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Gendered Habitus and Gender Differences in Academic Achievement

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Bourdieu's theory of cultural and social reproduction posits that students' habitus—learned behavioural and perceptual dispositions rooted in family upbringing—is a formative influence on how they react to their educational environments, affecting academic practices and academic achievement. Although originally conceived as a "class" variant construct, it has been argued subsequently that habitus is also conditioned by gender socialization, and so may also be characterized by significant gender differences. Working with multilevel Canadian data from the linked PISA-YITS surveys, this study investigates gender differences in a Bourdieu derived "structure-disposition-practice" model of academic achievement. For the most part gender differences in the model are modest, but several significant differences are evident: the boys outscore the girls in math and science while the girls excel in reading, students' socioeconomic status (SES) has a relatively stronger effect on the girls' academic achievement than on the boys' achievement, while students' habitus affects the boys' academic achievement more strongly than the girls' achievement. Finally, the average SES of the schools students attend affects both the boys' and the girls' academic achievement, but this effect is stronger for the boys, and the effect of the boys' habitus on their academic achievement diminishes slightly as the average SES of the schools they attend increases; no such contextual interaction was evident for the girls. Overall, the results suggest that habitus and the "structure-disposition-practice" model may still offer a worthwhile contribution to our understanding of gender differences in educational and occupational outcomes, and indeed, merit further empirical investigation.

Selon la théorie de Bourdieu sur la reproduction culturelle et sociale, l'habitus des élèves – leurs dispositions comportementales et perceptuelles apprises et ancrées dans leur éducation familiale – constitue une influence formative sur leur réaction à leurs milieux éducationnels, ce qui affecte leur rendement et leurs pratiques académiques. Quoiqu'à l'origine, l'habitus ait été conçu comme un concept qui variait en fonction de la classe sociale, on a établi depuis qu'il est également déterminé par la socialisation liée au sexe et qu'il peut donc se caractérisé par des différences significatives entre les sexes. Puisant dans des données canadiennes à plusieurs niveaux provenant de l'Enquête auprès des jeunes en transition (EJET) et du Programme international pour le suivi des acquis des élèves (PISA), cette étude porte sur les différences entre les sexes dans un modèle de rendement académique « structure-disposition-pratique » dérivé de Bourdieu. De façon générale, les différences entre les sexes sont modestes, mais plusieurs différences significatives se sont toutefois manifestées : le rendement des garçons en mathématiques et en sciences est supérieur à celui des filles; les filles excellent en lecture; le statut socioéconomique (SSE) des élèves a plus d'impact sur le rendement académique des filles que des garçons; et l'habitus des élèves affecte davantage le rendement académique des garçons que celui des filles. Le SSE moyen des élèves de l'école affecte le rendement académique des garçons et des filles, mais l'impact est plus fort chez les garçons. L'effet de l'habitus des garçons

> *sur leur rendement académique diminue un peu avec l'augmentation du SSE moyen des élèves de leur école; cette interaction contextuelle n'a pas été notée chez les filles. Globalement, les résultats portent à croire que l'habitus et le modèle « structure-disposition-pratique » peuvent continuer à enrichir nos connaissances des différences entre les sexes quant au rendement éducatif et professionnel et qu'ils méritent être l'objet de d'autres études empiriques.*

Although formal obstacles to female participation in various occupations have decreased dramatically over the years, and women have made notable gains in various non-traditional career paths, gender differentiated patterns of educational and occupational attainment are still evident. Although less overt than in past, distinct gender scripts with attendant behavioral, motivational, and achievement norms are still reinforced at many levels in society, such as in the family, the media, the school and the labour market. Differential gender socialization remains a fundamental process in society and societal conceptions of appropriate gender roles are still substantially constrained by essentialist sex-stereotypes. Consequently, traditional gender typing still influences the educational careers of many boys and girls (Gaskell, 1992; Mandell & Crysdale, 1993; Moss & Attar, 1999). For example, one of the strongest patterns to emerge from such pervasive gender typing is that males tend to be disproportionately channeled toward Math and Sciences while females are geared towards the Arts and Humanities (Bernhard & Nyhoff-Young, 1994; Forcese, 1997; Weiner, Arnot, & David, 1997). As Schaeffer (2000, p. 72) concluded, there is much evidence that

> …**a stunning amount of gender stereotyping remains** … [bold in original] from Kindergarten through graduate school and beyond. Males still dominate in the "hard" sciences, technology and engineering, while females still dominate in the arts and the helping professions.

Although the gaps are diminishing, there is still evidence of gender disparities in academic performance in Canada (e.g. Bussière et al., 2001; Edgerton, Peter, & Roberts, 2008) and in the U.S. (e.g. Gonzales et al., 2008; Fleischman, Hopstock, Pelczar, & Shelley, 2010) consistent with this pattern, with boys tending to outperform girls in math and science but lagging behind in reading. At the post-secondary level, in both Canada (Canadian Association of University Teachers [CAUT], 2012) and the U.S. (Snyder & Dillow, 2012), increasingly more women than men are enrolling in and graduating from university. But, even though female representation has been growing in traditionally male dominated fields, most of the growth in Canada and the U.S. has been in traditionally female fields such as education, nursing, arts, languages, sociology, and psychology. While, conversely, men account for about three quarters of graduates in mathematics, architecture, engineering, computers and information sciences, and related technologies (CAUT, 2012; Snyder & Dillow, 2012).

Another well-documented source of educational inequality is family background. Educational achievement is strongly linked in all OECD (Organization for Economic Co-operation and Development) countries to the occupations, education, and economic status of students' parents, although the magnitude of the relationship differs across countries (UNICEF, 2002). A number of studies have found that both higher and lower SES students perform better when they attend schools and/or classrooms with higher average SES (Frempong & Willms, 2002; Ho & Willms, 1996; Willms, 2002, 2004a). The relationship between educational outcomes and socioeconomic status (SES) is referred to as the socioeconomic gradient. Such gradients can exist at multiple levels—within schools, across schools, and/or across regions and

countries (Willms, 2006). These gradients point to the fact that educational inequality and socioeconomic inequality have a reciprocal causal relationship that is intergenerational in its effects—parental SES is a major determinant of a person's educational attainment and, in turn, educational attainment is a major determinant of that person's eventual SES (Edgerton, Roberts, & von Below, 2012).

One of the most prominent sociological explanations of enduring socioeconomic disparities in educational outcomes is Bourdieu's theory of cultural and social reproduction (Bourdieu & Passeron, 1977; Bourdieu, 1997, 2006). From this perspective, educational inequality is the purposeful product of an institutionalized system of legitimation intended to preserve the prevailing stratified social order and the privileged status of the ascendant social classes. Bourdieu's account of social reproduction includes a number of compelling concepts of which cultural capital is arguably the most widely known. Cultural capital consists of cultural and social competencies that are transmitted within families, vary by social class, and translate into schooling (and social mobility) disadvantages for working class children. Numerous empirical studies have examined the relationship between cultural capital and academic achievement (e.g. Aschaffenberg & Maas, 1997: De Graaf, De Graaf, & Kraaykamp, 2000; DiMaggio & Unseem, 1978; Farkas et al., 1990). Less studied empirically, but no less integral to Bourdieu's framework, are the concepts of habitus and practice. Habitus is a class-contingent set of learned dispositions (also rooted in familial socialization) that shapes the individual's outlook on the world, including perceptions of what is possible and preferable for someone in their social position. For Bourdieu, understanding class disparities in educational success requires understanding the effects of class-variant habitus and cultural capital on student practice (actions or behaviours) in the school setting. Although Bourdieu's original conception of habitus was primarily in class terms, he (Bourdieu, 2001) and others (e.g. Dillabough, 2006, 2009; Mickelson, 2003; Reay, 1995, 1997, 2004) have contended that it can be profitably expanded to the analysis of gender disadvantage as well. They argue that gendered patterns of socialization translate into gender differences in cultural capital, habitus, and practice, and that understanding these gender differences may further our understanding of why and how traditional gender disparities in educational and occupational outcomes persist.

There have been studies examining gender differences in cultural capital (DiMaggio, 1982; DiMaggio & Mohr, 1985; Mohr & DiMaggio, 1995), but they have not included habitus or practice in their analyses. Studies that have included habitus (e.g. Dumais, 2002; McClelland, 1990) have not included practice and have used a very narrow (single item) operationalization of habitus. Both Dumais and McClelland operationalized habitus with ordinal measures of occupational aspiration. Dumais (2002) uses a dummy variable to distinguish occupational aspirations in terms of upper white collar or non-upper white collar. Similarly, McClelland (1990) differentiates occupational aspirations into three categories: high-status white collar, low-status white collar, and non-white collar. The range of variation, and the fineness of the distinctions offered by these operationalizations are quite limited compared to the multi-item index used in the present study. Uniquely, this study undertakes a fuller, more multi-dimensional operationalization of habitus by including, in addition to educational aspirations, other dispositions and perceptions (of teachers and higher education), as well as associated practices. In doing so we specify a "structure-disposition-practice" model to examine whether there are gender differences in: the relationships between habitus, academic practices, and academic achievement; the effects of family SES (individual family level socioeconomic gradient) on these variables and relationships; and the effects of school SES (school level

socioeconomic gradient) on these variables and relationships.

The following sections provide a brief overview of Bourdieu's reproduction theory, how it extends to the analysis of gender difference, and what this study aims to contribute to previous work on Bourdieu's framework and to our understanding of gender differences in educational and occupational outcomes.

Theoretical Background

Bourdieu's Basic Framework

Bourdieu's theory of social and cultural reproduction views the formal education system as a primary mechanism in the perpetuation of socioeconomic inequality, as it serves to legitimate social hierarchy by transforming it into an apparent hierarchy of gifts or merit (Bourdieu & Passeron, 1977; Bourdieu 1997, 2006). He views the intergenerational transmission of cultural capital (cultural reproduction) as key to this covert process of maintaining and legitimating the social hierarchy (social reproduction). Families from different social classes differ in the competences (cultural capital) and dispositions (habitus) they bring to bear on their children's education, whether it is class differences in the knowledge and skills parents pass on to their children, or class differences in parents' understanding of the complexities and nuances of the educational system. The evaluative standards of schools reward the cultural capital and dispositions passed on by middle and upper class parents and these parents are also more familiar with the rules of the education field, its values, norms, and preferred practices, or the "rules of the game", and are therefore advantaged relative to working class parents in terms of their ability to facilitate their children's school success.

Habitus is the learned set of preferences or dispositions (values and attitudes) by which a person orients to the social world. Rooted in family upbringing (socialization within the family) and conditioned by one's position in the social structure, it shapes the parameters of people's sense of agency and possibility and entails perceptual schemes of which ends and means are probable given their particular position in a stratified society. People's *practice* or actions, what could be termed their behavioral repertoire, in a particular field (such as the education system) are the consequences of their habitus and cultural capital.

Attitudes toward schooling are an important manifestation of habitus. In a stratified society, individuals from different social classes do not share the same "objective probability" of educational success; and thus, according to Bourdieu, their dispositions toward schooling will tend to bear the imprint of such structural disparities. Middle class families are typically more confident in the payoffs of higher education than working class families and so are more likely to subscribe to, and their children better prepared to perform, the technical and behavioral practices sanctioned by the school system.

Nash (2002) uses the term "educated habitus" to characterize the set of dispositions most associated with academic success. He cites ethnographic evidence that high achieving secondary school students exhibit a "distinctive concept of self-discipline," one that emphasizes the value of particular academic practices (e.g. attentiveness, diligence and self-control) to academic performance (Nash, 2002). Many working-class students are less willing to adhere to such notions and practices, not because they want to fail, but because "…they simply have a different conception of what is worth knowing than the school" (p. 34). Further to this he suggests that, "[s]tudents who succeed at school do so because in consequence of their ambitions, academic

self-confidence, and positive response to the processes of schooling, they reveal a habituated willingness to be educated in accordance with a concept of the educated person that continues, despite ambiguities and contradictions, to be transmitted by the school" (p. 46).

In their work on career decision-making, Hodkinson and Sparkes (1997) emphasize the interrelation of people's habitus (cognitive schemata) and the opportunity structures of the labor market, which present individuals from different backgrounds with different "horizons for action." The concept of horizons for action denotes "the arena within which actions can be taken and decisions made" (p. 34). Hodkinson and Sparkes' research indicates that people's career decisions involve a pragmatic rationality shaped by their horizons for action, which "…both limit and enable our view of the world and the choices we can make within it" (p. 35). By extension, this conceptualization would also seem to apply to students', more or less conscious, decision-making along their educational pathways. People from different social backgrounds will perceive more or less open horizons for action, such that those with relevant advantages will tend to have and/or perceive greater degrees of freedom at respective choice points along the way. Further to this, horizons for action tend to be segmented (by class, gender and race/ethnicity for example), in that no individual seriously considers the entire spectrum of educational or occupational opportunities.

Gendered Opportunity Structures and Gendered Habitus

Bourdieu (2001) began to consider the gendered aspects of habitus in his later writings, most notably in *Masculine Domination*. He holds that the educational system, along with the family, the church, and the state, is essential to the reproduction of gender inequality. Education is fundamental to cultural production of symbolic domination whereby the arbitrary (e.g. socially constructed class and gender hierarchies) are rendered "natural" or legitimate and so come to be taken-for-granted, even by occupants of the less privileged positions. Education contributes to the reproduction and legitimation of a cultural system that reinforces masculine privilege and shapes the gendered identities and perceptions of citizens accordingly. Bourdieu pointed out the "structural constancy" underlying gender relations and gender divisions in society, and argued that although there may be some non-traditional shifting evident, beneath the surface deeper, more enduring bastions of traditional gender ideology hold strong. He draws attention to the traditionally gendered division of labour (e.g. care-giving and service work for women; managerial and technical work for men), and the gendered hierarchy of occupations and professions in the labour market, noting that the degree of feminization of an occupational field is inversely proportional to its power and prestige. He argues that such gender segmentation, culturally reproduced and structurally embedded, is internalized by young women who tend to turn from formally open, but less traditional, educational and occupational paths.

Similarly, Charles and Gursky (2004) argue that the occupational structure of most advanced capitalist countries is characterized by a high degree of gender segregation. They note that while the degree of segregation has decreased some in recent decades, this decrease lags far behind the rate of increase in female labor force participation and educational attainment. Charles and Gursky identify two interacting dynamics: horizontal gender segregation between manual and non-manual sectors, and vertical gender segregation within both of those sectors. Women are predominantly employed within the non-manual sector and they are overrepresented among the lower level occupations within this sector. They argue that the hybrid nature of this segregation dynamic is primarily grounded in two deeply entrenched

"logics": gender essentialism and male primacy (a position very much consistent with Bourdieu's principles of gendered labour division). Gender essentialism ascribes some character traits as naturally or typically feminine, and other traits as naturally masculine, while male primacy holds that males are inherently more authoritative and status-worthy.

Charles and Gursky make the case that the contours of horizontal gender segregation in the occupational structure reveal a strong correspondence between the supposed natural traits of males and females and the task requirements of different occupational sectors. Thus, the requirements of manual labor are seen to encompass more prototypically male traits (e.g. strenuous physical exertion, mechanical/technical manipulation), while the requirements of non-manual labor are seen to encompass more prototypically female traits (e.g. nurturance, personal service, interpersonal communication). Even to the degree that gender essentialist notions have subsided in the wake of an increasingly pervasive egalitarian discourse, the institutionalization of gender essentialism has abetted the reproduction of horizontal segregation and has allowed it to persist (an observation similar to Bourdieu's notion of "structural constancy"). Indeed they argue that official egalitarianism and tacit gender essentialism happily co-exist. Formal provisions for gender neutral "equality of opportunity" have not fully negated deeply engrained sex-typed notions of difference between males and females. This congruence between egalitarianism and gender essentialism helps to explain the persistence of vertical gender segregation, in that, discriminatory assumptions of male primacy tend to hinder the upward occupational mobility of women. Furthermore, the degree of vertical segregation is most extreme in the manual labor sectors of the job market where formal credentials are often less valued and the workplace less closely monitored. Also, recent structural economic changes have served to counter egalitarian cultural forces and to reinforce horizontal segregation as more women are drawn into the non-manual service-based sectors, which are characterized increasingly by non-standard (flexible, part-time) forms of employment with little security or advancement potential.

It follows that if there are traditionally fewer well-paying jobs for women without higher levels of education, then the labour market costs of not attaining higher formal education tend to be greater for women. Jobs that offer decent paying employment for individuals without higher education are primarily in the sectors ("manual") of the labour market dominated by men (e.g. construction, resource extraction, apprenticed based trades). The well-paying jobs more typically available to women tend to be concentrated in sectors ("non-manual") of the labour market that require higher formal education credentials (e.g. teaching, finance, government). The jobs most available to women with lesser levels of education tend to be in less secure, less well-paid occupations of the non-manual sector (retail, childcare, personal services, etc.). Thus less-educated women are doubly at risk, they are not formally qualified to access the more secure, better paying, upwardly mobile jobs available to females in the preferred sectors of the non-manual labor market, and yet are also disadvantaged in obtaining the more desirable positions in the male-dominated manual sectors. Given this reality it would make sense that females in general would express a more favorable disposition toward school and greater adherence to sanctioned academic practices as they may justifiably perceive the risks of insufficient educational attainment more intensely than males.

Consistent with this interpretation, there is evidence that not only have young women's occupational aspirations been rising in recent decades, while young men's have remained steady, but that more young women than men aspire to professional/managerial occupations (Andres et al., 1999). Furthermore, young women in Canada have been steadily outpacing young

men in terms of higher educational attainment. Canadian census data reveal that in 1981, 16.2% of employed women and 15.5% of employed men aged 25 to 29 had a university degree. By 1991, the gap had increased slightly with 19.1% of young women compared to 16.1% of young men holding a university degree, and by 2001 the gap had grown substantially, with 31.3% of young employed women holding a university degree compared to 21.6% of young men (Frenette & Coulombe, 2007). Yet despite increasing rates of female participation in higher education, the gender distribution across disciplines has changed very little in recent years. At the university level, women are more likely than men to choose education, arts, humanities, healthcare, social sciences, and life sciences. The disparities in education and health are particularly large. For example, in 2008, 77% of education graduates in Canada (CAUT, 2012), and 79.2% in the U.S. (Snyder & Dillow, 2012), were women. Men are more likely to take engineering, and mathematics/computer science/physical sciences. For example, in 2008, 78.7% of Canadian (CAUT, 2012) and 82.1% of American (Snyder & Dillow, 2012) engineering graduates were male.

While various feminist theorists have taken issue with aspects of Bourdieu's account, a number have also pointed out that there is much in his work to build upon in terms of understanding the persistence of gender inequality in education (e.g. Dillabough, 2009; Fowler, 2003; Lovell, 2000; McNay, 1999; Mottier, 2002). Dillabough (2006) sees Bourdieu's emphasis on the "constancy of structure" in shaping our taken-for-granted understanding of gender and gender divisions, as well as his attention to the role education plays in the societal process of symbolic domination which legitimates and reproduces masculine privilege, as parallel to the central concerns of many feminist sociologists in education. This focus on domination in educational processes serves to inform what she contends is the fundamental empirical research agenda for contemporary education feminists: "to what degree does education function as a cultural system which deploys symbolic and historically inherited forms of masculine domination and privilege and thus continues to shape the social conditions and opportunities for boys and girls in school?"

Just as class location can influence individuals' perceptions of which pathways are more or less realistic, so too can gender. As Mickelson (2003) notes "[t]he gendered nature of habitus is a consequence of the different possibilities that women and men perceive are available to them" (p. 374). Enduring gender disparities in academic achievement, as well as significant gender segregation in the labour market, underscore the reality that "men's and women's social actions take place in differently gendered fields" (p. 374). These gender disparities in the opportunity structure are reflected in the differing messages internalized by boys and girls and come to inform their habitus in important ways.

Building on Previous Work

To date there has been modest progress made in the application of the habitus concept to the empirical study of gender differences in achievement (Dumais, 2002; McClelland, 1990). The present study aims to move further in this direction by using a "structure-disposition-practice" model to test for gender differences in the relationships between SES, habitus, academic practices, and academic achievement. This model improves on these two previous studies, which used single item operationalizations, by utilizing a more multi-dimensional operationalization of habitus and by including a measure of practice.

The Bourdieu-derived "structure-disposition-practice" model (Figure 1) suggests that the structure-contingent messages (classed and gendered) a young person internalizes about their

educational and occupational prospects influence their orientation toward school both in terms of their level of aspiration and their disposition toward schooling (habitus), and their performance of student practices necessary to succeed academically. Thus, to the degree that young boys and girls are internalizing differing messages about their prospects, there may be gender differences in terms of aspirations and dispositions toward schooling, adherence to productive academic practices, and academic achievement.

The current research builds upon previous work with the "structure-disposition-practice" model (Edgerton, Roberts, & Peter, 2013) by examining the model separately in male and female subsamples, and then comparing parameters between gender groups to identify similarities and differences in the specified variables and relationships.

This study is interested in three basic questions regarding gender differences in the proposed "structure-disposition-practice" model. First, *do the effects of family SES differ for males and females?* Second, *are there gender differences in the relationships between habitus, academic practices, and academic achievement?* Third, *are there gender differences in the effects of school mean SES on these variables and relationships*?

Method

Data

The study employs two linked national data sets: the Canadian sample from the OECD's 2003 *Programme for International Student Assessment* (PISA) survey and the 2003 *Youth in Transition Survey* (YITS). Almost 28,000 fifteen-year-old Canadian students from the 10 provinces participated in the PISA survey which assessed the performance of 15-year-old students in the academic domains of mathematics, reading, and science, as well as providing data on important student background and school characteristics. YITS measured a number of additional variables influencing Canadian students' educational outcomes and includes data on their attitudes, aspirations, family backgrounds, and school experiences. After listwise deletion of cases with missing values, the sample used for this study was 21,948 students: 10,600 males and 11,348 females in 1077 schools.[1] (See Table 1 for the descriptive statistics.)

The 2003 *Youth in Transition Survey* (YITS) was a joint Human Resources Development Canada and Statistics Canada project that was integrated with the 2003 PISA survey and so follows the same sampling design. YITS measures a number of factors influencing students' educational outcomes and includes data on their family backgrounds, school experiences, achievement, attitudes, and aspirations. While dozens of countries have participated in PISA studies, YITS is unique to Canada. Not only does YITS provide high quality student data on an extensive set of behavioural, attitudinal, and social variables, it is also linked to the Canadian PISA data and, therefore can be used in conjunction with the PISA data to provide a wealth of sociological and educational data unavailable to researchers in most other countries.

The PISA sample for Canada was obtained using a two-stage stratified sampling strategy. The first stage involved sampling schools that had 15-year olds enrolled. Schools were sampled systematically with probabilities proportionate to their size, with size measured in relation to the estimated number of eligible 15-year olds enrolled in a school. The second stage of selection involved sampling students from within the sampled schools. For each selected school, a list of that school's 15-year old students was generated, and thirty-five students were randomly selected. If a school had less than thirty-five 15-year olds, then all the eligible students were

selected.

The PISA survey consisted of a student and a school component. The student PISA questionnaire was a paper-and-pencil test lasting two hours. The students also completed a 20-minute student background questionnaire and a 10-minute questionnaire on information technology and communication. The academic domains of math, reading, and science measured by PISA were defined by a team of international experts who agreed that test items should reflect the functional knowledge and skills necessary for active participation in society. The school component consisted of a 20-minute questionnaire completed by principals regarding various characteristics of their schools. (More detail on the PISA assessment framework can be found in OECD, 2003).

The YITS 20-minute self-completed student questionnaire was developed for a number of variables not included in the PISA questionnaire. These items gather information on the students' perception of their schools and school related experiences such as their school engagement, career aspirations, deviant behaviour, family relationships, early formative influences, living and learning conditions, and other background variables.

Measures

Independent variables. *Family SES* was operationalized by the PISA 2003 index (α = .74) of economic, social, and cultural status, which is derived from three family background variables: highest level of parental education, highest parental occupation, and index of home possessions (OECD, 2005). To test for school level socioeconomic gradient effects, this study uses *school mean SES* (individual student family SES aggregated to the school level). School level socioeconomic gradient effects are associated with between-school variation in the quality of educational resources and school climate as well as between-school variation in the types of students in schools, or, composition effects. School mean SES is a measure of school composition effects, and is implicated in numerous school context effects such as level of parental support, discipline problems, general learning atmosphere, and ability to attract and retain talented and motivated teachers (Willms, 1992, 2004b). Variation across schools in terms of these school characteristics may condition the effects of habitus on practices and academic achievement. In multilevel modeling, the moderating effect of school SES is also known as a contextual effect or a cross-level interaction, as the school-level variable is conditioning the effects of the student-level variables.

The model presented here operationalizes several school-related aspects of habitus, or what Nash (2002b) terms the "educated habitus". This more pro-school habitus is characterized by "positive response" to the purposes, priorities, and processes of school, including positive perceptions of teachers. As summarized in the literature review, class and gender-conditioned habitus are theorized to influence such student perceptions of the schooling environment and/or processes, their own academic prospects, the importance or value of schooling to their future, and their level of educational aspiration. The dimensions of school-related habitus that will be measured are: expected level of educational attainment, student perceptions of teachers, as well as student perceptions of the desirability of post-secondary education and their own potential as post-secondary students. Accordingly, *habitus* was operationalized by a composite index (α = .80) composed of students' expected level of education, as well as indices measuring their self-reported "Disposition toward Teachers" (α = .70) (e.g. "I get along well with teachers", "Most of my teachers do a good job of teaching"); and their self-reported "Disposition toward

Post-Secondary Education" (α = .86) (e.g. "I will need to go to college or university to achieve what I want in life", "I'm smart enough to do well in university/college"). *Academic Practices* was operationalized by an index (α = .80) that included a number of items that measure performance of practices conducive to educational achievement (e.g. "I complete my assignments", "I complete my homework on time", "When schoolwork is very difficult, I stop trying" (reverse coded). See Appendix A for more detail on the items and indices comprising the independent variable measures.

Dependent variables. The dependent variables are level of academic achievement as measured using the PISA 2003 Math, Reading and Science scales (see OECD, 2005 for more detail).[2] Separate models are run for each of the three academic achievement outcome variables.

Procedures

SPSS 16.0 was used to prepare the PISA and YITS data sets for analysis. All recoding and index computations were done in SPSS. Due to the nested nature of the PISA-YITS data (students nested within schools) the prepared files were then imported into HLM 6.06 to run the multilevel analyses. HLM 6.06 does not produce standardized regression coefficients, so all variables were standardized before entry into the analyses, which resulted in the standardized parameter estimates required for comparison of the various relationships within the specified path models. T-tests were also run to detect for significant differences between the male and female groups.

Results

Descriptive and Bivariate Relationships

Table 1 presents the means and standard deviations for males and females on the six student-level variables included in the analyses: family SES, habitus, academic practices, and academic achievement in mathematics, reading, and science. The results of t-tests assessing the significance of differences between the means for the boys and girls are also reported in Table 1. As expected, the difference between the males and females in their families' SES is not significant. Obviously, 15-year old Canadian boys and girls have similar family backgrounds. However, the differences between the sexes are significant on the other five variables. Specifically, the female students have significantly higher scores than the male students on habitus, academic practices, and reading, while the male students have significantly higher scores than the female students on achievement in math and science.

As a first step in estimating the effects of the socioeconomic status of the male and female students on the other variables in the model, namely habitus, academic practices, and students' academic achievement in math, reading, and science, the correlation coefficients between these variables are reported in Table 2. Results from tests for significant differences between correlation coefficients for two samples (Cohen, Cohen, West, & Aiken, 2003) are also reported in this table, and significant gender differences are denoted by asterisks beside the coefficients for females. In this table it is observed that although students' SES has a strong positive relationship with their habitus for both sexes, the relationship is slightly stronger for males (.35 vs. .31). Similarly, the correlation between students' SES and the average SES of the students in

Table 1.

The Means and Standard Deviations for Selected Variables by Sex

Variables	Males	Females
Family SES	0.07	0.06
	(2.23)	(2.26)
Habitus	41.14	43.05***
	(6.46)	(5.43)
Academic Practices	27.14	29.24***
	(5.12)	(4.69)
Achievement in Math	534.31	524.50***
	(89.10)	(81.58)
Achievement in Reading	507.73	541.56***
	(89.56)	(80.50)
Achievement in Science	522.43	512.71***
	(100.01)	(93.16)

Note: Standard deviations are in parentheses. Asterisks indicate that the female means are significantly different from the male means. Also, the descriptive statistics reported for math, reading and science scores are the mean value of the 5 plausible values for each of those variables (see footnote 2).
* p≤.05, **p≤.01, ***p≤.001

their school is also very strong for both sexes, it is slightly stronger for females (.53) than males (.50). These strong correlations suggest that students generally attend schools with other students who are from similar social class backgrounds. This finding is not surprising because public school catchment areas reflect residential segregation patterns (Willms, 2004b, 2006). It is not clear, however, if the causal effect of SES results from the students, the schools, or both the students and the schools. The multivariate analyses, which are reported later will help clarify the causal relationships between these variables, as the effects of family SES will be estimated controlling for school SES, and the effects of school SES will be estimated controlling for the effects family SES. It is also evident that although students' SES is strongly related to academic achievement for both sexes, this relationship is slightly stronger for females than for males (.35 vs. .32, .36 vs. .32, .38 vs. .34). The average SES of students' schools is also strongly related to their academic achievement (.29 and .28). Habitus is strongly related to academic achievement for both sexes, but the strength of this relationship is slightly greater for the boys than the girls in reading (.40 vs. .36) and science (.39 vs. .36) achievement. Academic practices are also strongly related with academic achievement for males (.28 to .31) and females (.30 to .31). We observed a strong relationship between habitus and academic practices for both sexes, but that this relationship is a little stronger for males than females (.55 vs. .52). This table also shows that the academic achievement variables are strongly correlated with each other for both sexes, but slightly more so for males than females (.88 vs. .85, .90 vs. .88, .93 vs. .91).

Although the general pattern of relationships at the bivariate level appears very similar for boys and girls, there are some small significant gender differences in the correlation coefficients. Gender differences were also evident in the means reported in Table 1, so we must use

Table 2.

Correlation Matrix for the Variables in the Model by Sex

Variables	1.	2.	3.	4.	5.	6.
Males						
Student Level Independent & Intervening Variables						
1. SES						
2. Habitus	.35					
3. Academic Practices	.27	.55				
School Level Independent Variable						
4. School Mean SES	.50	.24	.20			
Student Level Dependent Variables						
5. Achievement in Mathematics	.32	.39	.28	.29		
6. Achievement in Reading	.32	.40	.31	.29	.88	
7. Achievement in Science	.34	.39	.28	.29	.90	.93
Females						
Student Level Independent & Intervening Variables						
1. SES						
2. Habitus	.31**					
3. Academic Practices	.24**	.52**				
School Level Independent Variable						
4. School Mean SES	.53**	.20**	.17*			
Student Level Dependent Variables						
5. Achievement in Mathematics	.35*	.37	.30	.28		
6. Achievement in Reading	.36***	.36***	.31	.28	.85***	
7. Achievement in Science	.38***	.36**	.30	.28	.88***	.91***

Note: Asterisks indicate that the female correlation coefficients are significantly different from the male coefficients.
* p≤.05, **p≤.01, ***p≤.01

multivariate analyses to determine if the gender differences are significant when the other variables in the model are controlled.

Multivariate Analysis

Habitus and academic practices. The next step is to examine whether there are gender differences in the relationships between the independent variables and the two intervening variables—habitus and academic practices. Tests for equality of regression coefficients between the two samples were conducted, and the results, presented in Table 3, indicate no significant gender differences. Students' SES has a strong effect on their habitus for both males (.30) and

Table 3.

The Effects of the Student and School Variables on Habitus and Academic Practices by Sex

Variables	Intervening Variables			
	Habitus		Academic Practices	
	Male	Female	Male	Female
Student Level				
SES	.30***	.28***	.07***	.07***
Habitus			.55***	.52***
School Level				
School Mean SES	.09***	.05**	.04*	.04*
Contextual Interactions				
School SES x SES	-.01	-.03	.00	.00
School SES x Habitus			.04**	.04*

* p≤.05, **p≤.01, ***p≤.001 (two-tailed tests)

females (.28), but not a very strong effect on their academic practices (.07). In other words, a one standard deviation change in the students' SES results in a 30 percent of a standard deviation change in habitus for males, and a 28 percent of a standard deviation change in habitus for females, but only a 7 percent of a standard deviation change in academic practices for either sex. It is also evident that habitus has a strong effect on the academic practices of both males and females (.55 and .52). Specifically, a one standard deviation change in habitus results in more than half a standard deviation change in the academic practices of both males and females. When students' SES is controlled, the average SES of the schools attended by the students has similarly small effects on habitus for boys and girls (.09 and .05), and has the same small effect on academic practices of both boys and girls (.04). The observed effects of school SES on habitus were small in both gender samples and suggest that the dispositions, and to a lesser degree, the academic practices of both boys and girls are more substantially affected by their home environments than their school environments.

Finally, the third panel of this table shows that there is a small but significant contextual interaction effect (.04) for school SES and students' habitus on the academic practices of both boys and girls. A one standard deviation change in average school SES results in 4 percent of a standard deviation change in the effect of habitus on academic practices for both sexes. In other words, the effect of students' habitus on their academic practices increases slightly as the average SES of the schools they attend increase, and this relationship is the same for boys and girls. Overall, this table shows that there are no significant differences between boys and girls in the effects of their SES on their habitus or their academic practices. Likewise, there are no significant gender differences in the effect of their schools' SES or their habitus on students' academic practices.

Although there are no indirect associations with habitus, there are indirect relationships between students' SES and their academic practices. These relationships for males and females are reported in Table 4. The indirect relationship between students' SES and their academic practices via habitus is notably larger than the direct relationship between SES and academic

Table 4.

Student and School Variables' Direct and Indirect Relationships with Habitus and Academic Practices by Sex

Variables	Direct	Indirect	Total	Joint / Spurious	r
		HABITUS			
		Males			
Student Level					
SES	.30	-	.30	.05	.35
School Level					
School Mean SES	.09	-	.09	.15	.24
		Females			
Student Level					
SES	.30	-	.30	.01	.31
School Level					
School Mean SES	.09	-	.09	.11	.20
		ACADEMIC PRACTICES			
		Males			
Student Level					
SES	.07	.17	.24	.03	.27
Habitus	.55	-	.55	.00	.55
School Level					
School Mean SES	.04	.05	.09	.11	.20
		Females			
Student Level					
SES	.07	.15	.22	.02	.24
Habitus	.52	-	.52	.00	.52
School Level					
School Mean SES	.04	.03	.07	.10	.17

practices for both males (.17 versus .07) and females (.15 versus .07). Thus, the evidence shows that habitus mediates a sizable portion of the relationship between SES and academic practices for both males and females.

Academic achievement. The next step is to examine the gender differences in the relationships between the independent variables and the academic achievement variables. The results of these analyses are reported in Table 5. This table illustrates that students' SES has a moderate effect (.11 to .21) on their academic achievement scores and that this effect is stronger for females than males, although—due to differing standard errors for the parameter estimates—this gender difference only reaches statistical significance for achievement in science (.21 vs. .14). Thus, a one standard deviation change in students' SES results in a 21 percent of a standard

Table 5.

The Effects of the Student and School Variables on the Academic Achievement Variables by Sex

	Academic Achievement Variables					
	Mathematics		Reading		Science	
	Male	Female	Male	Female	Male	Female
Intercepts	541.52	528.38	516.52	546.68	527.41	515.42
	(2.02) [a]	(1.79)	(2.10)	(1.93)	(2.49)	(2.66)
Student Level						
SES	.11***	.17***	.11***	.17***	.14***	.21***
Habitus	.27***	.23***	.26***	.21***	.25***	.21***
Academic Practices	.07**	.10***	.08***	.10***	.06**	.10***
School Level						
SES	.15***	.10***	.13***	.09***	.13***	.08***
Contextual Interactions						
School SES x SES	.02	.02	.01	.00	.03	.01
School SES x Habitus	-.05*	-.01	-.06**	-.01	-.05*	-.01
School SES x Academic Practices	.01	.00	.01	.00	.01	.00
Variances Explained						
ICC	.19	.16	.16	.15	.17	.15
R_1^2	.22	.22	.21	.21	.21	.22
% Explained Student Level	87%	88%	89%	89%	88%	89%
% Explained School Level	13%	12%	11%	11%	12%	11%

[a] Standard deviations are in parentheses
* p≤.05, **p≤.01, ***p≤.001 (two-tailed tests)
Note: underlined coefficients represent significant differences between the sexes (p≤.05, one-tailed test)

deviation change in science achievement scores for females, compared to a change of only 14 percent of a standard deviation for males. The effect of students' habitus on their academic achievement scores is generally stronger than the effect of students' SES for both sexes, but the differences are slightly higher for males. Additionally, although the effect of students' habitus on their academic achievement is relatively strong for both sexes, tests for equality of regression coefficients between the two samples indicate the effects are significantly stronger for males than females (.27 vs. .23 in math, .26 vs. .21 in reading, and .25 vs. .21 in science). In math, for example, a one standard deviation change in students' habitus results in a 27 percent of a standard deviation change in mathematics achievement for males compared to 23 percent for females. Similar results are also evident for reading and science. There are no significant gender differences in the effects of students' academic practices, as the academic practices of both boys and girls have small significant effects (ranging between .06 and .10) on their academic achievement scores. Therefore, this table suggests that students' habitus is somewhat more

important for the boys' academic achievement than for the girls' achievement, and that students' SES is relatively more important for the girls' achievement in science than it is for the boys' achievement.

Looking at school SES, even when students' SES is controlled, the average SES of the schools the students attend has small-to-moderate effects (ranging from .08 to .15) on the academic achievement of boys and girls. Interestingly, these school effects are significantly stronger for males than for females (.15 vs. .10, .13 vs. .09, and .13 vs. .08). In science, for example, a one standard deviation change in the average SES of the schools that students attend results in a 13% of a standard deviation change in boys' science achievement scores, compared to only eight percent of a standard deviation change for girls. The fourth panel of this table shows small but significant contextual interaction effects for school SES on the effect of habitus on the academic achievement of boys but not of girls. Put another way, although the interaction between school SES and students' habitus is negligible for girls, this interaction effect is significant, if small, for boys, and shows that the effect of boys' habitus on their academic achievement diminishes slightly as the average SES of the schools they attend increases. Finally, as expected, the intraclass correlation coefficients (ICC) for math, reading, and science achievement, reported in Table 5, are very similar for boys and girls (.19 vs. .16, .16 vs. .15, and .17 vs. 15)—indicating that between 15 and 19% of the overall variation in academic achievement is located at the school level. Essentially the data in this table show that, combined, all the independent and intervening variables in the model explain between 21 to 22% of the variance in these achievement variables (R_1^2) for both sexes. Furthermore, close to 90% (87-89%) of this model-explained variation in students' academic achievement is accounted for by the student-level variables—SES, habitus, and academic practices—with just over 10 percent (11-13%) accounted for by the school-level variable—average SES of the students attending the schools. This ratio varies little between the male and female samples.

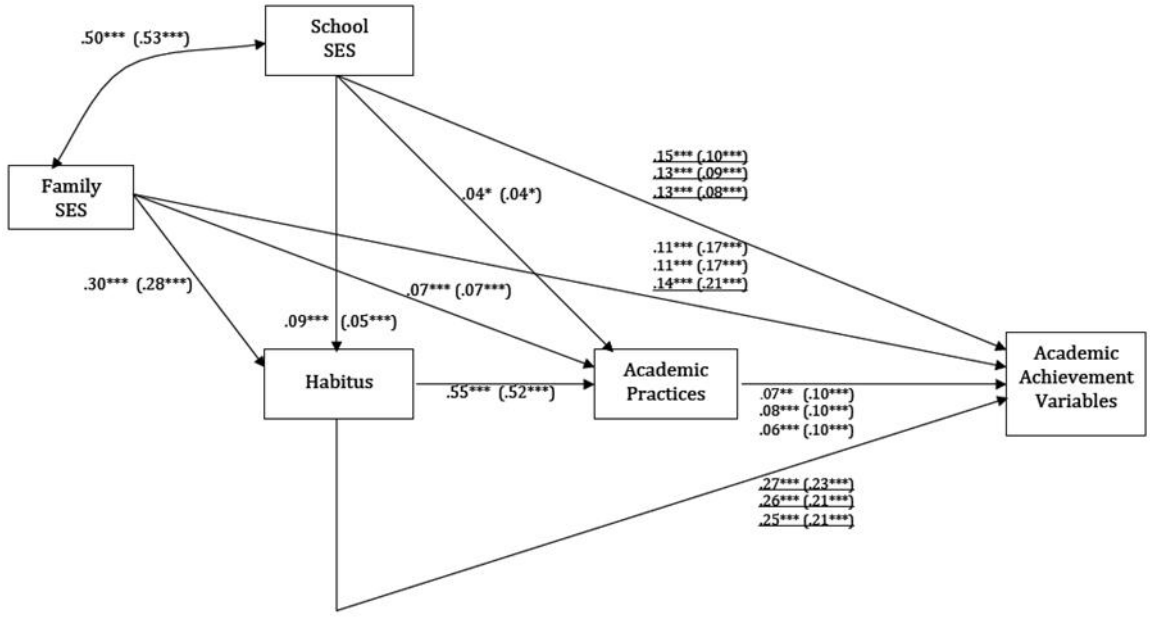
As reported in Table 6, there are a few small differences between the sexes in the indirect effects of their SES on their academic achievement scores. The direct effect of girls' family SES on their math, reading, and science achievement is about twice the size of the indirect effect via their habitus and their academic practices (.17 versus .08, .17 versus .09, and .21 versus .09). By contrast, the direct and indirect effects of boys' family SES are nearly equivalent for the boys' math and reading achievement (.11 and .10), and only marginally different for their science achievement (.14 and .09). So habitus and academic practices mediate slightly more of the effects of family SES on the academic achievement variables for boys than for girls. These gender differences—most notable in science achievement—appear to be largely due to the relatively stronger direct effect of girls' family SES on their academic achievement. Although the total causal effect of family SES on the academic achievement variables is generally a little larger for females than for males, proportionately, habitus and academic practices actually explain somewhat more of the socioeconomic gradient in academic achievement for boys than girls.

All of the gender differences in the causal relationships are displayed in Figure 1. Note that, for the sake of clarity, error terms and the contextual interaction coefficients are not included in this diagram, and that the direct effects of the independent variables on the academic achievement variables are reported in a column—math first, reading second, and science third. Female coefficients are in parentheses and coefficients that differ significantly between the sexes are underlined.

Table 6

The Direct and Indirect Effects of Student and School Variables on the Academic Achievement Variables by Sex

Variables	Direct	Indirect	Total Causal	Joint / Spurious	r
		MATHEMATICS			
		Males			
Student Level					
SES	.11	.10	.21	.11	.32
Habitus	.27	.04	.31	.08	.39
Academic Practices	.07	-	.07	.21	.28
School Level					
Mean SES	.15	.03	.18	.11	.29
		Females			
Student Level					
SES	.17	.08	.25	.10	.35
Habitus	.23	.05	.28	.09	.37
Academic Practices	.10	-	.10	.20	.30
School Level					
Mean SES	.10	.02	.12	.16	.28
		READING			
		Males			
Student Level					
SES	.11	.10	.21	.11	.32
Habitus	.26	.04	.30	.10	.40
Academic Practices	.08	-	.08	.23	.31
School Level					
Mean SES	.13	.03	.16	.13	.29
		Females			
Student Level					
SES	.17	.09	.26	.10	.36
Habitus	.21	.05	.26	.10	.36
Academic Practices	.10	-	.10	.21	.31
School Level					
Mean SES	.09	.02	.11	.17	.28
		SCIENCE			
		Males			
Student Level					
SES	.14	.09	.23	.11	.34
Habitus	.25	.03	.28	.11	.39
Academic Practices	.06	-	.06	.22	.28
School Level					
Mean SES	.13	.03	.16	.13	.29
		Females			
Student Level					
SES	.21	.09	.30	.08	.38
Habitus	.21	.05	.26	.10	.36
Academic Practices	.10	-	.10	.20	.30
School Level					
Mean SES	.08	.02	.10	.18	.28



Note[1]: The coefficients for the variables that directly affect academic achievement are reported such that the top coefficient is for Math, the middle for Reading, and the bottom for Science.
Note[2]: Female coefficients are in parentheses and coefficients that differ significantly between the sexes are underlined.
*p≤ .05, **p≤.01, ***p≤.001

Figure 1. Gender Differences in the Modeled Relationships

Discussion

Three basic gender difference questions were asked of the "structure-disposition-practice" model. First, did the effects of students' families' SES (family level socioeconomic gradient) differ for males and females? Second, were there gender differences in the relationships between habitus, academic practices, and academic achievement? Third, were there gender differences in the effects of school mean SES (school level socioeconomic gradient) on these variables and relationships?

The results indicate that sex has a strong effect on academic achievement; boys outperform girls in math and science while girls outperform boys in reading. This result seems consistent with the general argument that there is still a gendered "hidden curriculum" in schools channeling and reinforcing traditional gender scripts (Davies & Guppy 2006). Studies point to a number of possible causes of female underrepresentation in math, sciences, engineering and technology fields. Girls are less likely than boys to envision themselves as future scientists (Stake & Nickens, 2005), tend to express less interest in science and math in high school, and to underestimate their proficiency in these areas relative to similarly achieving boys (Correll, 2002; Xie & Shauman, 2003). "Chilly climate" studies indicate that many women are turned off of studying science, math, engineering and technology by perceptions of an unwelcoming climate in these disciplines, which tend to be prototypically "masculine" in character and stress individualistic competition (Fereirra, 2003; Serex & Townsend, 1999; Seymour & Hewitt, 1997) rather than the warmer more cooperative learning environment that seems to foster greater success for females (Burkam & Smerdon, 1997; McCarthy, Felmlee, & Haga, 2004; Shapka & Keating, 2003).

As discussed in the literature review, habitus is shaped, not only by social class, but also by gender socialization. In view of this, the perceptions and preferences noted above can be understood as aspects of habitus and practice, and understanding how they relate to academic performance would represent a step toward not just verifying that gender variant habitus and practices do affect academic outcomes, but toward identifying specific processes involved.

Students' family SES does generally have slightly larger direct influence on academic achievement for girls than for boys, most significantly in science. The direct effect of girls' family SES on their academic achievement is also twice the size of the indirect effect as mediated by habitus and academic practices; proportionately, this difference is less for boys. It appears that habitus and practices, as operationalized here, explain a slightly larger portion of the socioeconomic gradient for boys' academic achievement than for girls' academic achievement. Although not large, this gender difference merits further consideration. Future research should seek to undertake an even more precise and comprehensive operationalization of habitus and practice in order to tease out finer distinctions, for example, incorporating measures of preferences for competitive versus cooperative learning environments, and measures of subject-specific academic self-confidence.

A more substantial gender difference is evident in the effect of habitus on academic achievement. Consistent with Dumais' (2002) findings, our results indicate that habitus significantly affects the academic performance of both sexes. But, while Dumais (2002) found gender differences in the importance of cultural capital to academic achievement, our results provide novel evidence of gender differences in the contribution of habitus to academic achievement. The results indicate that although girls generally have more pro-school habitus and more positive academic practices than boys, students' habitus actually exerts significantly greater effect on boys' academic achievement than on girls' academic achievement.

Finally, our results indicate that the average SES of the schools' students attend exerts a significantly stronger direct effect on boys' academic performance than on girls' academic performance. There is also a significant, if small, contextual interaction effect for school SES and students' habitus on boys' academic achievement; but not on girls' academic achievement. That is, as the average SES of the schools boys attend increases, the effect of their habitus on their academic achievement diminishes slightly. Thus, while the findings overall suggest that boys and girls seem to generally react to their school environments in relatively similar ways, there are still some potentially important gender differences evident.

Why do girls generally have more pro-school habitus and more positive academic practices than boys? Why, despite this, does students' habitus exert greater effect on boys' academic achievement? Why does school SES have greater effect on boys' academic achievement? The speculative explanation of these differences we offer here focuses on the significance of gendered labour market segregation (Bourdieu, 2001; Charles & Gursky, 2004). If girls generally perceive a narrower, more credential-dependent occupational horizon (i.e. "horizons for action") for themselves and this manifests as generally more favourable dispositions toward school and greater adherence to achievement-conducive academic practices, then in contrast, it could be that the perception of broader, more open, occupational horizons for males—traversing both more credential-dependent non-manual and less credential-dependent manual sectors—manifests in greater variation in male aspirations for and dispositions toward schooling. That is, it may be that relatively few girls aspire to the manual sector because of its perceived lack of promise for females, while a substantial portion of males do aspire to the manual sector because they anticipate attractive opportunities. For this segment of male students, the awareness that

many of the opportunities in that sector do not require, or are less dependent upon, formal educational credentials translates into less favorable perceptions of formal schooling—including its value and the purpose of excelling within that environment. Conversely, males who aspire to credential-dependent non-manual sector occupations will tend to exhibit more pro-school dispositions and achievement practices, as they perceive the greater importance of educational attainment to their occupational ambitions. Thus, it could be that due to this greater heterogeneity in male orientations to the opportunity structure of the economy (broader horizons for action), the influence of classed habitus on academic achievement tends to be more evident among males. Unfortunately the occupational ambition indicators necessary to test these possibilities were not available in the PISA-YITS data set.

Finally, why does school mean SES have greater effect on boys' academic achievement than on girls' academic achievement? Perhaps with rising school SES the variation in male occupational outlooks, as discussed earlier, decreases. That is, as school SES increases the proportion of males aspiring to manual sector careers decreases while the proportion aspiring to non-manual occupations increases. As the distribution of occupational ambitions shifts toward the more credential-dependent non-manual side of the career spectrum, the differential influence of habitus becomes less distinctive among males as male dispositions and practices converge toward more similar academic and occupational goals. This interpretation is in line with the contextual interaction evident between school SES and boys' habitus, in which the effect of boys' habitus on their academic achievement diminishes slightly as the average SES of the school they attend increases. No such contextual interaction was evident for females; we would speculate that any such shifting pattern in the female student population would be less pronounced as girls' ambitions (and perceived horizons for action) are likely already predominantly clustered toward the credential-dependent non-manual sector occupations. Again, the lack of relevant indicators precluded testing for such gender differences in occupational aspiration in the present study; future research on this question would benefit from the inclusion of such indicators.

Although less formal or systematic than in many countries, tracking or streaming still occurs in Canada, with students from working-class backgrounds more likely to be channeled into vocational tracks and middle class children into academic tracks (Andres, et al., 1999; Andres & Krahn, 1999; Curtis, Livingstone, & Smaller, 1992; Wotherspoon, 2009). School mean SES may be linked to the mix of vocational to academic track students, with the proportion of academic track students rising with school SES. Thus, it could be informative to incorporate some measure of this vocational-academic mix into future models as well to examine whether it conditions the effects of classed and gendered habitus on academic outcomes.

Finally, it is also important to acknowledge that some of the statistically significant parameter estimates in the model were quite small, and should be interpreted with caution in light of concerns related to practical significance and potential selection bias. Yet, to conclude that the results offer qualified support for the utility of the habitus concept and the "structure-disposition-practice" framework is not to deny these issues, as the present study constitutes early steps in the project (we do not want to "throw the baby out with the bathwater"), and indeed further investigation of the potential merit of this framework will necessarily need to control for these issues of bias in, and substantiveness of, model parameter estimates. Accordingly, future research on this model should incorporate both more precise and comprehensive indicators of the relevant concepts (e.g. subject-specific indicators of habitus and practices, such as math self-efficacy and math learning preferences), and more sophisticated

methods for dealing with missing values (e.g. FIML or multiple imputation).

Conclusion

The most notable gender differences observed were: Family SES has a relatively stronger effect on girls' academic achievement than on boys' achievement, while habitus affects boys' academic achievement more strongly than girls' achievement; and although the average SES of the schools students attend affects both boys' and girls' academic achievement, this effect is stronger for boys. Furthermore, there were no contextual interactions for girls, while the effect of boys' habitus on their academic achievement diminishes slightly as the average SES of the schools they attend increases.

These results suggest that some gender gaps, although decreasing, still persist even in a relatively egalitarian education system such as Canada's, and that pedagogical reform alone can only go so far in unseating tendencies embedded in wider cultural and structural processes. The theory of gendered labour market segregation fits well with this perspective (Bourdieu, 2001; Charles & Gursky, 2004). There are gender based structural asymmetries in the labor markets of most advanced capitalist countries, including both horizontal gender segregation between manual and non-manual occupation sectors and vertical gender segregation within each of these sectors. These segregation dynamics are reinforced by inveterate cultural beliefs—gender essentialism and male primacy—and translate into typically narrower female educational and occupational "horizons for action". Thus, while SES is consequential to one's position in relation to the opportunity structure, to one's habitus, and hence to one's horizons for action, so too is gender. In sum, although even significant parameters were mostly modest-to-moderate in size, the results suggest that habitus and the "structure-disposition-practice" model do have something useful to contribute to our understanding of gender differences in educational and occupational outcomes, and indeed, merit further empirical investigation.

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Notes

1. This analysis was conducted at a Statistics Canada Research Data Centre (RDC), as part of this access agreement, researchers are not allowed to remove data from the RDC facility and are limited to using the software available at that RDC location. Given these limitations we were unable to implement either of the two preferred methods of dealing with missing values: multiple imputation of missing values or full information maximum likelihood (FIML) estimation (Enders, 2010). PISA-YITS is multilevel data that uses plausible values methodology (see note 2), and the capacity to implement multiple imputation of missing values with such data is underdeveloped in general and was unavailable at the RDC. HLM 6 (which is uniquely capable of handling plausible values) requires that there be no missing data and so does not enable the use of FIML to deal with missing values, instead listwise deletion had to be used. This of course leaves open the issue of selection bias, that our sample is somehow systematically different from the full sample and thus might produce biased estimates. Although we are not able to identify and rule out all possible sources of selection bias, we were able to assess two of the most important potential sources of selection bias—SES and students' level of academic performance. In terms of SES as a hypothesized source of selection bias, it would be expected lower SES students would be underrepresented in our smaller listwise sample (i.e. more likely to not complete all the items and thus were selected out). In terms of student academic performance, it would be expected that lower performing (scoring) students would be underrepresented in our smaller sample, again being selected out due to incomplete items. When we compare the means (t-tests) for these variables between the pre- and post-listwise deletion samples, we find that there is no significant differences in mean family SES or school mean SES. When we compare the mean math, reading and science scores between the two samples, we do find small but significant differences, but these differences are not in a consistent direction. That is, if academic performance was operating as a source of selection bias, we would expect all three scores to be higher for the smaller post-listwise deletion sample (due to more lower scoring students being selected out) but in fact, 2 out of 3 (Math and Science) mean scores are actually lower in the smaller listwise sample. Thus we can reasonably conclude that neither SES nor academic performance appear to be operating as sources of selection bias in our sample. One final note, the 2003 PISA-YITS survey consisted of three separate instruments: the academic achievement test, a questionnaire filled out by school principals regarding school characteristics, and a questionnaire filled out by the students regarding family background and school experiences (see OECD, 2003). Due to issues related to improperly administered consent forms, nearly 1000 students' personal questionnaires (which contain the items from which the independent variable indexes were constructed) were left out of the dataset, thus these 1000 students were deleted from the listwise sample for reasons unrelated to selection bias.

2. PISA 2003 utilized a rotating booklet design with 13 different booklets (subsets of items from the item pool), which were systematically linked by sets of common items. For reasons related to this incomplete—or rotating booklet—design, PISA employed Item Response Theory (IRT) methods to generate an estimate of student ability (see OECD, 2005). The IRT scaling procedures used in PISA 2003 factor in both the number of correct answers given by a student as well as the difficulty of each item administered to that student. Estimates of item difficulty were determined in relation to how students of differing ability do on each item, while level of student ability is estimated in relation to a student's performance on items of varying levels of difficulty (see OECD, 2005: 60-67). In addition to IRT procedures, PISA also employed the methodology of plausible values (see OECD, 2005b). Plausible values methodology assumes that, given uncertainty due to sampling error and the 'incomplete' design of PISA, any single estimate is just one possible value amid a distribution of possible values (plausibly accurate estimates). Thus, rather than produce a single estimate (a point estimate) of a student's ability on a given academic performance scale, the plausible values method produces several estimates. It does this by randomly selecting several values (five in the case of PISA) from the distribution (assumed to be normal) of plausible values, with each value

considered representative of the range of possible values (scores) Thus, rather than each student obtaining a single ability estimate (scale score) for each academic domain, they were assigned five scores. Moreover, unique parameter estimates must be calculated for each plausible value, thus for example, if one wished to calculate a correlation coefficient between SES and reading performance, a separate coefficient would be calculated for each plausible value and then the average of the five coefficients would be reported as the parameter estimate.

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Appendix: PISA and YITs Questionnaire Items Used in the Study

A. Family SES Index

The SES index is an additive index constructed from the sub-indexes below (see OECD, 2003 for more detail on indexes). Due to different scales of measurement, the three sub-indexes were converted into z-scores before being combined into the overall SES index.

1. Index of Home Possessions (from PISA student questionnaire). Additive index derived from students' responses to the 11 items listed below. These variables are binary and the scale construction is done through IRT scaling. Positive values on this index indicate higher levels of home possessions.

Q17 Which of the following do you have in your home?
- ST17Q01 a) A desk for study
- ST17Q02 b) A room of your own
- ST17Q03 c) A quiet place to study
- ST17Q04 d) A computer you can use for school work
- ST17Q05 e) Educational software
- ST17Q06 f) A link to the Internet
- ST17Q07 g) Your own calculator
- ST17Q08 h) Classic literature (*e.g.* <Shakespeare>)
- ST17Q09 i) Books of poetry
- ST17Q10 j) Works of art (*e.g.* paintings)
- ST17Q11 k) Books to help with your school work
- ST17Q12 l) A dictionary
- ST17Q13 m) A dishwasher

Q19 In your home, do you have:
- ST19Q01 More than 100 books (recoded 1='yes' 0='no')

2. Highest Occupational level of parents. The occupational data for both the student's mother and student's father were obtained by asking open ended questions in the student questionnaire for mothers' occupational status and fathers' occupational status. The responses were coded in accordance with the four-digit International Standard Classification of Occupation and then mapped to the international socio-economic index of occupational status (ISEI). The PISA 2003 index of the highest occupational level of parents (HISEI) corresponds to the higher ISEI (international socio-economic index of occupational status) score of either parent or to the only available parent's ISEI score. Higher values indicate higher level of occupational status.

3. Highest level of parental education (0-17 years). The PISA 2003 indices of parents' educational level are derived from students' responses to the items for mothers' educational level and for fathers' educational level. The students' responses to these items are coded in accordance with the International Standard Classification of Education in order to obtain internationally comparable categories of educational attainment. PISA converted educational level into years of schooling using the following conversion coefficients: Did not go to school = 0 years; ISCED 1 (primary) = 6 years; ISCED 2 (lower secondary) =9 years; ISCED Level 3B or 3C

(vocational/pre vocational upper secondary) =12 years; ISCED 3A (upper secondary) or ISCED 4 (non-tertiary post-secondary) = 12 years; (5) ISCED 5B (vocational tertiary) = 15 years; and (6) ISCED 5A, 6 (theoretically oriented tertiary and post-graduate) = 17 years.

B. Habitus

The habitus variable was an additive index of expected level of education, disposition toward teachers index, and disposition toward post-secondary education index. Positive values on this index indicate higher levels of pro-school Habitus.

1. Expected educational level (from PISA student Questionnaire). In PISA 2003, students were asked about their educational aspirations. Students' responses to the items ST23Q01-ST23Q06 measuring expected educational levels are classified according to ISCED. The PISA 2003 index of expected educational level (SISCED) has the following categories: (1) None; (2) ISCED 2 (lower secondary); (3) ISCED Level 3B or 3C (vocational/pre vocational upper secondary); (4) ISCED 3A (upper secondary) or ISCED 4 (non-tertiary post-secondary); (5) ISCED 5B (vocational tertiary); and (6) ISCED 5A, 6 (theoretically oriented tertiary and post-graduate). *(NOTE: kept as ordinal variable for inclusion in Habitus index.)*

2. Disposition toward teachers index. An additive index comprised of 3 questions are from the YITS student questionnaire. Higher values on this index indicate more positive disposition toward teachers.

YSA6D
Think about all of your classes THIS school year. How often are these statements true for you? ... I get along well with teachers.
01 Never
02 Rarely
03 Sometimes
04 Often
05 Always
99 Not stated

YSA1F
Think only about THIS school year. What do you think about the following?... Most of my teachers don't really care about me.
1 Strongly disagree
2 Disagree
3 Agree
4 Strongly agree
9 Not stated
(NOTE: This item was reverse coded for inclusion in index.)

YSA1L
Think only about THIS school year. What do you think about the following?... Most of my teachers do a good job of teaching.
1 Strongly disagree
2 Disagree

3 Agree
4 Strongly agree
9 Not stated

3. Disposition toward Post-Secondary Education Index. Additive index comprised of the following 4 Items from YITS student questionnaire. Higher values on this index indicate more positive disposition toward post-secondary education.

YSJ1B
When you think about your future, what do you think about the following? ... I will need to go to college or university to achieve what I want in life.
1 Strongly disagree
2 Disagree
3 Agree
4 Strongly agree
9 Not stated

YSJ1D
When you think about your future, what do you think about the following? ... I think I would enjoy going to college or university.
1 Strongly disagree
2 Disagree
3 Agree
4 Strongly agree
9 Not stated

YSJ1E
When you think about your future, what do you think about the following? ... I'm smart enough to do well in university.
1 Strongly disagree
2 Disagree
3 Agree
4 Strongly agree
9 Not stated

YSJ1F
When you think about your future, what do you think about the following? ... I'm smart enough to do well in college.
1 Strongly disagree
2 Disagree
3 Agree
4 Strongly agree
9 Not stated

C. Academic Practices

Additive index comprised of the following 8 items from the YITS student questionnaire. Higher values on this index indicate more adaptive academic practices.

YSA6B
Think about all of your classes THIS school year. How often are these statements true for you? ... When school work is very difficult, I stop trying.
01 Never
02 Rarely
03 Sometimes
04 Often
05 Always
99 Not stated
(NOTE: this item reverse coded for index construction.)

YSA6C
Think about all of your classes THIS school year. How often are these statements true for you? ... I do as little work as possible; I just want to get by.
01 Never
02 Rarely
03 Sometimes
04 Often
05 Always
99 Not stated
(NOTE: this item reverse coded for index construction.)

YSA5
Think only about THIS school year. About how often have you cut or skipped a CLASS without permission?
01 Never this year
02 1 or 2 times this year
03 3 to 8 times this year
04 About 1 to 3 times a month
05 About once a week
06 More than once a week
99 Not stated 1
(NOTE: This item was reverse coded for inclusion in index.)

YSA6A
Think about all of your classes THIS school year. How often are these statements true for you? ... I complete my assignments.
01 Never
02 Rarely
03 Sometimes
04 Often
05 Always
99 Not stated

YSA6F
Think about all of your classes THIS school year. How often are these statements true for you? ... I complete my homework on time.
01 Never
02 Rarely
03 Sometimes
04 Often
05 Always
99 Not stated

YSA3A
On average, how much time do you spend EACH WEEK on homework and study in these areas? (If you are not currently taking a course, please report for the last full week you were taking the course this school year.) When answering, include time during the weekend too ... English language and literature
1 No time
2 Less than 1 hour a week
3 Between 1 and 3 hours a week
4 3 hours or more a week
9 Not stated

YSA3B
On average, how much time do you spend EACH WEEK on homework and study in these areas? (If you are not currently taking a course, please report for the last full week you were taking the course this school year.) When answering, include time during the weekend too ... Mathematics
1 No time
2 Less than 1 hour a week
3 Between 1 and 3 hours a week
4 3 hours or more a week
9 Not stated

YSA3C
On average, how much time do you spend EACH WEEK on homework and study in these areas? (If you are not currently taking a course, please report for the last full week you were taking the course this school year.) When answering, include time during the weekend too ... Science (e.g., chemistry, physics and biology)
1 No time
2 Less than 1 hour a week
3 Between 1 and 3 hours a week
4 3 hours or more a week
9 Not stated