5	6
30. Learning a lot of new things in maths is important to me.	1	2	3	4	5	6
31. It doesn't matter how hard I work—if I am not good at maths, I won't do well.	1	2	3	4	5	6
32. It's important to me that other students think I am good at maths.	1	2	3	4	5	6

PLEASE CIRCLE ONE NUMBER FOR EACH STATEMENT	Disagree A Lot					Agree A Lot
33. Regardless of my current ability in maths, I think I have the capacity to change it quite a bit.	1	2	3	4	5	6
34. It's important to me that I don't look stupid in my maths class.	1	2	3	4	5	6
35. I try and learn all the material being examined in my maths test, even if it's boring.	1	2	3	4	5	6
36. It is important to me that I learn a lot of new skills in maths.	1	2	3	4	5	6
37. I look for reasons to keep me from studying maths (not feeling well, having to help my parents, taking care of a brother or sister, etc.). Then if I don't do well on my maths work, I have an excuse.	1	2	3	4	5	6
38. My ability in maths is something I can't change very much.	1	2	3	4	5	6
39. One of my goals is to show others that I'm good at maths.	1	2	3	4	5	6
40. Nothing could keep me from doing well in maths if I put in enough effort.	1	2	3	4	5	6

Thank You

Here are two **optional** questions. Think of them as an opportunity to tell us more about your experiences with maths. Your thoughts may help improve the learning experience of current and future students at your school.

Feel free to skip ahead if you don't have enough time.

41. Are there things you particularly like about your maths class and why?

42. If you had a choice, would you rather not study maths in school? Why?

3. About You

You're doing great! It's almost over. Just a few background questions and you're done.

a) Which maths class/set are you in?   _____

b) Which English class/set are you in?   _____

c) How would you describe your race/ethnicity? (Circle one)

White British / Irish	Bangladeshi	Black African
Other White	Chinese	Black Caribbean
Indian	Other Asian	Other Black
Pakistani	Mixed	Other ethnic group (specify)
		_____

d) Is English your main language?

Yes   No (specify) _____

e) Do you receive free school meals?

Yes   No   Don't know

Thank you very much for taking part in our study. Your insight and information are very valuable and may help improve the learning experience for other students.

Use the space below to tell us how we might improve your survey taking experience.

When you complete the survey booklet, please hand it to your teacher or tutor.

Should you have any further questions or concerns about this survey or any of its questions, please contact Junlin Yu at jy318@cam.ac.uk.

Appendix C: Study 1 Factor Loadings

Standardised factor loading of the 7-factor ESEM solution for motivation in English

	1	2	3	4	5	6	7
E mindset 1	**.39**	.39	.22	-.08	-.02	-.01	.04
E mindset 2	**.25**	.46	.06	.11	-.21	.10	-.05
E mindset 3	**.42**	.37	.13	-.04	.08	-.01	-.04
E effort 1	-.02	**.24**	.05	-.05	-.22	.20	-.25
E effort 2	.35	**.45**	.11	-.05	.01	.08	-.06
E effort 3	.20	**.56**	.03	.00	-.02	.14	-.10
E effort 4	.32	**.46**	.04	.10	-.07	.03	-.19
E effort 5	.22	**.16**	.01	-.02	-.06	.20	-.24
E mastery 1	.13	-.14	**.85**	.04	-.04	-.03	-.03
E mastery 2	.02	.02	**.77**	-.04	.07	.04	.01
E mastery 3	.14	-.15	**.90**	.03	-.05	.02	.05
E mastery 4	-.11	.08	**.50**	.01	.11	.24	-.07
E mastery 5	-.18	.11	**.74**	.02	-.01	.03	.01
E approach 1	-.16	.05	.06	**.71**	.17	.02	.02
E approach 2	-.05	.05	.15	**.76**	.09	-.09	-.03
E approach 3	.11	-.03	.02	**.74**	.06	.00	.05
E approach 4	.03	-.05	-.06	**.76**	.06	-.01	.00
E approach 5	.02	.01	-.08	**.78**	.12	.12	.03
E avoid 1	.06	-.02	.09	.25	**.62**	.02	-.07
E avoid 2	.16	-.13	-.13	.24	**.35**	.09	.16
E avoid 3	-.04	.05	.02	.10	**.66**	.03	.00
E avoid 4	-.12	.00	-.02	.20	**.42**	-.10	.13
E persevere 1	.05	.01	.13	.02	-.05	**.61**	.03
E persevere 2	-.25	.15	.15	-.11	.15	**.66**	-.05
E persevere 3	.16	-.13	.04	.14	-.12	**.74**	.09
E persevere 4	-.08	.05	-.03	-.03	.06	**.76**	-.02
E handicap 1	-.09	-.03	.06	.19	-.19	-.04	**.64**
E handicap 2	.20	-.16	.07	-.12	.13	.10	**.66**
E handicap 3	.04	-.09	-.10	-.15	.20	-.04	**.55**
E handicap 4	-.14	.21	.02	.07	-.09	.02	**.82**
E handicap 5	.08	-.05	-.08	.04	-.05	.09	**.75**
E handicap 6	.03	-.02	.00	-.03	.11	-.11	**.62**

Note. Target factor loadings are in bold.

Standardised factor loading of the 7-factor ESEM solution for motivation in maths

	1	2	3	4	5	6	7
M mindset 1	**.52**	.30	.15	-.01	-.07	.05	.06
M mindset 2	**.49**	.25	.05	-.08	.00	-.01	-.06
M mindset 3	**.48**	.33	-.02	-.11	.08	.15	.03
M effort 1	.03	**.40**	.03	.07	-.20	.05	-.25
M effort 2	.36	**.44**	.06	.07	-.05	.08	-.07
M effort 3	.29	**.35**	.03	.12	-.09	.05	-.22
M effort 4	.26	**.66**	.00	.03	.05	.03	-.05
M effort 5	.07	**.36**	.08	.09	-.14	.15	-.22
M mastery 1	-.12	.16	**.86**	.01	-.07	.07	.08
M mastery 2	.28	-.24	**.60**	-.05	.06	.15	-.18
M mastery 3	-.09	.13	**.78**	.01	-.01	.06	.05
M mastery 4	-.01	.09	**.44**	.06	.09	.11	-.10
M mastery 5	.25	-.21	**.38**	-.04	.09	.27	-.07
M approach 1	-.10	.11	.00	**.55**	.40	.01	.03
M approach 2	-.07	.10	.14	**.46**	.37	.00	.09
M approach 3	.04	.02	-.02	**.54**	.23	.07	.10
M approach 4	.02	-.01	-.04	**1.05**	-.22	.01	.05
M approach 5	-.06	.07	-.01	**.76**	.19	.04	-.02
M avoid 1	.08	-.07	.03	.44	**.42**	-.01	.01
M avoid 2	-.01	-.21	.09	.40	**.07**	.04	.15
M avoid 3	-.08	-.06	.12	.26	**.45**	-.03	.06
M avoid 4	.00	-.17	-.06	.25	**.49**	.01	.08
M persevere 1	-.04	-.03	-.10	.03	-.04	**.99**	.04
M persevere 2	-.03	.06	.49	.03	-.05	**.25**	-.07
M persevere 3	-.05	.08	.08	.03	.01	**.72**	.00
M persevere 4	.17	-.01	.34	-.02	.09	**.33**	-.08
M handicap 1	-.02	.09	-.03	-.02	.00	.12	**.89**
M handicap 2	.13	-.15	.11	.14	-.16	-.03	**.67**
M handicap 3	.05	-.16	-.12	-.02	.02	.05	**.66**
M handicap 4	.09	-.09	.06	.07	.06	-.18	**.54**
M handicap 5	-.06	.05	-.08	-.09	.02	.07	**.79**
M handicap 6	.00	-.07	.09	.03	.06	-.17	**.56**

Note. Target factor loadings are in bold.

Appendix D: Study 2 Factor Loadings

Standardised factor loadings of the 3-factor CFA solution for academic goals in English

	1	2	3
E mastery 1	.72		
E mastery 2	.80		
E mastery 3	.70		
E mastery 4	.81		
E mastery 5	.65		
E approach 1		.77	
E approach 2		.76	
E approach 3		.76	
E approach 4		.78	
E approach 5		.71	
E avoid 1			.68
E avoid 2			.62
E avoid 3			.68
E avoid 4			.61

Standardised factor loadings of the 3-factor CFA solution for academic goals in maths

	1	2	3
M mastery 1	.64		
M mastery 2	.73		
M mastery 3	.63		
M mastery 4	.68		
M mastery 5	.66		
M approach 1		.74	
M approach 2		.69	
M approach 3		.64	
M approach 4		.74	
M approach 5		.70	
M avoid 1			.58
M avoid 2			.55
M avoid 3			.65
M avoid 4			.59

Standardised factor loadings of the 1-factor CFA solution for social goals

	1
SDAp1	.78
SDAp2	.79
SDAp3	.74
SDAp4	.82
SDAp5	.81
SDAv1	.55
SDAv2	.71
SDAv3	.60

Appendix E: Study 3 Parental Consent Form

UNIVERSITY OF CAMBRIDGE
Faculty of Education

Student Voice Counts: Understanding students' self-perceptions and attitudes towards learning

Dear Parent/Guardian,

I would like to tell you about a research study that will be taking place with Year 10 and 11 students in the Summer Term.

This research will involve students completing a questionnaire about their self-perceptions and attitudes towards learning English and maths. Completing the questionnaire will take around 20 minutes. The school will also pass on students' attainment data to the researcher, which will include: students' English Language and mathematics GCSE grades and KS2 English and mathematics results.

Your son/daughter's data will be kept confidential and in a secure location. Their name or the name of the school will not appear in any report arising from the research. The information provided will be used to help the researcher and the school to develop a better understanding of students' self-perceptions and their attitudes towards learning, and the relationship between this and their attainment.

What you need to do:

Please read through this information and do not hesitate to contact Mr Junlin Yu (Doctoral Researcher) via email at jy318@cam.ac.uk if you have any questions or concerns. Taking part in this research is completely voluntary. If you decide, after reading the information and discussing it with your son/daughter, that you **DO NOT** wish for them to participate, then please complete the enclosed opt-out consent form and return it to your son/daughter's form tutor by Friday 21st April. If you are happy for your son/daughter to participate then you do not need to do anything, but please keep a copy of the information sheet for your records.

Yours sincerely,

Junlin Yu
Faculty of Education
University of Cambridge

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I ………………………………… (parent / guardian name) **DO NOT** give my permission for my son/daughter …………………………………… (full name) to take part in the **Student Voice Counts** study.

Signature	
Date	

Appendix F: Study 3 Student Questionnaire

Instructions

<u>(Please read before completing the survey)</u>

Hello!

Welcome to the Student Perception Survey.

We're researchers from Cambridge University, and we need your help. We want to learn more about **young people's attitudes towards learning and their views of themselves.** Your answers will help us understand what schools and teachers can do to improve your learning experience at school.

Your answers will be used for research purposes only. Your teachers and your school will not see your answers.

There are some questions that are quite similar to each other. This is not a trick. They truly all look at different things so just answer them in a way that shows what you really think about yourself.

Thank you for helping us!

Before you start, here is an example:

For the question below, **circle** the response that best represents how you feel about the statement.

	Disagree A Lot	Disagree	Disagree A Little	Agree A Little	Agree	Agree A Lot
1. I am interested in maths.	1	2	3	④	5	6

The survey includes questions about your self-perceptions and attitudes towards English and maths. It should take about 20 minutes to respond to them all. Ask your teacher, tutor or the person who administered this survey if you have any questions. You can now begin.

First Name _____   **Surname** _____

Grade/Year (Circle)   10   11   **Gender (Circle)**   Female   Male

1. How Do You Feel About English?

Disagree A Lot	Disagree	Disagree A Little	Agree A Little	Agree	Agree A Lot
1	2	3	4	5	6

Here are some questions about yourself as a student in your English class.
How much do you agree with the following statements? There are no right or wrong answers.
Just make sure that your answers show what you really think about yourself.

PLEASE CIRCLE ONE NUMBER FOR EACH STATEMENT	Disagree A Lot				Agree A Lot
1. To be honest, I don't think I can really change how good I am at English.	1 2 3 4 5 6				
2. When something that I study in English gets difficult, I spend extra time and effort trying to understand it.	1 2 3 4 5 6				
3. I sometimes fool around the night before an English test so that if I don't do so well, I can say that is the reason.	1 2 3 4 5 6				
4. I don't think I can do much to make me better at English.	1 2 3 4 5 6				
5. With enough time and effort I could significantly improve my ability in English.	1 2 3 4 5 6				
6. I sometimes let my friends distract me in English class. Then if I don't do as well as I hoped, I can say my friends kept me from working.	1 2 3 4 5 6				
7. I try and learn all the material being examined in my English test, even if it's boring.	1 2 3 4 5 6				
8. Regardless of my current ability in English, I think I have the capacity to change it quite a bit.	1 2 3 4 5 6				
9. I sometimes put off doing my English homework until the last minute so I have an excuse if I don't do so well.	1 2 3 4 5 6				
10. My ability in English is something I can't change very much.	1 2 3 4 5 6				
11. I look for reasons to keep me from studying English (not feeling well, having to help my parents, taking care of a brother or sister, etc.). Then if I don't do well on my English work, I have an excuse.	1 2 3 4 5 6				
12. If a particular topic or problem confuses me in my English lesson, I go back and try to figure it out.	1 2 3 4 5 6				

PLEASE CIRCLE ONE NUMBER FOR EACH STATEMENT	Disagree A Lot					Agree A Lot
13. Sometimes I purposely get involved in lots of activities. Then if I don't do as well on my English work as I hoped, I can say it is because I was too involved in other things.	1	2	3	4	5	6
14. I believe I can always substantially improve my ability in English.	1	2	3	4	5	6
15. Whether or not I like the material in English class, I try my best to learn it.	1	2	3	4	5	6
16. Sometimes I purposely don't try hard in English so that if I don't do well, I can say it is because I didn't try.	1	2	3	4	5	6
17. I believe I can change my overall ability in English considerably over time.	1	2	3	4	5	6

Thank You

Here are two **optional** questions. Think of them as an opportunity to tell us more about your experiences with English. Your thoughts may help improve the learning experience of current and future students at your school.

Feel free to skip ahead if you don't have enough time.

18. Are there things you particularly like about your English class and why?

19. If you had a chance, would you rather not study English in school? Why?

2. How Do You See Yourself?

Disagree Strongly	Disagree	Agree	Agree Strongly
1	2	3	4

Everyone is different. **We have listed some things young people might say or think about themselves.**
For each statement below, pick the answer that best describes how you see yourself. There are no right or wrong answers.

PLEASE CIRCLE ONE NUMBER FOR EACH STATEMENT	Disagree Strongly			Agree Strongly
1. I tend to share my feelings.	1	2	3	4
2. I believe that violence is never justified.	1	2	3	4
3. I would be happier if I was thinner.	1	2	3	4
4. Being in a romantic relationship is important.	1	2	3	4
5. In general, I will do anything to win.	1	2	3	4
6. It is important to keep your living space clean.	1	2	3	4
7. I hate it when people ask me to talk about my feelings.	1	2	3	4
8. I ask for help when I need it.	1	2	3	4
9. I am careful to buy clothes that will make me look my best.	1	2	3	4
10. I am happiest when I'm risking danger.	1	2	3	4
11. Sometimes violent action is necessary.	1	2	3	4
12. It bothers me when I have to ask for help.	1	2	3	4
13. I would like to lose a few pounds.	1	2	3	4
14. I frequently put myself in risky situations.	1	2	3	4
15. Winning is not my first priority.	1	2	3	4
16. I like to talk about my feelings.	1	2	3	4
17. If I were single, my life would be complete without a partner.	1	2	3	4
18. I am always trying to improve my physical appearance.	1	2	3	4
19. I clean my space on a regular basis.	1	2	3	4
20. Violence is almost never justified.	1	2	3	4

PLEASE CIRCLE ONE NUMBER FOR EACH STATEMENT	Disagree Strongly			Agree Strongly
21. I check my appearance in a mirror whenever I can.	1	2	3	4
22. I take risks.	1	2	3	4
23. I don't mind losing.	1	2	3	4
24. I enjoy spending time making my living space look nice.	1	2	3	4
25. No matter what the situation I would never act violently.	1	2	3	4
26. When I have a romantic relationship, I enjoy focusing my energies on it.	1	2	3	4
27. I would be perfectly happy with myself even if I gained weight.	1	2	3	4
28. I bring up my feelings when talking to others.	1	2	3	4
29. I never ask for help.	1	2	3	4
30. Before going out, I usually spend a lot of time getting ready.	1	2	3	4
31. Having a romantic relationship is essential in life.	1	2	3	4
32. I am not ashamed to ask for help.	1	2	3	4
33. I take special care with my hair grooming.	1	2	3	4
34. I don't care if my living space looks messy.	1	2	3	4
35. I tend to keep my feelings to myself.	1	2	3	4
36. In general, I do not like risky situations.	1	2	3	4
37. I am willing to get into a physical fight if necessary.	1	2	3	4
38. More often than not, losing does not bother me.	1	2	3	4
39. I am terrified of gaining weight.	1	2	3	4
40. I never share my feelings.	1	2	3	4
41. I enjoy taking risks.	1	2	3	4
42. My life plans do not rely on my having a romantic relationship.	1	2	3	4
43. Winning is not important to me.	1	2	3	4
44. I am disgusted by any type of violence.	1	2	3	4
45. I hate asking for help.	1	2	3	4
46. It is important for me to win.	1	2	3	4
47. There is no point to cleaning because things will get dirty again.	1	2	3	4
48. I am always trying to lose weight.	1	2	3	4

Thank You

3. How Do You Feel About Maths?

Disagree A Lot	Disagree	Disagree A Little	Agree A Little	Agree	Agree A Lot
1	2	3	4	5	6

Here are some questions about yourself as a student in your maths class.
How much do you agree with the following statements? There are no right or wrong answers. Just make sure that your answers show what you really think about yourself.

PLEASE CIRCLE ONE NUMBER FOR EACH STATEMENT	Disagree A Lot				Agree A Lot	
1. I believe I can change my overall ability in maths considerably over time.	1	2	3	4	5	6
2. I sometimes put off doing my maths homework until the last minute so I have an excuse if I don't do so well.	1	2	3	4	5	6
3. When something that I study in maths gets difficult, I spend extra time and effort trying to understand it.	1	2	3	4	5	6
4. To be honest, I don't think I can really change how good I am at maths.	1	2	3	4	5	6
5. Sometimes I purposely get involved in lots of activities. Then if I don't do as well on my maths work as I hoped, I can say it is because I was too involved in other things.	1	2	3	4	5	6
6. With enough time and effort I could significantly improve my ability in maths.	1	2	3	4	5	6
7. I sometimes let my friends distract me in maths class. Then if I don't do as well as I hoped, I can say my friends kept me from working.	1	2	3	4	5	6
8. Whether or not I like the material in maths class, I try my best to learn it.	1	2	3	4	5	6
9. I don't think I can do much to make me better at maths.	1	2	3	4	5	6
10. Sometimes I purposely don't try hard in maths so that if I don't do well, I can say it is because I didn't try.	1	2	3	4	5	6
11. I believe I can always substantially improve my ability in maths.	1	2	3	4	5	6
12. If a particular topic or problem confuses me in my maths lesson, I go back and try to figure it out.	1	2	3	4	5	6

PLEASE CIRCLE ONE NUMBER FOR EACH STATEMENT	Disagree A Lot				Agree A Lot	
13. My ability in maths is something I can't change very much.	1	2	3	4	5	6
14. I sometimes fool around the night before a maths test so that if I don't do so well, I can say that is the reason.	1	2	3	4	5	6
15. I try and learn all the material being examined in my maths test, even if it's boring.	1	2	3	4	5	6
16. Regardless of my current ability in maths, I think I have the capacity to change it quite a bit.	1	2	3	4	5	6
17. I look for reasons to keep me from studying maths (not feeling well, having to help my parents, taking care of a brother or sister, etc.). Then if I don't do well on my maths work, I have an excuse.	1	2	3	4	5	6

Thank You

Here are two **optional** questions. Think of them as an opportunity to tell us more about your experiences with maths. Your thoughts may help improve the learning experience of current and future students at your school.

Feel free to skip ahead if you don't have enough time.

18. Are there things you particularly like about your maths class and why?

19. If you had a choice, would you rather not study maths in school? Why?

4. About You

You're doing great! It's almost over. Just a few background questions and you're done.

a) Which maths class/set are you in?   _____

b) Which English class/set are you in?   _____

c) How would you describe your race/ethnicity? (Circle one)

White British / Irish	Bangladeshi	Black African
Other White	Chinese	Black Caribbean
Indian	Other Asian	Other Black
Pakistani	Mixed	Other ethnic group (specify)
		_____

d) Is English your main language?

   Yes   No (specify) _____

e) Do you currently receive free school meals?   Yes   No

f) Did you receive free school meals at any point in the last six years?   Yes   No

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Thank you very much for taking part in our study. Your insight and information are very valuable and may help improve the learning experience for other students.

Use the space below to tell us how we might improve your survey taking experience.

<u>When you complete the survey booklet, please hand it to your teacher or tutor.</u>

Should you have any further questions or concerns about this survey or any of its questions, please contact Junlin Yu at jy318@cam.ac.uk.

Appendix G: Study 3 Factor Loadings

Standardised factor loadings of the 9-factor ESEM solution for gender role measures

	1	2	3	4	5	6	7	8	9
Emot 1	**.73**	.06	.09	-.07	.02	.02	-.16	-.04	.06
Emot 2	**.73**	-.01	-.04	.18	.03	.03	.10	.04	-.04
Emot 3	**.82**	.03	.12	.03	.00	.00	-.08	-.04	.05
Emot 4	**.77**	-.10	-.07	.08	.04	-.01	.12	-.07	-.07
Emot 5	**.80**	.03	-.03	.03	-.05	.01	-.08	.02	.00
Emot 6	**.61**	-.04	.02	.07	.07	-.01	.22	-.05	-.07
Win 1	.00	**.70**	-.01	-.06	.14	-.06	.08	.01	.00
Win 2	.00	**.64**	.05	-.07	.02	.02	-.20	.08	.05
Win 3	.06	**.87**	.02	.04	-.10	.02	.03	.02	-.03
Win 4	-.05	**.79**	-.05	-.02	.10	-.06	.13	-.02	-.05
Win 5	-.01	**.83**	.04	.07	-.03	-.01	.03	-.06	.01
Win 6	-.06	**.83**	-.04	-.01	.04	.05	-.11	-.01	.04
Viol 1	.07	-.01	**.70**	-.06	-.19	-.06	.02	.01	-.12
Viol 2	.08	.01	**.68**	-.03	.05	-.03	.00	.00	-.03
Viol 3	.10	.04	**.67**	-.07	.09	.06	-.02	.04	-.04
Viol 4	.06	.01	**.51**	.07	.30	-.03	.15	.08	-.02
Viol 5	-.04	.00	**.72**	.01	-.04	.00	.02	-.02	-.01
Viol 6	-.05	.02	**.77**	.06	.03	.03	.00	-.04	.07
Self 1	.09	.02	-.12	**.74**	-.01	.03	.02	-.05	-.06
Self 2	.08	.02	.05	**.72**	-.02	-.08	-.14	.01	.04
Self 3	.20	.02	-.03	**.64**	.05	.00	.09	.04	-.02
Self 4	.01	.03	.09	**.73**	-.06	.05	-.08	.02	.03
Self 5	.01	.06	.01	**.61**	.09	.01	.05	.03	-.01
Risk 1	.00	.03	.21	-.03	**.62**	-.02	.01	-.03	-.03
Risk 2	.08	.02	-.03	-.08	**.89**	-.03	-.03	-.02	.01
Risk 3	-.01	-.01	.01	-.03	**.86**	-.05	-.01	-.02	.06
Risk 4	-.07	.07	.04	.13	**.75**	.08	.02	.05	-.02
Risk 5	.00	.02	.03	.10	**.75**	.05	-.07	.06	-.06
Thin 1	-.04	-.02	.03	.04	-.06	**.90**	-.02	-.04	.03
Thin 2	-.05	-.03	-.01	.05	.04	**.91**	-.03	-.01	-.01
Thin 3	.12	.04	-.01	-.18	.05	**.80**	.06	.02	-.04
Thin 4	.13	.03	.03	-.05	-.12	**.60**	.01	.08	.08
Thin 5	.08	.03	-.08	.00	.06	**.65**	.18	.06	-.04
App 1	.15	.02	-.01	-.18	-.05	-.01	**.71**	.10	.04
App 2	-.11	.09	.04	.09	.01	.09	**.70**	-.01	.05
App 3	-.08	.02	-.02	.04	-.02	.00	**.81**	.00	.04
App 4	.00	.01	.09	-.02	-.08	-.07	**.78**	-.03	.05
App 5	.04	.07	.01	-.07	.04	.22	**.56**	.14	.01
Roman 1	.05	.03	-.06	-.06	-.02	.00	-.03	**.86**	.01
Roman 2	-.11	-.02	.03	.08	.03	-.01	.03	**.78**	-.03
Roman 3	-.04	.04	.09	.05	-.17	-.01	-.02	**.53**	.06
Roman 4	-.11	-.17	.07	.05	.14	-.07	.15	**.57**	-.01
Roman 5	.04	.06	.05	-.08	-.11	.06	-.09	**.42**	.10
Dom 1	.19	.04	-.12	-.09	-.01	-.03	-.05	.08	**.74**
Dom 2	.05	-.01	.00	-.06	.04	-.02	.07	-.03	**.83**
Dom 3	-.08	-.05	-.07	.05	.10	.02	.11	.01	**.73**
Dom 4	-.07	.02	.02	.08	-.03	.03	.03	.03	**.83**
Dom 5	-.08	-.04	.10	.02	-.07	-.01	-.08	-.06	**.74**

Note. Target factor loadings are in bold.

Standardised factor loadings of the 6-factor ESEM solution for motivation and engagement

	1	2	3	4	5	6
E mindset 1	**.90**	.03	.09	-.03	.03	-.11
E mindset 2	**.65**	.04	-.13	.17	-.08	.10
E mindset 3	**.67**	.05	.02	.01	-.05	-.04
E persevere 1	.03	**.84**	-.01	-.02	-.05	-.02
E persevere 2	.15	**.41**	-.17	-.14	.37	.13
E persevere 3	.03	**.72**	-.01	.03	-.03	.01
E persevere 4	.05	**.46**	-.18	-.06	.14	.08
E handicap 1	.04	-.09	**.50**	-.02	.10	.22
E handicap 2	-.02	-.01	**.55**	.05	.04	.18
E handicap 3	-.05	-.11	**.68**	-.01	.11	.07
E handicap 4	-.04	.04	**.74**	-.04	-.09	-.09
E handicap 5	.00	-.05	**.64**	-.04	-.06	.07
E handicap 6	-.01	-.10	**.68**	-.02	.09	.09
M mindset 1	.07	-.07	-.12	**.80**	.14	.13
M mindset 2	.06	.04	.03	**.67**	-.08	-.13
M mindset 3	.05	-.07	.04	**.73**	.08	-.04
M persevere 1	-.10	.30	.11	.18	**.44**	-.14
M persevere 2	.03	-.06	-.01	.05	**.73**	-.07
M persevere 3	-.08	.21	.08	.25	**.33**	-.16
M persevere 4	.00	.07	.03	-.05	**.69**	-.14
M handicap 1	-.09	-.01	-.05	.06	-.02	**.83**
M handicap 2	.04	.03	.17	-.03	-.04	**.52**
M handicap 3	-.02	.03	.02	-.05	-.01	**.74**
M handicap 4	.03	.09	.26	.02	-.21	**.34**
M handicap 5	-.08	-.01	.10	-.01	-.15	**.52**
M handicap 6	.06	.02	.21	-.13	-.13	**.33**

Note. Target factor loadings are in bold.