Taking the attitude of the other? The role of study attitdues in mediating gender compositional effects on girls' and boys' school misbehavior.

Jannick Demanet, Pieter Vanderwegen, Hans Vermeersch, and Mieke Van Houtte

Abstract

Previous research on consequences of schools' gender composition has mostly investigated students' socio-emotional wellbeing and achievement, while students' academic attitudes and behavioural outcomes – including school deviancy – have been less studied. Moreover, most studies compared single-sex and coeducational schools, and did not focus on the proportion of girls at school. Starting from reference group theory, we hypothesize that boys attending schools with a higher proportion of girls adopt the latter's positive study attitudes, rendering them less susceptible to disruptive behaviour. Conversely, girls in schools with more boys are expected to adopt the latter's negative study attitudes, consequently being more likely to misbehave. Multilevel analyses on data from the Flemish Educational Assessment (FlEA), consisting of 5961 girls and 5638 boys in 81 schools, showed that both boys and girls valued studying more and were less likely to misbehave at school when proportionally more girls attended their school. Implications are discussed.

Introduction

Adding to the debate on the benefits of single-sex versus coeducational schooling, for decades many studies have focused on the effects of the school's gender context (Lee and Bryk 1986; Marsh 1989; Kessels and Hannover 2008). Prototypical research on this topic, although not the first of its kind, is that of Dale (1969, 1971, 1974). He found coeducational settings to provide an array of social and affective benefits, which were not at the expence of students' academic achievement. Over the last four decades, his academic work has been replicated repeatedly, but with inconclusive results. Some scholars are proponents of single-sex education, which would be especially beneficial for girls (Kessels and Hannover 2008; Lee and Bryk 1986; Mael et al. 2005). Other researchers, however, find no advantage in single-sex education, for neither sex (e.g., Harker 2000; Marsh 1989; Jackson 2010), and maintain that there is not enough scientific evidence to advocate a return to single-sex schooling (Halpern et al. 2011). These inconsistencies are due to methodological aspects, selection effects, or even ideological considerations (Bigler and Signorella 2011; Marsh 1989). Moreover, according to Harker (2000, p. 206), conclusions may vary according to the specific outcome under study. In this respect, it is noteworthy that, although students' socio-emotional well-being and academic achievement have thoroughly been investigated, research relating the gender school context to students' academic attitudes and behaviour at school is limited.

In the current study, we investigate whether the school gender composition influences boys' and girls' study attitudes and chances of misbehaving at school. Previous research has shown that the level of school deviancy displayed by students varies between schools and that school-level factors can be introduced to account for these differences (Demanet and Van Houtte 2011; Eitle and Eitle 2003). It can be supposed that schools' gender composition is at least in part responsible for between-school differences. For this, we start from reference group theory (Merton 1949), more specifically, from the notion of normative reference groups. Normative reference groups provide guidelines for the formation of attitudes, which ultimately guide behaviour (Merton 1949; Kelley 1952). Wilson (1959) connected normative reference group taking to the numerical presence of a group of students at school, stating that if a group with specific attitudes is numerically dominant, this group can determine the attitudes held by the students in that school (see also Harris, 1995; Van Houtte, 2004). In this respect, it is noteworthy that previous research found girls to be more industrious and to have positive attitudes regarding school and studying, whereas boys tend to reject school values (Francis 2000; Warrington, Younger, and Williams 2000). So it might be expected that when attending a school with a higher proportion of girls, boys and girls will support school values more. Moreover, as resistance theory holds that students who do not see the value of studying may actively oppose the school by showing disruptive behaviour (Willis 1977), we may expect that boys and girls will be less deviant, when attending schools with a higher proportion of girls.

Investigating the relationship between school gender composition and school misconduct extends two distinct lines of inquiry. First, we build on previous research into the effects of the school gender composition by focusing on students' academic attitudes and misbehaviour at school, outcomes that have been rarely studied in the past (for exceptions, see Lee and Bryk 1986; Lavy and Schlosser 2011). Furthermore, previous research on the effects of the school gender composition has been dominated by studies investigating the dichotomous distinction between single-sex and coeducational schools (see e.g., Lee and Bryk 1986; Kessels and Hannover 2008). As we use a continuous measure for gender composition – namely, the proportion of girls at school – we provide a more fine-grained analysis of gender compositional effects than previous research (see also Van Houtte 2004; Schneeweis and Zweimüller 2012; Lavy and Schlosser 2011). A second line of inquiry on which we build is the literature on school deviancy. This literature has been dominated by studies investigating determinants of student deviancy on the individual level. Only recently, some studies have started to unravel compositional effects on students' deviance, mainly focusing on schools' socioeconomic and ethnic composition (Eitle and Eitle 2003; Stretesky and Hogan 2005; Demanet and Van Houtte 2011). Other compositional features, including the gender context, are yet to be studied more closely. Through this paper, we aim to fill these research lacunae.

Single-sex or coeducational schools?

The debate on single-sex versus coeducational schooling has continued for decades. Historically, the most important research on this topic was provided by Dale in the UK (1969, 1971, 1974). Dale maintained that the social community at school benefits from the coeducation of girls and boys. As such, he showed that coeducational schools were happier

communities, that students had lower levels of anxiety, and that boys had lower levels of neuroticism in coeducational schools. Moreover these happier school communities did not preclude students from performing well. Coeducationally schooled boys performed even better than their counterparts attending boys' schools (Dale 1974). Although prototypical, Dale's research was later accused of not standing up to scientific scrutiny for reasons of subjectivity. However, it did bring forth much research on the desirability of coeducational schools over single-sex schools. On the one hand, research still favors coeducation (e.g., Schneider, Coutts, and Starr 1988; Van Houtte 2004; Jackson 2010). On the other hand, a body of literature has surfaced that points to the benefits of single-sex schooling, and urges its reinstalment (Lee and Bryk 1986; Kessels and Hannover 2008). This side maintains that single-sex education is especially beneficial for girls, who would perform better, feel less stereotyped, and have a better self-knowledge of their ability in girls' schools (Kessels and Hannover 2008; Lee and Bryk 1986; Lee and Marks 1990). In 2005, the US Department of Education commissioned a literature review on the issue, undertaken by Mael and colleagues (2005). They concluded that there were some positive effects of single-sex schools/classes on boys' and girls' academic achievement and socio-emotional development. This seems to be especially true for disadvantaged pupils (Mael et al. 2005). Opponents of single-sex education, however, maintain that the evidence is inconclusive and certainly does not advocate a massive return to single-sex education (Halpern et al. 2011). As such, the debate still continues until this day.

Harker (2000, p. 206) remarked that the conclusions in the coeducation debate may vary according to the specific outcome under study. In this respect, it is noteworthy that studies relating the schools' gender composition to students' school behaviour are scarce to non-existent (see also Lee and Bryk 1986, p. 382). However, there are a few studies that may provide an indication to the nature of the relationship between gender composition and school deviancy. Jones and Thompson (1981), for example, investigated the consequences of a school transforming from an all-boys school to a coeducational one. They found that the number of detentions had dropped for boys in their new coeducational environment. However, the scarce research on this topic provided mixed results, as another study discovered no differences between single-sex and mixed schools with respect to truancy and disciplinary behaviour (Lee and Bryk 1986), and still another found that girls are less likely to be deviant in single-sex schools (Caspi et al. 1993).

Furthermore, the vast majority of research into the schools' gender context has focused on single-sex versus coeducational schooling. However, it is also important to research the effects of the proportional distribution of girls and boys at school. For one, because an often overlooked consequence of the reinstalment of single-sex schooling is an imbalanced sex ratio in coeducational schools (Morse 1998). This arises because single-sex education is generally considered more beneficial for girls than for boys, resulting in parents sending especially their daughters to single-sex schools. Studies into the effects of the relative proportion of girls at school may provide insight into what this imbalanced sex ratio means for the students in coeducational schools. Research showed, for example, that not only the sheer presence of girls at school (Van de Gaer 2006), but also their relative proportion impacts boys' achievement: boys do not only perform better when girls are around, their performance rises as well with the proportion of girls at school (Lavy and Schlosser 2011; Van Houtte 2004).

Research on gender stereotyping agrees that coeducational school contexts do not only reinforce gender stereotyping (Kessels and Hannover 2008), but girls are less likely to choose a traditionally female subject course when attending schools with proportionally more girls as well (Schneeweis and Zweimüller 2012). In the following section, we explain why we expect the gender ratio at school to influence both boys' and girls' chances for deviancy as well.

Gender context and school misbehaviour

In the last decade, it has become apparent that boys, relative to girls, tend to underperform at school (Epstein et al. 1998; Younger and Warrington 2005). One cited explanation for this gender gap is the existence of a 'macho' or 'laddish' culture among boys (Jackson 2003; Warrington, Younger, and Williams 2000). The term 'lad' originally referred to a group of white, working-class boys who rejected educational values (Willis 1977). Later, it became applicable to middle-class boys as well (Francis 1999). Fitting a 'laddish' culture is the image that working hard at school and valuing studying is typical for a feminine role set (Jackson 2002). Boys would feel pressurised to conform to these macho images in order to remain popular and would be ridiculed when working hard (Jackson 2003; Warrington, Younger, and Williams 2000). This leads them to be more laid back at school and reject school values. Other research concurs that girls are more industrious at school, have more positive study attitudes, are more motivated, and spend more time on homework than boys (Francis 2000; Marsh 1989; Van Houtte 2004). Eventually, students who do not value studying may actively oppose the school by showing disruptive behaviour (Willis 1977), a viewpoint also known as the resistance theory (see also McGrew 2011). This may help to explain the overrepresentation of boys among offenders of delinquency (Junger-Tas, Ribeaud, and Cruyff 2004), school misconduct (Stewart 2003; Demanet and Van Houtte 2011) and bullying (Olweus 1994; Demanet 2008). In short, a laddish culture at school may lead boys to devalue studying, eventually resulting in an active opposition of the school rules.

School characteristics may impact the conception of masculinity in the school culture (Legewie and DiPrete 2012). In particular, academically oriented schools may supress the idea of performing well as ill-suiting for boys. Legewie and Diprete (2012) showed that the laddish culture was more manifestly present in lower SES schools, where boys had less favourable attitudes towards schooling and, consequently, performed worse. While designating school determinants of attitudes towards schooling, Legewie and DiPrete (2012) did not focus on the role of the schools' gender context. Starting from reference group theory, however, we would expect the gender composition of the school to shape girls' and boys' academic attitudes and behaviour at school. Reference group taking is the process by which people compare themselves to other individuals or groups (Merton 1949). Two kinds of reference groups exist: comparative reference groups, in which individuals take others as a yardstick to evaluate their own situation, and normative reference groups (Kelley 1952). In normative reference group taking, the individual is provided with guidelines for the formation of attitudes, which ultimately shape his/her behaviour (Kelley 1952; Merton 1949). According to Richer (1976), for reference taking to occur, the reference group should be visible to the actor. Henceforth, we may expect boys and girls to take each other as a reference group in coeducational schools. Empirical evidence confirms that comparative reference group taking is occuring in coeducational schools. Marsh (1989) argued that girls and boys in

coeducational schools evaluate their own ability relative to the other gender, resulting in a more favorable reading self-concept for girls, and a poorer reading self-concept for boys. Other reports found that girls evaluate themselves better in 'masculine' subjects (for example physics and mathematics) in single-sex schools than in coeducational ones (Kessels and Hannover 2008). There are also indications that normative reference group taking is at work in mixed-sex schools. Lee and Bryk (1986), for example, showed that girls had better study attitudes in girls' schools as compared to mixed-sex schools. This could be due to normative reference group taking in coeducational schools: as girls take over the boys' attitudes in mixed-sex settings, they value studying less.

Not only the sheer presence, but also the relative distribution of both genders may influence normative reference group taking (Wilson 1959). In her conception of group socialization theory, Harris (1995) states that children's socialization is context-specific. One of the most important socializing agents is the peer group, in which children learn from one another attitudes and behaviour, independently from what they have learned from their parents. According to Harris (1995, p. 468), attitudes and behaviour held by the majority of the peer group spread to the rest of the group. Consequently, we may expect that, when girls constitute the majority in a certain school, their better study attitudes extend to the boys attending the school as well. Van Houtte (2004) started from this assumption to show that the general school culture becomes more study oriented when more girls attend the school, ultimately impacting boys' achievement for the better. Following this reasoning, we may expect that, when girls gain ascendancy – numerically speaking – at school, their norms and attitudes will eventually spread to all students at school – both boys and girls - rendering them more study oriented. Eventually, this may result in less students actively resisting the school rules by showing disruptive behaviour.

The Flemish educational context

The debate concerning the educational gender context is complicated by the different cultural contexts in which studies have been undertaken (Bigler and Signorella 2011). Therefore, it is appropriate to discuss briefly the Flemish educational context and its history in providing coeducational schools.

Flanders is the Dutch-speaking, northern part of Belgium. Since 1988, the Flemish government has had the jurisdiction to implement and govern its own educational system. Schools fall into two sectors: the public sector, which is provided by the Flemish, provincial, and city governments, and the private sector, which consists almost exclusively of Catholic schools. For historical reasons, the private sector has always been the most developed, in terms of both the number of schools and students. In the Flemish school system, no difference is made between private and public schools with respect to state support. Usually children go to nursery school from the age of two and a half. Education becomes compulsory when the child is six years old. After six grades of primary education, children transfer to secondary education. There are four tracks in secondary education: the academic track; the technical track; the vocational track and the artistic track (which is marginal in terms of number of students). The Flemish school system can be categorised as 'explicit school-level tracking to different school types catering to specific student groups', using achievement as a selection

criterion (Trautwein et al. 2006; Van Houtte, Demanet, and Stevens 2012). The different tracks are commonly classified hierarchically, placing vocational tracks at the lower end.

Over the past few decades, secondary schools in Flanders have become progressively coeducational. Coeducation in the public sector was made compulsory in 1970. However, as in the United States (Bigler and Signorella 2011), the private sector was initially reluctant to the idea of coeducational schooling (Brutsaert 1999, 2001). It is only since the mid-1980s that more and more private schools became coeducational, mostly due to economic reasons. In 1994, following a European Community resolution aimed at preventing discrimination in education, the Flemish government made mixed-sex schools compulsory for private schools as well. At present, all secondary schools – private and public schools alike – have become fully coeducational, although some schools still bear the mark of their single-sex history. Other schools (mainly technical/vocational schools) still enroll a female or male dominated school population, because of the courses they offer. Hence, despite their obligatory coeducational nature, a wide range in the proportion of girls at school still exists in Flemish secondary schools.

Methods
Data

The data were part of the FlEA (Flemish Educational Assessment), gathered in the 2004–2005 school year in 85 Flemish secondary schools. We used multistage sampling. At first, we selected proportional-to-size postal codes, size being defined by the number of schools within each postal code, information provided by the Flemish Educational Department. From the 240 postal codes, we selected 48 ad random. This resulted in the desired overrepresentation of larger municipalities. Consequently, we selected all regular secondary schools in the chosen postal codes that provided a third and fifth grade (corresponding to years 9 and 11 in the UK system), yielding a response rate of 31 %. This low response rate was due to schools in Flanders being swamped with research requests. Schools choose the research they take part in on a first-come, first-served basis. Analyses in which we compared our sample to the Flemish school population, based on information attained through the Flemish Educational Department, showed that the participating schools did not differ from those that opted out in terms of school sector, size, curriculum, or student composition. Hence no systematic biases occurred, and the 85 schools in the sample were representative of the Flemish situation (Van Houtte et al. 2005).

In the participating schools, we asked all third- and fifth-grade students present at the time of the visit to fill out the questionnaire. Students filled out the questionnaire in class, supervised by members of the research team and a teacher. A few students were not present, due to absence or field trips. A total of 11,945 students completed the questionnaire, of which 11,872 (response rate: 87%) proved valid: 6,081 (response rate: 90%) in the third grade, 5,791 (response rate: 86%) in the fifth grade. However, we lacked data from four schools on the gender composition variable (see variables section). As multilevel analysis does not permit missing data at the second level, we had to remove these four schools from the analyses. Subsequently, the analyses are based on 11,599 students, among which 5961 girls and 5638 boys, attending 81 schools (see Table 1).

Table 1: Descriptive statistics for variables: Frequencies (%), means, standard deviations (SD), Cronbach's alpha, and *N*.

		Total sample					Girls				Boys				Mean difference
Variables		%	Mean	SD	Cronbach's alpha	N	%	Mean	SD	N	%	Mean	SD	N	
School level															
Gender composition			49.57	26.57		81									
School size			467.06	286.42		81									
Ethnic composition			15.78	21.24		81									
SES composition			4.82	1.19		81									
Student level															
School misconduct			30.01	8.45	0.87	11,323		28.28	7.01	5777		31.81	9.40	5526	-3.528*** (t=-22.683)
Study involvement			19.42	4.04	0.76	11,472		20.17	3.74	5867		18.63	4.18	5583	1.534*** (t=20.710)
Gender															
	Girls	51.40%				11,599									
SES			5.21	2.09		10,922		5.10	2.10	5640		5.32	2.08	5261	-0.221*** (t=-5.525)
Grade															
	Fifth grade	48.90%				11,628	50.00%			5961	47.90%			5638	
Ethnicity															
	Immigrant	10.80%				11,626	10.90%			5960	10.60%			5637	
Track															
	Technical	28.80%				11,599	25.50%			5961	32.40%			5638	
	Vocational	21.90%				11,599	22.60%			5961	21.10%			5638	
Prior achievement			69.43	9.24		10,484		70.57	8.75	5286		68.25	9.59	5181	2.323*** (t=12.950)

Variables

School-level variables

We measured the *gender composition* of the schools by calculating the proportion of girls in each school. For this, we used information supplied by the school administrators, who provided us with the total number of students at school (see below), and the number of girls and boys among the students. Dividing the absolute number of girls by the total number of students, we obtained the percentage of girls in each school. However, 4 of the 85 administrators choose not to provide information on the number of girls and boys in their school. The proportion of girls in the schools in our sample ranged from 0% (3 schools) to 97.84% (1 school). The mean gender composition in our sample was 49.57 (SD=26.57, see Table 1). The *school size* was measured by asking the school administrators to provide us with the total number of students at school. The mean school size in our sample was 467.06 (SD=286.42). The 85 schools in our sample covered the entire range of *ethnic composition,* from 0% (6 schools) to 88.20% (1 school) ethnic minority students (see below). The mean ethnic composition was 16.45 (SD=21.70). As is common (Demanet and Van Houtte 2011), the *SES composition* was measured by calculating the mean SES of students (see below) per school. The mean of the schools was 4.82 (SD=1.19).

Individual-level variables

We measured *school misconduct* using a scale inspired by Stewart (2003, p. 602–604), consisting of 17 items. Students were asked how often they performed deviant acts, such as being late for school, cheating on tests, doing drugs during school hours, and so forth (for all items, see Appendix). Students could answer using a 5-point scale, ranging from *never* (1) to *very often* (5). Scores were summed to a scale ranging from 17 to 85 (mean=30.01, SD=8.45, see Table 1). The Cronbach's alpha of 0.87 confirms the reliability of the scale. It has been shown that using self-reported measures is not ideal for measuring deviant acts (Crosnoe 2002). However, it nonetheless remains the most common method of gathering such information (e.g., Stewart 2003). We interpolated missing values by item correlation substitution (Huisman 1999): a missing item was assigned the value of the most highly correlated item. The dependent variable was significantly skewed (1.58, SE=0.023) toward its lower end. It is notable that, in our sample, boys had a significantly higher mean on this scale than girls (mean difference=3.53, *p<0.001*, see Table 1).

Study involvement was measured by a scale consisting of six items (Brutsaert 2001). Examples of items are: 'There are much more important things in life than studying (reversed)' and 'To me, studying is very important because it helps to develop oneself'. Students could answer on a five-point scale, ranging from *absolutely do not agree* to *totally agree* (1–5). We computed missing items by item correlation substitution (Huisman 1999). The answers were summed up, yielding a range of 6 through 30 (Cronbach's alpha=0.76). In our data, we found evidence for the more study-oriented attitudes of girls: bivariately, there was a significant (*p<0.001*) difference between the means for boys and girls (mean difference=1.53, *p<0.001*, see Table 1).

The sample was quite equally divided by *gender* (51.4% girls; coding: 1=boy). The *SES* was measured by the occupation of the father or the mother (Erikson, Goldthorpe, and Portocarero 1979), or, if they were unemployed, their last profession. If both worked, we used

the highest ranked profession as the SES of the family. The respondents in our data covered the entire range of SES (1=unskilled manual labor; 8=professionals and large proprietors). Respondents averaged 5.21 (SD=2.09) on the SES-measure. *Grade* was evenly distributed: 51.2% of the students attended the third grade. We assessed *ethnicity* using multiple questions. The principal criterion was the birthplace of the maternal grandmothers. If missing (1%), we considered the nationality of students' mothers and fathers. Only West European birthplaces and nationalities were considered native descent (Timmerman, Hermans, and Hoornaert 2002). Additional criteria in case of missing data regarding nationality (father: 4%, mother: 3.3%) were the language spoken at home (other than Dutch), religion (Islam), and the student's name (Felouzis 2003). This resulted in a dichotomous variable (0=native, 1=immigrant); 10.80% were immigrants. Of our respondents, 46.50% attended the academic track, 2.8% the arts track, 28.80% the technical track and 21.90% the vocational track. In our analyses, we accounted for attendance of the technical track (1=technical track) or the vocational track (1=vocational track), so that our reference category was academic/arts track. To grade their students, Flemish high-schools use a percentage, hence, grades range from 0% to 100%, 50% being the passing grade. In our data, boys' prior achievement ranged from 41% to 100%, with a mean of 68.25% (SD=9.59). Girls performed significantly ($p<0.001$) better, averaging 70.57% (SD=8.75). The overall mean was 69.43% (SD=9.24, see Table 1). However, this measure should be considered carefully. As no standardised tests (for example, state administered tests) exist in Flemish education, it is hard to compare measures of academic achievement across schools. Furthermore, as this is a self-reported measure, it could contain biases due to memory problems and cover-up strategies. As a result, it had a large number of missing values (9.8%).

Data analyses

We set two main research objectives. First, we assess whether a higher proportion of girls leads to better study attitudes both for girls and boys. The second main research objective is to investigate whether gender school composition affects students' chances of misbehaving at school, and, moreover, whether study attitudes mediate that relationship. As these research questions are situated at two levels –school characteristics are hypothesized to affect individual outcomes - it is imperative to use multilevel modeling (HLM6; Raudenbush and Bryk 2002; Snijders and Bosker 1999). In multilevel analyses, it is customary to start by estimating unconditional 'null' models, to estimate the amount of variance in the dependents that is situated at the school level. To determine possible mediation effects, we estimated stepwise multilevel regression models. All independents but the dichotomous variables were grand mean centered to ensure model stability.

First, we performed analyses to investigate whether gender school composition relates to students' study attitudes. In the first model, we investigated the bivariate relation between gender composition and study involvement. In the second model, we added control variables to rule out spurious relations and selection effects. At the school level, we controlled for school size and the schools' ethnic and SES composition. At the individual level, we controlled for the sociodemographic characteristics of gender, SES, grade, and ethnicity. Moreover, as research in Flanders showed students in technical/vocational tracks to have lower study attitudes (Van Houtte and Stevens 2009), we controlled for track position as well.

This takes the overrepresentation of boys in the technical track (see table 1) into account as well. In the third model, then, we investigated by means of a cross-level interaction effect between gender school composition and students' gender whether eventual gender compositional effects differed between girls and boys. In the last model, we additionally controlled for achievement in the previous school year, as better achieving students may be expected to value studying more (Legewie and DiPrete 2012). This was done in the last step, because the measure of prior achievement was a rather crude one and had a large number of missing values (see Variables section).

The second set of models relates gender composition to school misconduct. As is common for delinquency measures (Stewart 2003), school misconduct was significantly skewed (see variables section) toward its lower end. Using alternative techniques, we tested whether this affected the results.[1] The same picture emerged whether we used linear or more complex, nonlinear models. For ease of interpretation, we present the linear multilevel results in this article. In the first step, we investigated bivariately the role of the schools' gender composition. In the second step, we controlled for several school- and individual-level characteristics. At the school level, we controlled for school size, and the school's ethnic and SES composition, as these variables are related to students' misbehavior at school (Demanet and Van Houtte 2011; Stewart 2003; Stretesky and Hogan 2005). At the student level we controlled for gender, SES, grade and ethnicity. Additionally, we controlled for track position, as students attending technical or vocational tracks have been shown to be more deviant (Van Houtte and Stevens 2008). Previous studies on the relationship between gender composition and school deviancy hinted that differences may occur between boys and girls (Caspi et al. 1993; Jones and Thompson 1981). Henceforth, it was again important to assess potential differences between boys and girls. In the third step, we therefore added a cross-level interaction term between gender composition and gender. In the fourth step, then, we added the individual study involvement of students. This enabled to test whether an eventual effect of gender composition, and the difference therein between boys and girls, was due to study involvement. In the last model, we added the students' prior achievement, as prior achievement has been linked to school deviance in the past (Roeser and Eccles 1998). Moreover, this takes into account the underachievement of boys (Epstein et al. 1998; Younger and Warrington 2005).

Results

The unconditional 'null' model showed study involvement to vary significantly across schools: 7.12% (σ^2=15.399; τ_0=1.181; p<0.001) of its variance was between schools, warranting the introduction of school-level determinants. The results of the multilevel analyses on study involvement are shown in table 2. Model 1 showed a significant positive association between gender composition and study involvement (standarized gamma γ^*=0.145; p<0.001): students attending schools with a higher proportion of girls had more positive study attitudes. Adding the control variables in model 2 diminished this association, but there remained a small but borderline significant effect of the school gender composition (γ^*=0.040; p<0.01): even net of selection effects, a higher proportion of girls at school associated with more positive study attitudes held by individual students in that school. The

interor term in the third model was not statistically significant (γ=-0.003; p>0.05), showing that the effect of gender composition on study involvement was the same for both genders. Lastly, adding prior achievement, which in itself was positively associated with study involvement (γ*=0.155; p<0.001), did not alter the picture.

Table 2: Association between gender composition and study involvement. Results of stepwise multilevel analysis.

Variables			Model 1	Model 2	Model 3	Model 4
Intercept			19.442***	20.354***	20.335***	19.697***
			(0.111)	(0.240)	(0.244)	(0.254)
School level						
Gender composition		γ	0.022***	0.006°	0.007*	0.007°
		γ^*	0.145***	0.040°	0.049*	0.044°
			(0.005)	(0.003)	(0.004)	(0.004)
School size		γ		-0.001	-0.001	-0.001
		γ^*		-0.035	-0.034	-0.031
				(0.001)	(0.001)	(0.001)
Ethnic composition		γ		0.027***	0.027***	0.026**
		γ^*		0.142***	0.144***	0.136**
				(0.007)	(0.007)	(0.009)
SES composition		γ		0.194	0.201	0.229
		γ^*		0.057	0.059	0.067
				(0.155)	(0.159)	(0.175)
Student level						
Gender		γ		-1.324***	-1.311***	-1.126***
		γ^*		-0.164***	-0.162***	-0.139***
				(0.084)	(0.079)	(0.083)
SES		γ		0.015	0.015	0.004
		γ^*		0.008	0.008	0.002
				(0.021)	(0.021)	(0.020)
Grade		γ		0.060	0.060	0.143**
		γ^*		0.015	0.015	0.035**
				(0.050)	(0.050)	(0.052)
Ethnicity		γ		1.805***	1.806***	1.856***
		γ^*		0.139***	0.139***	0.142***
				(0.183)	(0.183)	(0.170)
Track						
	Technical track	γ		-0.862***	-0.868***	-0.473**
		γ^*		-0.096***	-0.097***	-0.053**
				(0.154)	(0.153)	(0.157)
	Vocational track	γ		-1.526***	-1.536***	-1.292***
		γ^*		-0.155***	-0.156***	-0.131***
				(0.216)	(0.213)	(0.196)

Prior achievement	γ			0.068***
	γ^*			0.155***
				(0.005)

Interaction term				
Gender*gender composition	γ		-0.003	-0.002
			(0.004)	(0.004)

Variance components				
Intercept	U_0	1.687***	1.695***	1.695**
Gender	U_1	0.082	0.082	0.100
SES	U_2	0.001	0.001	0.002
Grade	U_3	0.080*	0.080*	0.082
Ethnicity	U_4	0.612	0.616	0.366
Technical track	U_5	0.291	0.298	0.350
Vocational track	U_6	0.590***	0.605***	0.385
Prior achievement	U_7			0.001

Note: The unstandardized (γ) and standardized (γ^*) gamma coefficients are presented, with the standard errors appearing in parentheses.

$^{\circ}\, p \le .10$; * $p \le .05$; ** $p \le .01$; *** $p \le .001$

The unconditional 'null' model performed on school misconduct showed that 7.30% of its total variance was between schools (σ^2=66.787; τ_0=5.289; $p<0.001$). Again, this warranted the use of multilevel models. Table 3 presents the results of the multilevel analyses for school misconduct. Model 1 showed the schools' gender composition to be significantly related to school misconduct (γ^*=-0.151; $p<0.001$): students were less likely to be deviant when they attended schools with a higher proportion of girls. When introducing the control variables in model 2, this effect diminished, but a small significant effect persisted (γ^*=-0.044; $p<0.05$). In model 3, we tested whether this effect differed between girls and boys. The interaction term was not significant (γ=0.011; $p>0.05$): for girls and boys alike, a higher presence of girls at school slightly reduced chances for school deviancy. In the third model, we added study involvement, which, as expected, had a significant negative effect on school misconduct (γ^*=-0.386; $p<0.001$). Moreover, adding this variable dispelled the association between gender composition and school misconduct (γ^*=-0.033; $p>0.05$). This meant that the initial association between gender composition and school misconduct was due to the higher study involvement of students enrolled in schools with a higher proportion of girls. Lastly, adding the GPA, which in itself was negatively related to school misconduct (γ^*=-0.128; $p<0.001$), did not alter the overall picture.

Table 3: Association between gender composition, study involvement, and school misconduct. Results of stepwise multilevel analysis.

Variables			Model 1	Model 2	Model 3	Model 4	Model 5
Intercept			30.149***	23.069***	23.153***	23.991***	24.549***
			0.233	0.460	0.481	0.417	0.500
School level							
Gender composition		γ	-0.048***	-0.014*	-0.022°	-0.011	-0.007
		γ^*	-0.151***	-0.044*	-0.069°	-0.033	-0.023
			(0.008)	(0.006)	(0.012)	(0.011)	0.012
School size		γ		0.001	0.001	0.001	0.001
		γ^*		0.028	0.019	0.002	0.002
				(0.001)	(0.001)	(0.001)	(0.001)
Ethnic composition		γ		-0.006	-0.007	0.010	0.028*
		γ^*		-0.016	-0.018	0.025	0.071*
				(0.015)	(0.016)	(0.015)	(0.013)
SES composition		γ		-0.185	-0.216	-0.061	-0.013
		γ^*		-0.026	-0.030	-0.009	-0.002
				(0.295)	(0.328)	(0.298)	(0.258)
Student level							
Gender		γ		2.823***	2.775***	1.747***	1.536***
		γ^*		0.167***	0.164***	0.103***	0.091***
				(0.271)	(0.290)	(0.299)	(0.287)
SES		γ		0.162***	0.161***	0.171***	0.194
		γ^*		0.040***	0.040***	0.042***	0.048
				(0.042)	(0.042)	(0.041)	(0.046)
Grade		γ		1.158***	1.157***	1.188***	1.083
		γ^*		0.137***	0.137***	0.141***	0.128
				(0.112)	(0.112)	(0.097)	(0.103)
Ethnicity		γ		-0.657	-0.664	0.800*	0.620
		γ^*		-0.024	-0.024	0.029*	0.023
				(0.411)	(0.410)	(0.402)	(0.422)
Track							
	Technical track	γ		1.643***	1.649***	0.822**	0.390
		γ^*		0.088***	0.088***	0.044**	0.021
				(0.336)	(0.312)	(0.312)	(0.257)
	Vocational track	γ		2.543***	2.552***	1.225**	1.228***
		γ^*		0.123***	0.124***	0.059**	0.060***
				(0.486)	(0.465)	(0.418)	(0.331)
Study involvement		γ				-0.808***	-0.770***
		γ^*				-0.386***	-0.368***
						(0.023)	(0.022)

Prior achievement	γ				-0.119***
	γ^*				-0.130***
					(0.013)

Interaction term

Gender*gender composition	γ		0.011	0.008	0.006
			(0.017)	(0.015)	(0.017)

Variance components

Intercept	U_0	3.195	3.796	1.909	6.969
Gender	U_1	2.607	2.321	3.292	2.137
SES	U_2	0.018	0.021	0.022	0.037
Grade	U_3	0.363**	0.377**	0.255*	0.352*
Ethnicity	U_4	4.098	4.138	4.397	4.558
Technical track	U_5	3.150	1.245	2.370	0.860
Vocational track	U_6	7.074**	5.273**	4.980**	1.040
Study involvement	U_7			0.013	0.010
Prior achievement	U_8				0.008

Note: The unstandardized (γ) and standardized (γ^*) gamma coefficients are presented, with the standard errors appearing in parentheses.
$^{\circ} p \le .10$; $* p \le .05$; $** p \le .01$; $*** p \le .001$

Discussion

Many studies have investigated student outcomes of single-sex versus coeducational schooling (Halpern et al. 2011; Lee and Bryk 1986; Marsh 1989; Jackson 2010). Although conclusions may vary according to the specific outcome under study (Harker 2000), most previous research on this issue has neglected academic attitudes and school misbehaviour (for exceptions, see Jones and Thompson 1981; Lee and Bryk 1986; Caspi et al. 1993). Moreover, previous research remains limited to investigating the dichotomous distinction between single-sex and coeducational schools. However, it is also important to pinpoint effects of the relative distribution of girls and boys at school (see e.g., Lavy and Schlosser 2011; Schneeweis and Zweimüller 2012; Van Houtte 2004). In the current study, we investigated the effect of the proportion of girls at school on boys' and girls' study attitudes and chances of misbehaving at school.

The results point out that students in schools with a higher proportion of girls had more positive study attitudes and were less deviant. When accounting for selection effects, these effects were very small, but remained significant. Furthermore, study attitudes acted as mediator. We found evidence that students who attend schools with proportionally more girls have more positive study attitudes, which associates with less deviant behavior. As such, the findings endorse the hypotheses based on reference group theory (Kelley 1952; Merton 1949; Richer 1976). As girls have been shown to have more positive study attitudes than boys (Jackson 2003; Warrington, Younger, and Williams 2000; Van Houtte 2004), we interpret these results as an indication that the numerically dominant group at school impacts the study attitudes of all students in school (see also Wilson 1959; Van Houtte 2004; Harris 1995). We conclude that, for girls and boys alike, it seems more beneficial to enroll in schools where proportionally more girls are present – at least in reference to study attitudes and school misbehaviour.

These findings contradict the viewpoint that coeducation fosters a deepening of gender-stereotype behaviour in youngsters. Students experience what Hill and Lynch (1983) call 'gender intensification', which is an augmented pressure to conform to gender-appropriate behaviour. According to several authors (Harris 1995; Kessels and Hannover 2008), gender is more salient in coeducational school settings, which would lead students – and especially girls - to conform more readily to gender role stereotypes in coeducational school settings (see also Harris 1995, p. 471; Schneeweis and Zweimüller 2012). An explanation for our divergent findings with this viewpoint may be that our study was set in the later years of students' adolescence. According to Harris (1995, p. 471), gender ceases to be an important marker for group identity in mid-adolescence, giving way to age as the primary group identity marker. Consequently, it may well be that our results especially apply to late-adolescence. Indeed, Riordan (1985) maintained that in coeducational schools adolescent girls seem to learn very quickly – probably unwittingly – that their academic success may be seen as a threat by boys, who might then reject them as potential sexual associates. This is likely in adolescence, although very unlikely in elementary school contexts. Other research needs to be conducted in other life phases to assess whether processes of gender intensification are typical for primary schools, or in the early years of secondary education.

Although these results are not consistent with the literature on gender intensification, they do align with findings from other previous research. Lee and Bryk (1986), for example, found that girls had better study attitudes in girls' schools than in coeducational schools, although they did not find differences between single-sex and coeducational schools with respect to behavioural problems. Another study, however, did show that after the transition of their school from an all-boys' school to a coeducational one, boys were sent less frequently to detention (Jones and Thompson 1981). As such, the presence of girls seemed to moderate the boys' school-disruptive behaviour. Caspi and colleagues (1993) found coeducation to foster more school deviancy for girls. More recently, Lavy and Schlosser (2011) showed the level of disruption to be lower in classrooms with proportionally more girls. It is notable that, unlike previous scholars, Lavy and Schlosser (2011) investigated both boys and girls, equally finding that their findings applied to both sexes.

It is important to note the limitations of the current study. First, in assessing the effects of the proportional distribution of girls across schools, we are unable to present empirical evidence to add to the debate on the desirability of single-sex versus coeducational schools. However, as most children in Western democracies attend coeducational schools, investigating gender compositional effects by means of the proportion of girls at school seems more relevant to their contemporary situation. Furthermore, by using a continuous measure we are not faced with the problem of the highly selective student intake in single-sex schools (Harker 2000; Marsh 1989; Schneeweis and Zweimüller 2012; Jackson 2010). Moreover, as stated above, an often overlooked consequence of the reinstalment of single-sex schooling for girls is a distorted sex ratio balance in coeducational schools (Morse 1998). Studies into the effects of the relative proportion of girls at school may provide insight into this distorted sex ratio balance in coeducational schools. Although the current study is unable to provide data on school misconduct in sex-segregated contexts, as there are hardly single-sex schools in Flanders, we may tentatively extrapolate our results to single-sex schools. The findings suggest in this respect that the lack of boys as a normative reference group in girls' schools

may preserve girls' positive study attitudes and conforming school behaviour. However, the creation of single-sex schools for girls may prove to be detrimental for boys, as a reduction of the proportion of girls in their schools may deteriorate their study attitudes and render them susceptible for school deviancy. A further limitation of the current study is the cross-sectional nature of the data, which precludes us from making any causal claims. Moreover, as noted above, it may be that our results only originate for adolescents, while younger children are less or even adversely affected by the gender composition at school. Hence, we call for additional longitudinal research, to test our results in students' different life phases.

The results of the current study have implications for educational policy. Most notably, the findings may provide an answer as to what policy initiatives may be undertaken to remedy boys' underachievement at school (Epstein et al. 1998; Younger and Warrington 2005). Recently, following research that showed that single-sex education ameliorates girls' performance, a call has surfaced to implement single-sex education for boys as well, in order to counter the latter's underachievement (Warrington and Younger 2001). However, our findings seem to endorse the viewpoint that single-sex education is especially beneficial for girls, while coeducation seems to be the best way of organizing schools for boys (Kessels and Hannover 2008; Lavy and Schlosser 2011; Lee and Bryk 1986; Lee and Marks 1990; Van Houtte 2004). The presence of girls at school may encourage boys to underscore the school values and conform to the school rules, as such counteracting the influence of the 'laddish' culture (Jackson 2002; Warrington, Younger, and Williams 2000). Lavy and Schlosser (2011) found that the lower level of disruptive behaviour at the classroom level in schools with a higher proportion of girls may lift up boys' achievement. Hence, on the basis of our results, we propose that reinstating single-sex education for boys may only widen the gender gap. In order to limit boys' school deviancy and possible detrimental effects on their academic achievement, it seems important to target boys' negative study attitudes by letting them meet girls at school. Although this may not be attainable in all schools, the best way of organizing schools seems to be mixed-sex school settings with a preponderance of girls (see also Van Houtte, 2004).

Conclusion

This study is unique in relating the proportion of girls at school to girls' and boys' study attitudes and school misconduct. We show that both boys and girls have more positive attitudes toward schooling and studying, when they attend schools where proportionally more girls are enrolled. Ultimately, this associates with lower rates of school misbehaviour. As deviant behaviour at school is associated with lower grades (Lavy and Schlosser 2011), we advocate that coeducation, preferably with a preponderance of girls, seems to be the best way of organising schools in order to counteract boys' more negative study attitudes, deviant behaviour, and, eventually, their underperformance.

Notes

1. We used HLM6 to perform overdispersed Poisson models with constant exposure, which yielded the same basic image as the linear multilevel model, the results of which are shown in tables 2 and 3.

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APPENDIX: The School Misconduct Scale (inspired by Stewart, 2003, p. 602-604)

How often have you:

1. been late for school
2. skipped lessons
3. skipped school all day
4. cheated on tests
5. copied someone's homework
6. not made your homework
7. fought at school
8. stolen at school
9. committed vandalism at school
10. smoked at school
11. drunk alcohol during school hours
12. done drugs during school hours
13. talked back at teachers
14. broke the school rules
15. had to do impositions
16. been sent to detention
17. been suspended for one or more days