TOO COOL FOR SCHOOL

Evidence from the YITS on mismatches in aspirations and performance among fifteen year-olds

By

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Table of Content

Introduction

Given the rising needs for skills in the labour market and the push for equality in the advanced economies, including Canada, there has been an increasing attention on improving students' schooling choices and removing barriers to education, especially among low socioeconomic demographic groups. In order to remove these barriers and improve schooling choices, one needs to first understand how students make their choices and what are the potential issues and barriers to education. Traditionally, financial costs have been viewed as the main barriers, and therefore, the main policy responses have revolved around improving loans and bursaries for education. However, an increasing number of studies (see Finnie et al, 2011 for an example in the Canadian context) find that financial barriers play a smaller role than previously thought. Therefore, research attention has been focussing on other factors, one of which is behavioural.

Despite the development of behavioural economics in recent years and its applications in a number of different fields, little research attention has been paid to behavioural economics of schooling choices. This study aims to contribute to the better understanding of how schooling choices are made, using insights from behavioural economics. More specifically, this study aims to understand whether, and to what, degree students are overconfident (or "underconfident") in preferences. A better understanding of why certain demographic groups may have inconsistent preference and/or make poor schooling choices can help guide public policy on improving such choices.

The two primary questions this study hopes to answer are the followings:

1. Is there any evidence of mismatched aspirations and performance among 15-year-olds?
2. If so, what are the common characteristics, if any, of students with mismatched aspirations and performance?

The organization of this paper is as follows: first, I will discuss behavioural economics and its advantages over neoclassical economics. Second, I will review some of the recent literature on schooling choice and motivate the behavioural approach and the research questions of this paper. Third, I will briefly discuss the data and the methodology of this research. After, I will show the results and discuss the implications of the findings. Lastly, I will conclude by highlighting the next steps of this research.

Behavioural Economics Versus Neoclassical Economics

Given the behavioural premise of this study, it is important to highlight some advantages of behavioural economics over the conventional neoclassical model. Neoclassical economics is based on the axiom that individuals are rational self-interested optimizers with consistent preferences and full information (or at least with full relevant information) and they tend to act in ways that reveal, and hence, justify such a premise. For example, if one decides to purchase car instead of using the public transportation for her commute to work, she has thought about this decision and concluded that the utility of owning an automobile (e.g. liberty from public transit, increased mobility, joy of driving, etc.) outweighs its costs (e.g. the monthly payments, insurance, gas and maintenance charges, the occasional parking tickets etc.). Hence, her decision is both rational and optimizing in the neoclassical sense. Similarly, if one decides to pursue

postsecondary education, he has concluded that the benefits of having postsecondary education (e.g. higher earnings) outweigh its costs (e.g. tuitions and related expenses and forgone earnings) in the long run. Many empirical studies on decision making correctly support the neoclassical view in most cases.

Although the neoclassical model can correctly predict behaviour and decisions, it fails to explain many other decisions. For example, studies show that most people acknowledge the importance of having sufficient retirement savings and would like to increase their contribution to their retirement savings by saving more each month. However, the large majority of people fail to do so (Thaler & Benartzi, 2004). Many make it their New Years resolution to eat healthy, exercise more, save more and spend less in the new year. Many start eating better, sign up at the local gym, and reduce their expenses within the first few weeks of the year. However, facing a juicy burger and fries in February, they fail to choose a healthier option. When the time comes forgo an unnecessary purchase and save more in March, they rationalize the purchase and procrastinate the savings. Few seem to ever have enough time to exercise. Hence, many end up with the same or worsen levels of health and retirement savings (Thaler & Sunstein, 2008). These examples simply highlight that there may be other importance forces in the process of decision making that make decisions inconsistent with the axioms of rationality and optimality. Therefore, there may be a need for a new model that more accurately captures and predicts these inconsistencies.

Behavioural economics, on the other hand, argues that while the neoclassical model is powerful and effective in explaining many behavioural tendencies and decisions, its

assumptions of rationality, optimality, and time-consistency systematically fail under certain conditions. As a result, behavioural economics offers revisions to these assumptions in order to improve the predictive quality of the model. In a nutshell, behavioural economics uses economics and psychology to identify biases that systematically lead humans to have errors in judgement and make poor decisions (Mullainathan & Thaler, 2000). At its core, behavioural economics has three assumptions: bounded self-control, bounded self-interest, and bounded rationality.

Bounded Self-Control

Unlike the neoclassical model, behavioural economics argues that humans have bounded self-control and suffer the consequences. This is especially apparent in intertemporal decisions and time-discounting functions, where individuals tend to choose immediate minor gratifications over much greater but delayed gratifications. Similarly, individuals tend to procrastinate small immediate costs and accept to pay much greater delayed costs instead. The lack of sufficient self-control can lead serious and severe suboptimization.

Robert Strotz was the first economist to point out the problem of time-inconsistent choices and provided the theory of commitment. In his 1956 paper, he argues that assuming an individual is free to reconsider a previously-chosen utility-maximizing future consumption plan, if given a choice when that future point arrives, she will change her plans and choose immediate gratifications and delay costs. Therefore, this will lead the individuals to have time-inconsistent preferences. Strotz argues that unlike the neoclassical assumption, the individual discount functions are not logarithmically linear. A logarithmically linear discount function that discounts at a constant rate will be time-

consistent. However, the time-inconsistent preferences and a discount function that overvalues present rewards and undervalues future costs suggest that the discount function is different from a logarithmically linear function. Strotz points to an important fact here: if discount rates and time-horizon have an inverse relationship, individuals will choose to consume at the present time more than they previously planned. He calls this dynamic inconsistency.

Limited self-control can have grave implications for the welfare of individuals and many have studied the implications of this "hyperbolic discounting". Laibson (1997) analysed hyperbolic discounting function of dynamically inconsistent decision-maker with access to commitment technology. This study primarily showed that, the marginal propensity to consume for an individual, who exhibits a hyperbolic discounting function, is dependent on the type asset he/she possesses. That is, individuals with more liquid assets will have a higher marginal propensity to consume than their counterparts with illiquid assets.

This paper further argues that illiquid assets present a kind of commitment mechanism. For example, participating in a pension plan prevents one from consuming his savings prior to retirement. Laibson compares these illiquid assets with the goose that laid golden eggs (i.e. assets that produce substantial benefits in the long term). He devises the golden eggs model where individuals tend to consume depending on their level liquid and illiquid assets. Using this model, he postulates that low savings level of 1980s can be explained by the expansion of "instantaneous" access to liquid assets during that period. He argues that dramatic expansion of credit (e.g. through the growth of credit cards and their acceptance among retailers and expansion of ATM networks) provided a vast

immediate access to liquid asset during the 1980s, which lacked the previous commitment devices that would lead individuals to have lower capital accumulation. He argues that because of dynamically inconsistent preferences, little academic attention has been paid to commitment mechanism despite the fact that most assets are in illiquid forms. While the rational choice model would expect the welfare of individuals to increase with improve access to liquidity, Laibson demonstrates that under the limited self-control assumption welfare declines as a result of decline in savings.

Of course, humans are not unaware of their limited self-control and their propensity to value immediate gratifications and postpone costs. Studies show that individuals tend to make future plans while taking into account their limited self-control. In his book, *Predictably Irrational*, Ariely (2008) demonstrate that students tend to prefer deadlines that take into account their present-biased preferences. In the beginning of the semester, students were asked to submit three dates as deadlines for their assignments without any restriction on the selection (e.g. the papers can be handed in all on one day). Once the dates were selected and submitted, they could not be changed. Of course, the most maximizing plan would be the last possible day for all three papers since a student would have the maximum amount of time to prepare the papers any time before the deadline. However, a large majority of students chose three dates throughout the semester with a few weeks between the reports (Ariely, 2008). In other words, these students preferred deadlines that took into account their tendency to put off work, acknowledging that, because of their irrational present-biased preferences, they may be worse off with the rational deadline of last day of semester.

Bounded Self-Interest

Behavioural economics also revises the self-interest axiom of the standard economics model slightly, indicating that humans are not boundlessly self-interested. It demonstrates that humans do care and act to improve the wellbeing of others as well. In fact, empirical studies show that the introduction of self-interest to charity can reduce participation in such activities. In an experiment, Ariely shows that lawyers were more likely to participate in providing free legal services (i.e. volunteer) for underprivileged individuals than doing the same and getting paid half their normal hourly rate (Ariely, 2008). There is clearly an inherent social value in volunteering that can be lost if it is evaluated by market norms.

Behavioural economics also argues and demonstrates that fairness matters, too. In fact, individuals tend to be kind to those who are kind to them and punish those who are unkind to them (Rabin, 1993). Humans generally value fairness and pay important attention to being treated fairly and fairly treating others with important implications in consumer behaviour and the labour market (Kahneman, Knetsch, & Thaler, 2004). Such beliefs have an effect on preferences. In other words, preferences have a social dimension that may not lead to self-interested decisions that the neoclassical model would expect.

Bounded Rationality

Bounded rationality simply assumes that human rationality and optimality are limited by constraints of human cognitive capacity. Put simply, we make decisions based on the information that we *have*, not the information that we *should* have, and to the extent that

we *can* understand the choices and their consequences, not to the extent that we *should* optimally understand. Two pieces of research have arguably been instrumental in the development of this axiom. Herbert Simon (1955) was first to point out that human rationality has limits, which can lead individuals to make decisions that fall outside of the rational actor model. In his influential 1955 paper, he points out that the rational actor model of the standard economic model suggests that individuals are "economic" and "rational" who have sufficient relevant knowledge about the decisions they have to make, are well-organized with consistent and stable set of preferences, and are able to compute the most efficient course of action that leads them to the optimal point within their preference set.

However, Simon shows that there is empirical evidence contradicting this model. He argues that the described rational actor model holds simplistic views of human behaviour that are inaccurate. He proposes a set of changes to the model that can better model human behaviour, arguing that modifications need to change the model to "approximate" rationality rather than complete rationality, and hence, coining the phase of "bounded rationality". For example, instead of assuming individuals use all the information available to them to make an optimal choice, it is more realistic to assume that individuals use a sample of the available information to make choices; humans "simplify" their decision-making process by using only a part of the information available to them rather than using it in its entirety. Simon suggests that using full information is impractical due to humans' limited processing capacity. Kahneman and Tversky (1974) capture many behavioural departures from the neoclassical model in a number of experiments, which later led to the development of the prospect theory (Kahneman &

Tversky, 1979). They demonstrated that, when facing uncertainty, individuals use a set of heuristics (i.e. rules of thumb) in probability assessments. While these heuristics are useful in many instances, they can lead one to make "severe and systematic errors" in judgment. In other words, individuals tend to make mental short-cuts that can systematically lead to suboptimal decisions.

Kahneman and Tversky identify a number of such heuristics that can mislead individuals in their assessments under uncertain condition. Many of these heuristics fundamentally show that human decision-making is highly reference dependent. For example, they shows that some poor assessments are due to the availability heuristic, which is the tendency to assess the probability of an event based on the ease of recalling a similar event regardless of the actual frequency of occurrence. While this can be a helpful tip in general, it can bias one's assessment of rare events that are easy to recall. As a result, people tend to overestimate the probability plane crashes. Another reference-dependant process is called anchoring and adjusting, which demonstrates that, instead of making objective assessments, individuals tends to make estimates that are the result of adjustment to an initial value or a reference value that itself may be the result of an incomplete computation.

Kahneman and Tversky conclude this study by stating that these experiments shows many decisions are influenced by biases that cannot be characterised as optimal. Rather, they followed a bounded rationality, which systematically led individuals to make suboptimal decisions.

Bounded rationality has numerous and important implications. Given the limited processing capacity of humans, variables that create uncertainty or complexity can lead to heuristics suboptimal decisions. For example, the rational choice model suggests that increasing number of choices leads to better decisions. The intuition behind this assumption is simple: more choices allow one to choose one that maximizes one's welfare. However, empirical studies suggest the contrary: increasing the number of choices can lead to decline in the quality of choice selection. This is also known as the paradox of choice (Schwartz, 2004). The reforms of the government health insurance in the U.S. in 2006 increased the number of health coverage plans for Medicare, were based on this wrong assumption. In fact, studies shows that individuals were worse off under the reforms simply because the larger number of choices increased the complexity of making a decision, as a result, many made heuristic choices that failed to maximize their benefits (Thaler & Sunstein, 2008).

One of the ramifications bounded rationality is the overconfidence bias, which is the focus on this research paper. In general, overconfidence refers to excessive certainty about one's abilities and decisions. Academically, however, overconfidence can be interpreted in a number of different ways, which should be delineated. Most commonly, researchers interpret overconfidence as one's tendency to overestimate one's ability, performance, and chances of success. One can refer to this interpretation of overconfidence as "overestimation".

Overconfidence in research may also be a reference to the "better-than-others" belief. In this case, the individual believes that her performance is better than the 'average person'

although she may not overestimate her absolute performance. In essence, this is a type of overestimation in a comparison. This is a curiously "irrational" phenomenon because, mathematically speaking, individuals generally are much more likely to fall within close proximity of the average than not because average is simply a measure central tendency (i.e. where large majority of people are). This behavioural bias is commonly referred to as "above-average tendency", or more technically as "overplacement" (Moore & Healy, 2008). The above-average phenomenon is quite common and the following studies can provide some examples. In the beginning of the semester, most students predict that they will get an above-average grade. However, as pointed out above, only half of the students can possibly be placed above the class average. Over 90 percent of university professors at one institution claimed to have teaching skills that are better than the average professor at their institution (Price, 2006). Despite the fact that people generally know 'the house always wins', most gamblers are over-optimistic and tend to think their chances of winning are uniquely greater than other gamblers. They continue to play, and since their chances are not generally better than the average, they generally lose to no one else but the casinos and the lottery companies (Orkin, 1991). In fact, Orkin finds that one is three times more likely to be killed in a car accident during a 10-mile drive to buy a lottery ticket than winning the lottery.

Above-average thinking can also lead to risky health behaviour. Thinking they are healthier than the average person, many take health risks when they should not. For example, it is well-established fact that smoking greatly increases one's chances of developing heart disease, cancer, and premature death. Despite acknowledging that fact, smokers tend to believe their chances of developing heart disease and cancer are lower

than other smokers, attributing their above-average health to trivial factors. This overconfidence leads many smokers to continue with their destructive habit (Ayanian & Cleary, 1999).

The last class of overconfidence originate from one's excessive certainty in the accuracy of his beliefs, which is often referred to as "overprecision" (Moore & Healy, 2008). Overprecision simply is a reference to one's lack of moderation in beliefs. For example, to highlight the overprecision bias, a study ran an experiment in which the subjects were asked to guess certain static numerical values (e.g. the length of the Nile River) and then state how certain they are of their guess. Majority of individuals stated that they were 90% sure of their answers, while the correct answers would have been less than 50% (Alpert & Raiffa, 1982; Soll & Klayman, 2004). Overprecision among healthcare professionals can also lead to greater than normal risk taking. Studies show that physicians tend to be excessively confident of their diagnoses and treatments for patients even when there is no consensus on one's diagnosis and treatment (Baumann, Deber, & Thompson, 1991).

Although one can differentiate between different types of overconfidence in abstract, the overconfidence effects often are the results of mix of different types of overconfidence. For example, overconfidence leads equity traders to trade too much and increase trading volume but lower the expected utility for overconfident trades (Odean, 1998). Moore et. al. find that overconfidence bias also leads professional investors to overestimate the performance of their past and future investment, hence making suboptimal decisions (Moore, Kurtzberg, Fox, & Bazerman, 1999). In this case, investors tend to exhibit two

types of overconfidence. Firstly, they seem to overestimate the performance of the stocks (i.e. overestimation). Secondly, they exhibit excessive certainty in their decisions (i.e. overpercision).

Behavioural Economics in Education

The rising demand for higher skills and the skills-biased technological change in today's knowledge economy have led countries to increase their investment in skills in recent years through variety of means including formal education. As a result, there has been an increasing body of research interest in understanding and improving schooling choices of the youth.

Although the neoclassical model has been a powerful model in economics, current evidence suggests that it is insufficient for understanding schooling choices mostly because many schooling decisions of youths cannot be characterised as rational and optimal as defined by the neoclassical model. Evidence from current research (for examples see Levitt, List, Neckermann, & Sadoff, 2012; Finnie, 2012; Jabbar, 2011) suggests that there is a need for a new behavioural model for explaining and understanding how youths make these choices. A better understanding in this area can help the development of more effective policy responses to improve students' choices.

There are a number of insights and effects from previous work in behavioural economics that can be relevant to education decision-making.

The intertemporal nature of schooling decisions makes this decision difficult. The costs of the education are almost entirely immediate and are persistent for a few years. The

benefits of education are often delayed for years. Thus, the intertemporal nature of this decision merits a behavioural model. Furthermore, decisions about future education and careers are generally very complex and uncertain. The costs of schooling are multifaceted (e.g. tuition fees and related expenses, forgone earnings). Moreover, its benefits are vague and uncertain at the time of decision making (e.g. the potential of getting a well-paid job at some point later). Making a career choice among numerous options is difficult, complex, and often beyond one's processing capacity. Therefore, the assumption of bounded rationality relevant here, and its effects, namely overconfidence effects, merit further exploration and investigation.

A number of studies find that the low-performing students are more likely to be overconfident of their performance than their high-performing counterparts. Hacker et al. (2000) find that students tend to overestimate their score on an exam when their score is lower than the average. However, the reason behind this overconfidence is not clear. The most dominant theory suggests that low-performing students overestimate their performance because they lack metacognitive insights. Simply put, they are overconfident because they are unaware of the knowledge they have and the knowledge they do not have.

Miller and Geraci (2011) dispute this claim this theory by experimentally demonstrating that while lower-performing students tend to overestimate their ability when compared with their higher-performing counterparts, they are less certain about their predictions. In other words, in comparison to their high-performing students, low-performing students tend to have predictions about their performance that are higher than their actual

performance, but they are less certain about their predictions, which suggests that these students are aware of their ineptitude (Miller & Geraci, 2011).

The availability of rich panel data, particularly from the Youth in Transitions Survey (YITS), has enabled researchers to shed light on schooling choices in the Canadian context. Evidence from the YITS suggests that financial barriers, while important, seem to play a much smaller role under the current financial assistance programs in Canada than previously thought. There is also evidence that tuition fees in Canada and incremental increases in tuition fees have little effect on postsecondary education decisions (for examples see Bell & Anisef, 2005; Neil, 2009). For example, tuition fees increased by 85% and the average income decreased by 5% between 1989 and 1997. At the same time, there has been an over-supply of students choosing to attend postsecondary education (Bell & Anisef, 2005). Nevertheless, individuals with low socioeconomic backgrounds and from certain minority groups such as aboriginals access postsecondary education at significantly lower rates than their counterparts from higher socioeconomics backgrounds (Clark, G., Skolnik, & Trick, 2009; Finnie R. , 2011; Frenette, 2007).

Given the limited effects of financial issues on postsecondary education decisions, studies are increasing looking for behavioural and cultural characteristics that may act as barriers to postsecondary education. Using the YITS, Finnie et al (2008) have examined the characteristics of individuals who attend postsecondary institutions. They demonstrate that while parental education and family income play important roles in schooling decisions, there are other influential factors at play. For example, overall high school

performance – not just in mathematics – is closely related to one's probability of pursuing postsecondary education. The test scores of 15-year-olds from the Programme for International Student Assessment (PISA) also are correlated with pursuing postsecondary education. There is also significant attention on the gender gap in university attendance, where increasingly more girls than boys continue their education (Frenette & Zeman, 2008). Studies find that this gender gap can partly be explained by non-cognitive characteristics and behaviours that are more common among girls such as overall academic performance, favourable study habits, and higher parental expectations (Frenette & Zeman, 2008; Jacob, 2002). Research also suggests the gender-gap in aspirations and efforts in high school, where girls tend to perform better than boys, is consistent with the gender gap in university attendance (Drewes, 2009). Furthermore, evidence from the YITS also suggests that the large majority of students decide to attend postsecondary education at a much earlier age that previously thought (Finnie, Mueller, Sweetman, & Usher, 2008).

Self-confidence and aspirations among students are two other characteristics that seem to matter in the context of formal education. Evidence suggests that high performing individuals with low self-confidence and low aspirations tend to "aim low" and have weaker education and labour market outcomes than their counterpart with more self-confidence and aspirations (Childs, 2011). On the other hand, individuals who are overconfident tend to also have poor outcomes (Dunlosky & Rawson, 2012). This suggests that students with low self-confidence may have improved education outcomes with increasing their self-confidence while overconfidence students may have better outcomes by increasing their efforts in formal education to match their high aspirations.

Despite all the aforementioned findings on schooling decision and self-confidence, there is little research on individual characteristics of those with too high or too low confidence levels. Thus, following questions remain unanswered: Do students with low socioeconomic background have low self-confidence? Do some high performing students have low self-confidence? If so, what are the characteristics of these students? Do some low preforming students have high self-confidence? If so, what are the characteristics of these students?

Lastly, it is important to view education as an investment[1], where individuals choose to pay some upfront costs (e.g. tuition fees, books, forgone labour) to reap the benefits later in life (e.g. higher wages). Similar to investment decisions, people differ significantly on the type of investment and how they choose to have. Therefore, the "one size fits all" may not apply to schooling decisions. That is, different individuals tend to invest differently given their investment habits and attitudes.

Although overconfidence in capital investment has received substantial academic attention in recent years, little research attention has been paid to overconfidence in education investment. For example, we do not know whether and to what degree students are overconfident of achieving their education goals or their labour market outcomes. An overconfident student may invest less than required to achieve success. On the other hand, an underconfident student may aim too low despite his ability to do better and achieve an optimal labour market outcome. This spirit inspires this research

[1] Education consumers are the obvious exception to this assumption.

piece. More specifically, the aim of this research is to investigate whether there are mismatches between students' future career aspirations and their current performance.

Data and Methodology

I have chosen to use the Cycle 1 of the YITS A for this analysis. This data was gathered using phone interviews by Statistics Canada. There are six cycles to this data where the same individuals are contacted every two years for an update. The respondents in Cycle 1 are 15-year-olds in Canada and their parents or legal guardian. The survey captures many characteristics of the student, the parents, and the school to which the student belongs. The YITS also captures the respondents' behaviour at home and at school, their background, and their aspirations (see Table 1 for top 10 career aspirations).

Table 1 – Top ten stated career aspirations

	Girls		Boys	
1	Medical Doctors	10.2%	Computer programmers and engineers	9.2%
2	Teachers (K-12)	8.1%	Police Officers	4.5%
3	Lawyers	5.8%	Athletes	4.2%
4	Psychologists	4.7%	Medical doctors	4.0%
5	Actors	4.1%	Lawyers	3.4%
6	Veterinarians	3.8%	Aviation's (pilots, engineers etc.)	2.6%
7	Nurses	2.8%	Graphic Designers	2.5%
8	Biologists	2.4%	Mechanics	2.4%
9	Accountants	2.2%	Other Professional Engineers,	1.9%
10	Social Workers	2.2%	Electronic Service Technicians	1.9%
	Total	46.2%	Total	36.5%

This data is also linked to the students' performance on the PISA. All students are asked to write the PISA Reading Test but only half of randomly chosen students take the PISA Math Test and the other half write the PISA Science Test. This study only uses the reading and the math scores, as a result, only half of 25,000 observations are used.

This paper uses two multinomial ordered probit models, where confidence level is the dependent variable for both models. Independent variables are gender, parental education, household income, PISA scores (reading scores for Model I and math scores for Model II), level of academic engagement, visible minority status, rural status, and immigration status are independent variables. Two models are used in this study. The PISA reading scores are used as an independent variable and in the development of aspirations variable (see below) for Model I, while the PISA math scores are used in the same fashion in Model II. The models this paper uses are summarized in the following equation.

$$Confidence\ level = \beta_0 + \beta_1\ male + \beta_2\ parental\ education + \beta_3\ household\ income + \beta_4\ PISA\ score + \beta_5\ Academic\ engagement + \beta_6\ Visible\ minority + \beta_7\ rural + \beta_8\ immigrant$$

Dummy variables are used for gender, visible minority status, and rural status.

Although there are a number of variables in the YITS with the intent to measure self-confidence, they are mostly self-reported, hence are subjective and likely to be inconsistent. This is because confidence level is, by its very nature, a subjective measure, where healthy level of confidence to one may seem too high to others. Furthermore, individuals are unlikely to rate their self-confidence consistently. As a result, self-reported confidence level may make a biased and inconsistent measurement. Thus, it is advisable to create a more consistent, albeit subjective, measure of confidence level. As a result, this research has attempted to achieve this consistency by using two variables of academic performance and stated career aspirations, where a student is considered underconfident if her performance ranking is above what is generally required to achieve

her career aspirations. On the other hand, a student is considered overconfident, if her performance ranking is below what it needs to be to achieve her aspirations. Logically, if one's performance ranking is equivalent to the level she needs to have to achieve her aspirations, she would be considered confident.

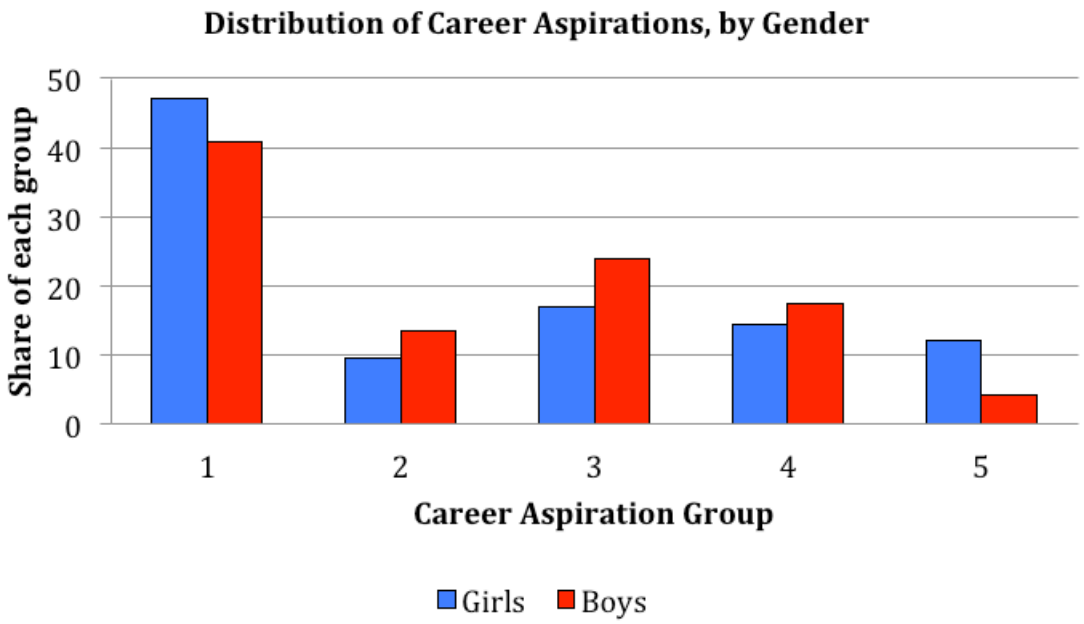
While this measure provides a consistent measure of confidence level, it is biased in at least one significant respect. This measure of confidence assumes that academic performance on PISA tests reveals of one's ability, where high scores are interpreted as high ability and low scores indicate low ability. However, it is clear that academic performance can make a poor measure for ability in many different fields where academic performance is not as relevant as other fields. For example, highly capable athletes and entrepreneurs may have average or even poor academic performance, but they can be highly successful in the labour market due to their discipline and hard work in their field. Nevertheless, this research definition of ability enables it to identify and investigate issues that are relevant to postsecondary education because it is focussed on measure mismatches of performance and aspirations in the education context.

In Model I, the PISA reading scores are used as the performance variable. The distribution is categorized into 5 groups using the percentile ranking. That is, individuals in the first to 19th percentile are in group 5, 20th to 39th percentile are in group 4, 40th to 59th percentile are in group 3, 60th to 79th are in group 2, and 80th to 99th percentile are in group 1.

Similarly, the aspired careers, which have been recorded using the Standard Occupational Classification (Statistics Canada, 2006), were also categorized in the order of required

education performance. Careers that required little or no training (e.g. cashiers) are placed in a group 5. Job requiring manual labour with some training (e.g. administrative staff) are placed in group 2. Jobs that require at least a trades or college degree (e.g. dental assistants) are placed in group 3. Careers that required a bachelor's degree (e.g. engineers, chemists) are placed in group 2 and professional careers that require very competitive education performance and credentials (e.g. medical doctors and lawyers) are placed in group 1.[2] The distribution of aspirations is illustrated in figure 1.

Figure 1 – The distribution of career aspirations



As briefly explained above, a mismatch in confidence level in this study is defined as an individual in a specific performance group, aspires to have a career that is in a different group. In other words, a mismatch is a career category that is different from a performance category. For example, a lower preforming student, whose performance

[2] See Annex I for the complete classification.

puts him in group 5, aspires to become to a doctor, a group 2 category. Similarly, a high performing student in group 1 of performance category, aspires to a job that is in group 4. For the sake of this study, former is defined as 'overconfident' (i.e. performance group > the career aspiration group) and latter is 'underconfident' (i.e. performance group < the career aspiration group). Students whose careers aspirations and performance are in the same groups are thus called 'confident'. Same exercise is performed using the PISA math scores for Model II.

It is possible that some respondents have randomly chosen career aspirations without the seriousness required to be included in this study. As a result, this study has chosen to only include students who explicitly stated that they were certain and fairly certain of achieving their career aspirations. This restriction eliminated less then 40% of respondents, indicating that more than 60% of students were certain or fairly certain of their choices.

The parental education variable measures the highest level of education credential held by either parents. They are categorized into 5 groups of below high school, high school diploma, college or university below a bachelor's degree, university bachelor's degree, and postgraduate degree (i.e. master's and doctoral degrees as well as professional degrees such medical and law degrees).

Lastly, level of academic engagement is derived through a number of other variables that measure academic activities. These include hours spent doing homework or studying at home and the frequencies of skipping classes without permission, completing homework, and paying attention to the teacher. This derived measure of academic engagement is a

continuous, normally distributed variable with the mean of zero and standard deviation of one.

Results

The following table shows that the results of the two multinomial probit regressions described above. As previously mentioned, Model I uses the PISA reading scores and Model II uses the PISA math scores.

	Model I		**Model II**	
	Underconfident	**Overconfident**	**Underconfident**	**Overconfident**
Household Income				
$25,000 - $49,999	0.12	0.05	0.06	0.12
	(0.15)	*(0.62)*	*(0.61)*	*(0.36)*
$50,000 - $74,999	0.13	-0.04	0.14	0.11
	(0.13)	*(0.66)*	*(0.20)*	*(0.38)*
$75,000 - $99,999	0.17*	-0.02	0.07	0.05
	(0.07)	*(0.88)*	*(0.54)*	*(0.72)*
$100,000+	0.06	-0.04	-0.11	-0.01
	(0.55)	*(0.75)*	*(0.42)*	*(0.95)*
Parental Education				
High School	0.26**	0.07	0.22*	0.03
	(0.01)	*(0.52)*		*(0.83)*
College/University below Bachelor's	0.29***	-0.01	0.32**	0.02
	(0.00)	*(0.90)*	*(0.01)*	*(0.89)*
Bachelor	0.31***	-0.05	0.16	-0.15
	(0.00)	*(0.66)*	*(0.25)*	*(0.33)*
Postgraduate	0.35***	-0.40***	0.25	-0.28
	(0.00)	*(0.00)*	*(0.13)*	*(0.14)*
Male	0.35***	0.03	0.21***	0.14**
	(0.00)	*(0.59)*	*(0.00)*	*(0.04)*
Reading Score	-0.01***	0.01***	–	–
	(0.00)	*(0.00)*	–	–
Math Score	–	–	-0.01***	0.01***
	–	–	*(0.00)*	*(0.00)*
Academic Engagement	0.17***	-0.07**	0.20***	-0.09***

	(0.00)	*(0.01)*	*(0.00)*	*(0.01)*
Visible Minority	0.08	-0.33***	-0.07	-0.61***
	(0.36)	*(0.00)*	*(0.50)*	*(0.00)*
Rural	0.05	0.16***	-0.05	0.08
	(0.36)	*(0.00)*	*(0.47)*	*(0.30)*
Immigrant	0.27**	0.13	0.10	-0.12
	(0.01)	*(0.29)*	*(0.44)*	*(0.49)*
Constant	3.28	-3.18	3.56	-4.22
	(0.00)	*(0.00)*	*(0.00)*	*(0.00)*

Note: *p<0.1 ; **p<0.05 ; ***p<0.01

These results show different likelihood compared to the base outcome. The base outcome of the model is confident (i.e. career aspiration group equals performance group). The base household income category is $0 to $24,999, and the base for parental education is below high school education. Given these, the above outcome can be interpreted in the following way.

Household income does not show a significant effect overall. The only exception here is for Model I in the $75,000 to $99,999 income category where there is an increased likelihood of being underconfident at 0.1. Parental education also does not seem to have a consistently significant effect overall. However, a few notable exceptions are worth mentioning. In Model I, as parental education increases, the likelihood of being underconfident increases. Similar results are found in Model II albeit the findings are less significant. On the other hand, the individuals are less likely to be overconfident as the parental education increases at the university level, but the results are only significant for the postgraduate level in Model I only. Although the findings on parental are not consistently significant for both models, the direction of findings are consistent throughout.

Gender seems to have an affect confidence. Boys are more likely to be both underconfident and overconfident in both models than girls. This suggests that males tend to have higher likelihood of having mismatched aspirations and performance than girls.

In general, performance on PISA is found to have a reverse effect on confidence. In Model I, as reading scores increase, the likelihood of being underconfident decreases, while the likelihood being overconfident increases. That is, the student is less likely to be underconfident and more likely to be overconfident as his reading score increases. Similar results are found in Model II, the student is less likely to be underconfident and more likely to be overconfident as her math score increases. However, level of academic engagement seems to have a reverse relationship. As the level of academic engagement increases, the student is more likely to be underconfident and less likely to be overconfident in both models. Interestingly, the results show a strong significance at the 0.01 level.

Both models find that visible minority status students are significantly less likely to be overconfident than their counterparts. The results for rural status and immigrant status are generally found to be insignificant with two exceptions in Model I: rural students are more likely to be overconfident than their urban counterparts, while immigrants are more likely to be underconfident than their Canadian-born counterparts.

Discussion

Overall, the findings suggest that there is evidence of mismatched aspirations and performance. The evidence suggests that girls tend to have a better sense for matching their performance with aspirations, while boys' tendency is bimodal. That is, they are likely to be among the overconfident and underconfident than girls. There may be two effects at works here. One is that boys tend to be more overconfident than girls in their ability to success and reach their goals. This is consistent with the literature (Barber & Odean, 2001). The other is due to larger share of teenage boys having masculine sounding and physical career aspirations that requires low levels of education (see table 1). This is consistent with the gender aspiration gap that Drewes finds (2009).

The gender effect may have some implications in understanding the gender gap in education. On the one hand, overconfident boys may underestimate how much efforts and hard work are required to achieve strong outcomes in education and later in the labour market. It is well established that boys tend to have poorer academic performance than girls overall (Frenette & Zeman, 2008) – this view is further supported by the lower performance of boys on PISA illustrated in Figure 2. Thus, these overconfident boys would benefit from an adjustment in their efforts and improving in their academic activities to realize their career goals. In other words, these boys may need to be reminded that better work habits and more effects are required to achieve their set out goals. On the other hand, some boys seem to aim low despite having the performance to achieve higher career goals. Many boys may have unrealistic views or lack sufficient information about entering certain "cool sounding" but generally low earning careers like

being a hockey player (Table 1 shows 4.2% of boys planned to become athletes). Although this study labels these boys as underconfident because little postsecondary education is required to become a professional athlete, one may also argue that these boys are overconfident about achieving success by aiming to become professional athletes.

The finding on the effects of parental education on students' confidence level is rather curious. We know from previous research (e.g. see Finnie et al, 2008) that parental postsecondary education is a strong indicator of students' access and persistence in the postsecondary system. However, the findings suggest that the children of parents with postsecondary education seem to have aspirations that are below their performance than their counterparts with no parental postsecondary education. It is difficult to draw definitive conclusions based on these findings. But one may suggests that children who have postsecondary educated parents have more exposure and familiarity to postsecondary education and are more likely to have a realistic view achieving the level of education required for highly competitive fields. In essence, these students have a more precise reference point about education and educational credentials. This view is somewhat supported but the finding about academic engagement, where students who are more academically engaged are more likely to be underconfident. Less academically engaged students are more likely to be overconfident with their career aspirations. It is possible that the academically engaged students have more accurate understanding of academic challenges because of their more academic exposure than their counterparts who lack the academic engagement and exposure.

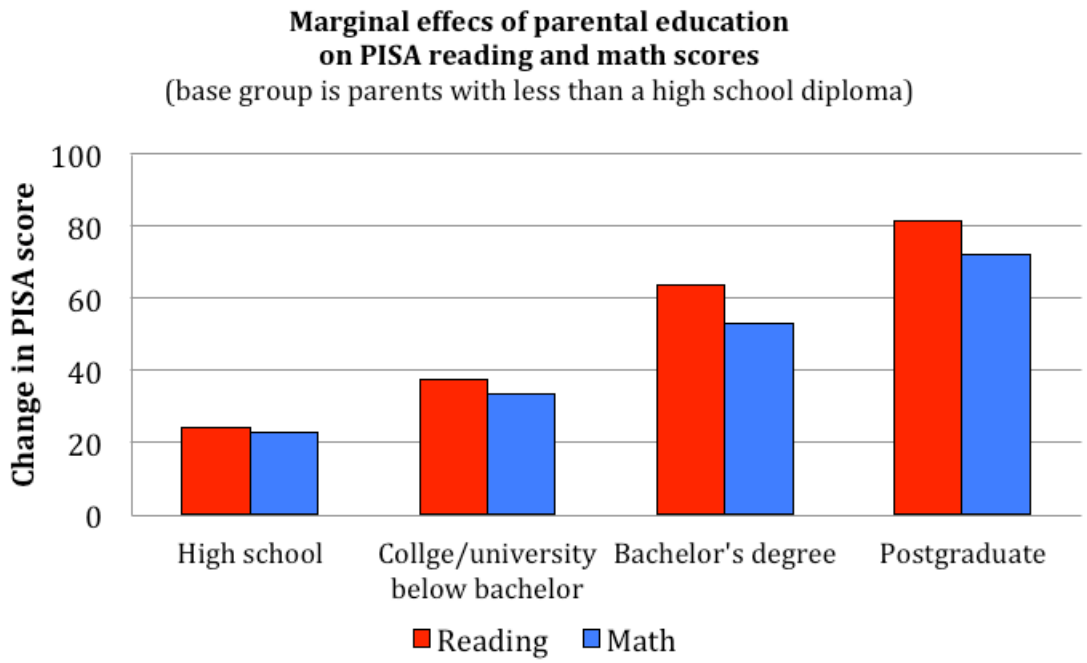
On the other hand, one may also argue that these children have a similar distribution of career aspirations as other children with no parental postsecondary education, but they are more academically prepared, and thus fare better on PISA. In other words, children of parents with postsecondary have similar career aspirations as their counterparts without any parental postsecondary education, but are stronger academically. Given the importance of these two hypotheses, they merit a brief investigation and a discussion.

In order to investigate the effects of parental education on PISA scores for the two models, the following OLS regression is performed.

$$PISA\ score = \beta_0 + \beta_1\ household\ income + \beta_2\ parental\ education + \beta_3\ male + \beta_4\ academic\ engagement + \beta_5\ visible\ minority + \beta_6\ rural + \beta_7\ immigrant$$

For model I, PISA reading scores were used while PISA math scores were used to model II. The following figure illustrates the marginal effects of parental education on PISA reading and math scores.

Figure 4 – Marginal effects of parental education on PISA performance
(All results are significant at 0.01 level)



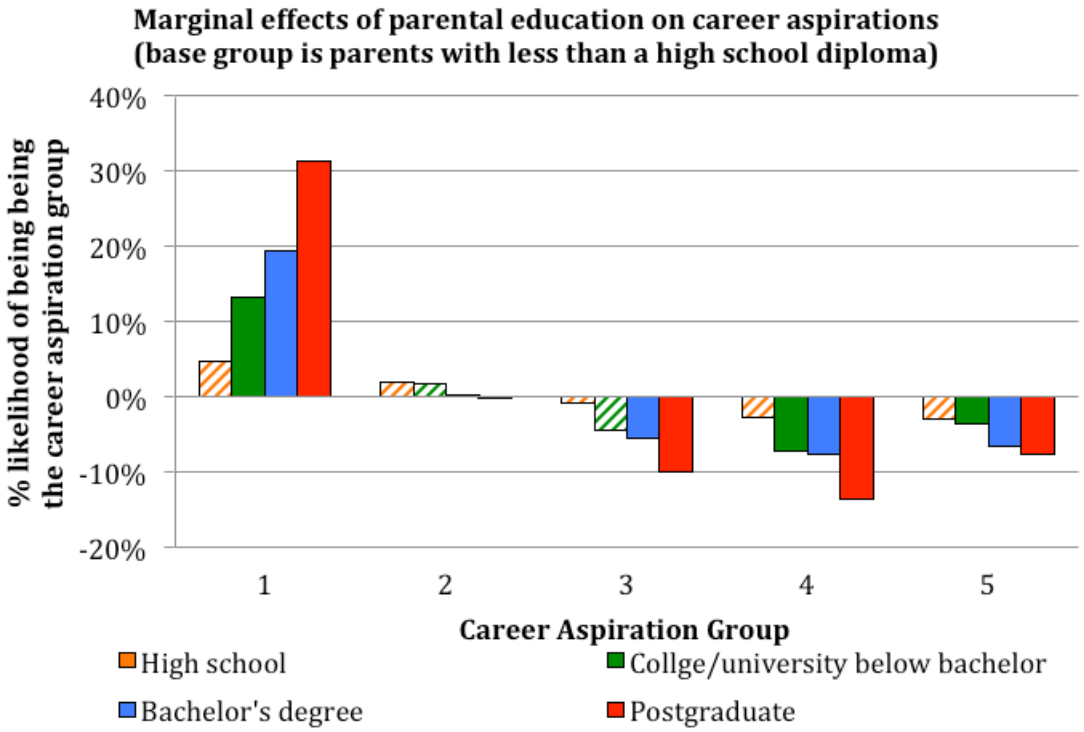
Given that the mean reading and math scores are 538 and 533 with the standard deviation of 88 and 83, respectively, the result here suggest that parental education has a very strong effect on PISA performance. For example, students with parents with postgraduate degrees score about a standard deviation above their counterpart with parents who lack a high school diploma. The positive marginal effect of parental education on PISA scores is strongly and significantly consistent for both math and reading tests.

On the other hand, one can also investigate the marginal effects of parental education on students' aspirations using the following multinomial probit regression.

$$Aspirations = \beta_0 + \beta_1\, household\ income + \beta_2\, parental\ education + \beta_3\, male + \beta_4\, academic\ engagement + \beta_5\, visible\ minority + \beta_6\, rural + \beta_7\, immigrant$$

Figure 3 provides the marginal effects of parental education (at means) on aspirations when controlling for other characteristics (i.e. household income, gender, visible minority, and immigrant status).

Figure 5 – The marginal effects of parental education on career aspiration group
(Solid bars are significant at the 0.05 level while the diagnolly patterned bars are not)



In fact, parental education also seems to have a generally significant marginal effect on students' careers aspirations. The effects are especially pronounced at the highest career aspiration groups (i.e. the most ambitious and competitive careers). For example, students who parent's highest level of education is a university bachelor's degree is about 20% more likely to have career aspirations that call in group one than their counterparts with parents without a high school diploma. Furthermore, the results in figure 5 suggest that as parental education increases, the students are more likely to have high career

aspirations and less likely to have low career aspirations. For example, students whose parents hold postgraduate degrees are about 15% less likely to be in group 4 of career aspirations (i.e. jobs that require college or trades degrees). Thus, it is safe to conclude that parental education has significant marginal effects on both academic performance and career aspirations.

Conclusions

This paper is an attempt to use a behavioural framework to understand how young students make schooling decisions. This paper outlines some of the advantages of behavioural economics in understanding and examining economic decision-making. Using one of these behavioural insights, this study tries to identify overconfidence (and underconfidence) bias by examining the mismatches of students' career aspirations and performance at the age of 15 in the Cycle 1 of the YITS. Using the PISA reading and math scores and stated careers aspirations, the two multinomial probit models point out the following findings: boys are more likely than girls to have mismatches in both directions; increases in PISA scores seem to increase the students' confidence level beyond their capacity, making them overconfident; as parental education increases students underconfident than their counterparts with less educated parents. Further investigation reveals that parental education has strong and significant marginal effects on both performance and aspirations of students. This further highlights the important role of parental education in understanding schooling decision. In sum, this study provides evidence that there are some significant mismatches of career aspirations and performance. In the next steps of this study, one can using the longitudinal nature of the

YITS and re-examine the confidence levels among the students and explore whether the students adjust their aspirations, performance, or both in the future. This could provide more insights into the evolution of confidence levels among students.

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Annex I

	Assigned Aspiration Group				
	1	**2**	**3**	**4**	**5**
The Standard Occupational Classification (SOC) - 1991	A0	A1	B1	B2	G0
	B0	A2	D3	B4	G1 - G9
	C0	A3	E12	B5	I2
	D0	C1	E13	F1	J1 - J3
	D1	D2	F0	G1	
	E01	E01 - E03	H2	G2	
	E11	E2	H4	H0	
			H7	H1	
			G6	H3	
				H5	
				H6	
				H8	
				I0	

Details of each category is available at http://www.statcan.gc.ca/subjects-sujets/standard-norme/soc-cnp/1991/soc-ctp91_ind-eng.htm

Annex II

The following table provide the full regression outcome, where PISA scores are the dependent variables (PISA reading scores for Model I and PISA math for model II).

	Model I	**Model II**
	Coefficients	
Household Income		
$25,000 - $49,999	12.62***	5.43
	(0.00)	*(0.24)*
$50,000 - $74,999	21.59***	12.87***
	(0.00)	*(0.00)*
$75,000 - $99,999	19.82***	10.49*
	(0.00)	*(0.04)*
$100,000+	23.64***	11.61*
	(0.00)	*(0.03)*
Parental Education		
High School	24.27***	22.58***
	(0.00)	*(0.00)*
College/University below Bachelor's	37.57***	33.48***
	(0.00)	*(0.00)*
Bachelor	63.65***	53.16***

	(0.00)	*(0.00)*
Postgraduate	81.48***	72.06***
	(0.00)	*(0.00)*
Male	-20.96***	15.92***
	(0.00)	*(0.00)*
Academic Engagement	14.87***	9.44***
	(0.00)	*(0.00)*
Visible Minority	-17.01***	-13.45***
	(0.00)	*(0.00)*
Rural	-6.17***	-3.62
	(0.00)	*(0.17)*
Immigrant	-15.87***	-4.29
	(0.00)	*(0.45)*
Constant	494.27***	482.79***
	(0.00)	*(0.00)*
Note:	**p<0.1 ; **p<0.05 ; ***p<0.01*	

Annex III

Multinomial probit regression outcome with career aspiration category as the dependent variable.

	1 (highest)	2 (high)	3 (base)	4 (low)	5 (lowest)
Household Income					
$25,000 - $49,999	0.04	0.11	-	0.04	0.03
	(0.68)	(0.35)	-	(0.71	(0.80
$50,000 - $74,999	0.18	0.09	-	0.16	0.02
	(0.09)	(0.46)	-	(0.18	(0.86
$75,000 - $99,999	0.14	0.05	-	0.20	0.03
	(0.20)	(0.70)	-	(0.11	(0.82
$100,000+	0.21	0.29	-	0.32	0.14
	(0.09)	(0.04)	-	(0.02	(0.36
Parental Education					
High School	0.12	0.13	-	-0.06	-0.17
	(0.24)	(0.35)	-	(0.63	(0.23
College/University below bachelor	0.43	0.24	-	-0.11	-0.09
	(0.00)	(0.07)	-	(0.35	(0.49
Bachelor	0.58		-	-0.10	-0.35
	(0.00)	(0.19)	-	(0.48	(0.04
Postgraduate	0.96	0.35	-	-0.24	-0.33
	(0.00)	(0.06)	-	(0.18	(0.12
Male	-0.28	0.00	-	-0.09	-0.86
	(0.00)	(0.95)	-	(0.19	(0.00
Academic Engagement	0.31	0.05	-	0.02	-0.10
	(0.00)	(0.12)	-	(0.46	(0.01
Visible Minority	0.57	0.15	-	0.29	0.28
	(0.00)	(0.31)	-	(0.04	(0.09
Rural	-0.04	0.11	-	0.18	0.25
	(0.53)	(0.11)	-	(0.01	(0.00
Immigrant	0.64	0.33	-	0.50	0.59
	(0.00)	(0.08)	-	(0.00	(0.00
Constant	0.07	-0.75	-	-0.27	-0.26
	(0.61)	(0.00)	-	(0.05	(0.09

Annex IV

Marginal effects of parental education on PISA performance.

Change in PISA scores

	PISA Scores	
	Reading	**Math**
High school	24.27	22.58
	(0.00)	(0.00)
College/university below bachelor	37.57	33.48
	(0.00)	(0.00)
Bachelor's degree	63.65	53.16
	(0.00)	(0.00)
Postgraduate	81.48	72.06
	(0.00)	(0.00)

Marginal effects of parental education on careers aspirations

Percent change in likelihood of being a career aspiration group

	Career Aspiration Group				
	1	**2**	**3**	**4**	**5**
High school	0.05	0.02	-0.01	-0.03	-0.03
	(0.09)	(0.30)	(0.71)	(0.30)	(0.08)
College/university below bachelor	0.13	0.02	-0.04	-0.07	-0.03
	(0.00)	(0.30)	(0.05)	(0.00)	(0.04)
Bachelor's degree	0.19	0.00	-0.06	-0.08	-0.07
	(0.00)	(0.86)	(0.03)	(0.00)	(0.00)
Postgraduate	0.31	0.00	-0.10	-0.14	-0.08
	(0.00)	(0.99)	(0.00)	(0.00)	(0.00)