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PERSISTENT ATTITUDES AND BEHAVIORS

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Persistent Attitudes and Behaviors

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Abstract

This paper estimates the impact of adolescent attitudes and behaviors - academic motivation as assessed by the child herself and behavioral problems as assessed by the mother or the teacher of the child at age 16 - on adult attitudes and behaviors including illegal drugs consumption, smoking, physical and mental health, criminal activity, political participation, self-confidence and opinions about the labor market at age 41. Adolescent attitudes and behaviors are latent variables estimated using a semiparametric item response theory method. Conditional on educational attainment and personal characteristics, I find that individuals with higher academic motivation and lower behavioral problems at age 16 have lower probabilities of having 'problematic' attitudes and behaviors at age 41. The results are very similar across gender. I also examine the role of family environment in shaping these adolescent attitudes and behaviors. Academic motivation and behavioral problems have a stronger association with parental interest in the education of their children than with measures of the financial situation of the family.

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1 Introduction

Some recent studies in economics have established that personality or socio-emotional traits such as motivation, attentiveness, self-esteem, perseverance or disruptiveness are important determinants of educational and labor market outcomes.[1] Segal (2011) shows that the relationship between misbehavior in school and economic outcomes cannot only be attributed to observable family background characteristics. As Osborne-Groves (2005, p.828) points out,"*there is an intuitive appeal that a good worker is, in part, determined by personality traits.*"[2] While most authors have focused on the impact of these traits at adolescent age on schooling and earnings, others have examined their effects on social behaviors. Using measures of abilities between age 14 and 21, Heckman et al. (2006) find that the same vectors of cognitive and noncognitive abilities explain various labor market outcomes and adolescent risky social behaviors. Using measures of skills at age 11, Carneiro et al. (2007) confirm this evidence for the U.K. They also find that early home environment has an impact on the development of cognitive and noncognitive skills.

Heckman et al. (2010) show that childhood intervention programs have positive long-lasting effects on adult outcomes including education, employment, earnings and crime. They use data from the Perry preschool program, a randomized social experiment targeted towards disadvantaged African American children. Perhaps surprisingly, they find that the program did not boost cognitive abilities or IQs of the treatment group permanently but that it raised measures of personality traits. This suggests that personality and motivation of the participants had an important role in explaining the success of the program in terms of adult outcomes. Cunha et al. (2010) develop and estimate a model of multistage production functions governing the evolution of cognitive and noncognitive skills. They show that "*skills beget skills*".

Segal (2008) also finds thats student behaviors during adolescence are persistent. Adolescent attitudes and behaviors have thus been shown to be associated with adolescent outcomes such as final educational attainment, teenage pregnancy, youth smoking and consumption of illegal drugs. But do they matter for attitudes and behaviors 25 years later? This paper examines the impact of socio-economic skills at age 16 on self-reported adult attitudes and behaviors at age 41 including illegal drugs consumption, smoking, physical and mental health, criminal activity, political participation, self-confidence and opinions about the labor market. I take into account the multidimensionality of adolescent socio-economic skills and divide them into academic motivation and behavioral problems.

[1] See, e.g., Bowles et al. (2001), Piatek and Pinger (2010) and Segal (2012).

[2] Klein et al. (1991) argue that perseverance lead individuals to acquire more education and reduce their propensity to quit a job, a trait which is valued by employers.

I find that adolescent attitudes and behaviors are important determinants of adult social outcomes. The analysis is made separately for males and females but the results are very similar across gender. I use two different measures of behavioral problems at age 16, the first is based on a set of questions asked to the teacher of the child and the second on a set of questions asked to the mother. Conditional on educational attainment and personal characteristics, individuals with higher academic motivation and lower behavioral problems at age 16 have lower probabilities of reporting 'problematic' behaviors at age 41. This leads to the next research question discussed in this paper: what are the factors affecting academic motivation and behavioral problems at age 16? I thus also examine the role of family environment in shaping these adolescent attitudes and behaviors. To avoid the problem of simultaneity, I use information on family environment when the child is 11 years old. I find that the associations of adolescent attitudes and behaviors with parental interest in the education of their child are much higher than the associations with measures of the financial situation of the family. Parental investment does not necessarily imply money or financial resources. If parents care more, children behave better and show more academic motivation.

Adolescent attitudes and behaviors are not directly observable. However, I have some questions that are related to them and can provide the basis for their measurement. Typically, the answers to these questions (or item responses) are categorical or ordered discrete. I hence need to use a method that takes the discrete nature of the data seriously. Academic motivation and behavioral problems are latent variables measured using the semiparametric item response theory method developed by Spady (2007). This novel method has been used to measure attitudes in other contexts: Spady (2010) estimates the effects of latent economic and cultural attitudes in U.S. presidential elections, El-Attar (2010) measure Palestinians' attitudes towards a peace process in the Israeli-Palestinian conflict and El-Attar and Poschke (2011) analyze how trust affects portfolio choice. One of the advantages of the method is that it takes into account the measurement uncertainty. It is very flexible and does not impose strong parametric assumptions on the relation between the questions and the latent variables. It also allows for the possibility that individual characteristics affect attitudes and behaviors. Indeed, observable characteristics, such as the social environment of the child, may influence how adolescent attitudes and behaviors are distributed in the population under study. Moreover, unlike other factor or item response models, the method does not require all individuals to have complete information on all items used to measure the latent variables. This increases the final sample size and reduces the problem of sample selection.

The remainder of this paper is organized as follows. The next section describes the rich dataset that I use. Section 3 introduces the methodology. Section 4 discusses the associations

between the characteristics and the latent variables. Section 5 presents the estimates of the effects of adolescent attitudes and behaviors on adult social outcomes. The last section is a conclusion.

2 The data

The data used in this paper is taken from the National Child Development Study (NCDS), a longitudinal dataset containing rich information about a particular cohort of the British population: all children born between 3 and 9 March 1958. After a parental survey at birth, individuals have been surveyed in seven subsequent follow-ups - at age 7, 11, 16, 23, 33, 41 and 46. The NCDS obtains information on family background, physical and mental health, education and labor market outcomes. The initial sample covers 17,415 individuals. However, there is substantial attrition and the sample size reduces to 11,469 in 1991 (age 33) and 11,419 in 1999 (age 41).[3] I use data on family structure, social environment, educational attainment and measures of academic motivation and behavioral problems.

Because the focus of this paper is the measurement of academic motivation and behavioral problems and their effects on later behaviors, the analysis will be guided by the available data that bear on them. My sample consists of 6,453 individuals: 3,113 males and 3,340 females. I consider 18 different outcomes at age 41 including illegal drugs consumption, smoking, physical and mental health, criminal activity, political participation, self-confidence and opinions about the labor market. Table 1 shows some descriptive statistics for the characteristics.[4] Table 2 suggests that men are slightly more educated than women. The six educational levels are sequential and mutually exclusive. Descriptive statistics for the outcomes are given in Table 3. More details on the variables can be found in Appendix A.

The measures of academic motivation and behavioral problems merit some further discussion. The measure of academic motivation is based on five questions that were asked to the child at age 16 about her feelings towards school. Borghans et al. (2008, p.974) make a distinction between thoughts, feelings and behaviors on one hand and motivation, interest, values, interest and attitudes on the other. They claim one should focus "*on individual differences in how people actually think, feel, and act, not on how people want to think, feel and act.*" Clearly, the measure of academic motivation that I consider in this paper falls in the first category since the questions that I use correspond more to feeling towards school than to the motivation to score well in a particular exam. They are coded 1 to 5 where 1

[3]See Harmon and Walker (2000) for a discussion of the problems of attrition and incomplete information in the NCDS cohort.

[4]Blundell et al. (2005) use a set of similar characteristics in their analysis of the effect of education on earnings for the NCDS cohort.

corresponds to 'very true', 2 to 'partly or usually true', 3 to 'cannot say, no feeling either way', 4 to 'partly or usually untrue', 5 to 'not true at all'. Tables 4 and 5 show that the pairwise Kendall rank correlation coefficients between the items range from 0.25 to 0.44 for males and from 0.28 to 0.43 for females. Cronbach's alpha for this combination of 5 items is 0.77 for males and 0.771 for females.

The two different measures of behavioral problems are based on questions that were asked to the child's teacher and mother. The first measure of behavioral problems is based on questions that were asked to the teacher of the child at age 16. The teacher had to fill the questionnaire and return the answers. I have retained 8 questions to proxy for behavioral problems. They are coded 1 to 3 where 1 corresponds to 'certainly applies', 2 to 'applies somewhat' and 3 to 'does not apply'. The pairwise Kendall rank correlation coefficients shown in Tables 6 and 7 are between 0.29 and 0.65 for males and 0.32 and 0.63 for females. Cronbach's alpha for this combination of 8 items is 0.866 for males and 0.871 for females.

The second measure of behavioral problems is based on identical questions that were read to the mother about the behavior of her child. Tables 8 and 9 show that the pairwise Kendall rank correlation coefficients are lower than with the questions as reported by the teacher. The range is between 0.07 and 0.47 for males and between 0.07 and 0.46 for females. Cronbach's alpha for this combination of 8 items is 0.718 for males and 0.708 for females. The magnitude of the pairwise correlation coefficients is not the same because two different persons with very different views on the child are rating her: the teacher and the mother. They are lower when the mother is rating the child but they are all statistically different from zero. However, one should note that the patterns in the correlation coefficients are very similar, i.e. when the correlation between two items as reported by the teacher is *relatively* high, this is also the case for the correlation between the items as reported by the mother, and *vice versa*. Moreover, for all three set of items, the pairwise correlation coefficients are very similar across gender.

I apply the item response theory method for the measurement of latent variables developed by Spady (2007) for ordered discrete items. I interpret the measure of each of the three latent variables as an index that permits us to rank each individual in terms of academic motivation and behavioral problems. The index of behavioral problems is coded such that a higher level means a better behavior.

3 An item response theory method

Adolescent attitudes and behaviors are not observable. However, I have several questions that are related to them and can provide the basis for their measurement. Measuring academic

motivation or behavioral problems using a single question or a standardized average of the questions would fail to take into account the possible measurement uncertainty. As argued in Schennach (2004), relying on more than one question to measure the latent variables gives a more precise measure and reduces measurement error. Moreover, a standardized average of the question would weight all questions equally, thereby ignoring their different informational content.[5] But it is crucial to have a precise measure of attitudes and behaviors. The measures should encompass various dimensions of the unobservables and capture their complexity.

I thus apply the item response theory method for the measurement of latent variables developed by Spady (2007). Item response theory has a long tradition in psychometrics and educational testing. Unlike factors analysis, it has not been used much by economists.[6] However, it deals with discrete data in a more explicit way.[7] A good example of an early item response theory method for ordered polytomous response data is the graded response model of Samejima (1969). Using a series of questions (or items), the method of Spady (2007) allows us to estimate a probability distribution of unobservable academic motivation or behavioral problems for each individual. It is developed for the case where the answers to the questions (or item responses) are categorical or discrete. It requires ordered responses. The method has several advantages over more common methods used in the psychometric literature.[8] It does not impose many parametric assumptions. It also allows for the possibility that individual characteristics affect the latent variables. Observable characteristics, such as the social environment of the child, may indeed influence how academic motivation or behavioral problems are distributed in the population under study.

As in other item response theory methods, some general restrictions for the measurement procedure need to be fulfilled. These include some forms of unidimensionality, monotonicity and independence. Each latent variable is estimated separately. I thus assume that a unidimensional latent variable determines each set of item responses. This assumption is based on the observation that the correlations between items within a latent variable are much higher than across latent variables (e.g. the item 'I feel school is largely a waste of time' is highly correlated with the item 'I think homework is a bore' but both are poorly correlated with

[5]With a standardize average, items that have a lot of measurement error are assigned the same weight as items that are more precisely measured. A standardized average also ignores the discrete nature of the data and assumes that an increase in the evaluation from 1 ('certainly applies') to 2 ('applies somewhat') is the same as from 2 to 3 ('does not apply').

[6]Carneiro et al. (2003) develop a factor model which has been applied to the measurement of cognitive and noncognitive abilities by Heckman et al. (2006). Cunha et al. (2010) extend their model.

[7]Takane and de Leeuw (1987) prove that, under some conditions, the marginal likelihood of item response theory is equivalent to the likelihood of factor analysis. In some cases, the parameters of an item response model are thus equivalent (under some transformations) to the ones of a factor model.

[8]See Skrondal and Rabe-Hesketh (2004) and Sijtsma and Junker (2006).

the item 'restlessness'). To measure academic motivation and behavioral problems, I have selected some specific questions. I did not use all the items that are available. For instance, to measure behavioral problems, I did not use questions such as 'frequently bites nails or fingers'. When choosing among the different possible combination of items, it is important to test whether a particular combination is scalable.[9] Spady (2006) defines the conditions under which the multinomial distribution given by the collection of items has a monotonic scale presentation. The monotonic scale representation does not need to be unique. Spady (2006) argues that the appropriate notion of monotonicity is stochastic dominance. This means that the item responses of individuals with higher academic motivation stochastically dominates the responses of individuals with lower academic motivation. Higher values in the item responses are associated with a higher value in the corresponding motivation scale.

The item responses are specified as a probabilistic function of the latent variable. It is the latent variable that causes the item responses. As in most latent class models, Spady (2007) assumes conditional independence: for each individual, conditional on the latent variable, a response to one item is independent of the response to any other item. That is, the association between the item responses is 'completely' explained by the latent variable. This implies that the latent variable is a sufficient summary of the item responses. As Sijtsma and Junker (2006) point out, the statistical model (or likelihood) is thus reduced to a product of separate terms for each item. Psychometricians, e.g. Junker (1993), usually refer to this assumption as local independence. Holland and Rosenbaum (1986) prefer to call it latent conditional independence. This assumption implies that the probability of a particular response pattern conditional on the latent variable θ is the product of the constituent item probabilities

$$p(r_1, r_2, ..., r_m|\theta) = p_1(r_1|\theta)p_2(r_2|\theta)...p_m(r_m|\theta) \tag{1}$$

where r_i denotes the response to item i. Equation 1 assumes that after conditioning on the latent variable θ, the m items are independent. The probability of a particular response pattern $\{r_1, r_2, ..., r_m\}$ is then given by

$$p(r_1, r_2, ..., r_m) = \int p_1(r_1|\theta)p_2(r_2|\theta)...p_m(r_m|\theta)f(\theta)d\theta. \tag{2}$$

To make the estimation of the probability distribution of the latent variable more precise, the method makes efficient use of individual characteristics. It assumes that the distribution of the latent variable can vary across the population and is a function of the item responses

[9]The combinations of items that I retain to estimate the three latent variables are also consistent with the graded response model of Samejima (1969).

and individual characteristics. Let W be a vector of characteristics

$$p(r_1, r_2, ..., r_m|W) = \int p_1(r_1|\theta, W)p_2(r_2|\theta, W)...p_m(r_m|\theta, W)f(\theta|W)d\theta \tag{3a}$$

$$= \int p_1(r_1|\theta)p_2(r_2|\theta)...p_m(r_m|\theta)f(\theta|W)d\theta. \tag{3b}$$

The second equality assumes that characteristics affect the items responses only through the latent variable θ. In the psychometric literature, this assumption is referred to as no differential item functioning. With the method I am using, it is also possible to deal with the case where certain characteristics affect some items but not all of them. This is not persuaded here.

Figure 1 illustrates the relation between the latent variable θ and the probability of giving a response equal to 1, 2 or 3. I only present 2 out of the 8 items that are used to estimate the latent variable 'behavioral problems as reported by the teacher' for males. The lines on the figures on the top represent item characteristic curves. The lowest line corresponds to the probability of answering 1 $F(r_i = 1|\theta)$, the second line the probability of answering 2 or 1 $F(r_i = 2|\theta)$, and 1 the probability of answering 3 or less $F(r_i = 3|\theta)$ since there are only 3 categories. Stochastic dominance requires that all the lines slope downwards. This implies that the probability of giving higher responses rises as the value of the latent variable increases, i.e. $F(r_i = 2|\theta_2) < F(r_i = 2|\theta_1)$ if $\theta_2 > \theta_1$. The probability of answering 2 is the difference between the second and the first line; the probability of answering 3, the difference between 1 and the second line. These probabilities are represented as a function of the latent variable on the bottom in figure 1. Probability theory requires these item category response functions to be non-negative. If they were negative, the item characteristics curves in the figure on the top would cross.

The item response model in equation 3b is estimated by maximum likelihood, subject to the constraint that the item characteristic curves are monotonic decreasing and not crossing. The curves are approximated using exponential tilting with two parameters and shifted Legendre polynomials as basis functions

$$G_i(\theta) = \frac{\int_0^\theta e^{t_1\gamma_1(u)+t_2\gamma_2(u)}du}{\int_0^1 e^{t_1\gamma_1(u)+t_2\gamma_2(u)}du} \tag{4}$$

where $\gamma_1(u) = (6u^2 - 6u + 1)$ and $\gamma_2(u) = (2u - 1)$ are the basis functions. This means that the shape of each line in figure 1 is characterized by the two tilting parameters t_1 and t_2. In a parametric item response theory model, one would assume instead that the relationship between the latent variable θ and the item responses follows a specific parametric function,

such as the logistic or the normal ogive.[10] Exponential tilting with two basis functions is a more flexible specification. The expression in the denominator imposes the normalization that the values of $G_i(\theta)$ lie within the interval $[0, 1]$ so that $G_i(\theta)$ is a cumulative distribution function. Then, by construction, the hazard rates $1 - G_i(\theta)$ will be monotonic decreasing. In the example illustrated in figure 1, $1 - G_2(\theta) = F(r_i = 2|\theta)$, i.e. the second curve or the probability of answering 2 or 1. (Remember that $F(r_i = 3|\theta) = 1$.) The lowest curve is constructed by multiplying $1 - G_1(\theta)$ with the previous one: $(1 - G_1(\theta)) \cdot F(r_i = 2|\theta) = F(r_i = 1|\theta)$. The curves are monotonic decreasing because they are functions of two decreasing functions. Since $G_2(\theta)$ takes on positive values on $[0, 1]$, the curve corresponding to $F(r_i = 1|\theta)$ will lie below the previous curve. More generally, if there are k response categories in item j, $(1 - G_{k-1}(\theta)) \cdot F(r_j = k|\theta) = F(r_j = k - 1|\theta)$. This also implies that the notion of stochastic dominance used is dominance in hazard order.

A convenient choice to specify $f(\theta|W)$ in equation 3b is $\mathcal{N}(\mu(W), \Sigma(W))$ with $\mu(W) = W\beta$. This is a parametric and somewhat arbitrary restriction on the model. The restriction implies that the latent variable θ will have a normal distribution with a mean that is a linear function of the characteristics.[11] If $\Sigma(W)$ is restricted to be unit diagonal, this corresponds to a normal additive location shift model for $f(\theta|W)$. In this case, the latent variable θ is thus normalized for a specific reference group with characteristics $\widetilde{W} = 0$ where $f(\theta|\widetilde{W})$ is $\mathcal{N}(0, 1)$. The reference group is hypothetical and does not need to be found in the data. The effect of each individual characteristic is additive and refers to the difference with the reference group.

Using Bayes' Theorem the posterior distribution of the latent variable for each individual can be inferred from the item responses and the characteristics

$$f(\theta|r, W) = \frac{f(\theta, r|W)}{p(r|W)} = \frac{p(r|\theta, W)f(\theta|W)}{p(r|W)} = \frac{p(r|\theta)f(\theta|W)}{p(r|W)}. \tag{5}$$

Note that the last equality assumes that $p(r|\theta, W) = p(r|\theta)$ which corresponds to the assumption of no differential item functioning. Using maximum likelihood, equation 3b gives estimates of $p(r|\theta)$ in equation 5. The method does not require all individuals to have complete information on all items. If an individual does not have information on all m items, the likelihood function will only use $m - l$ items where l is the number of missing items. In this paper, I only allow individuals to have missing information to at most 1 item. In equation 5, the denominator is the integral of the numerator $p(r|W) = \int p(r|\theta)f(\theta|W)d\theta$. The integral in the likelihood function does not have closed form solution. The numerical integration

[10] See Sijtsma and Meijer (2007).

[11] This is only one way to specify the distribution of the latent variable. One could use instead, e.g., a uniform distribution.

is carried out with Gauss-Legendre quadrature with 72 grid points spaced unevenly in 7 segments of the grid (with more points toward the middle of the interval $[-8, 8]$). Gaussian quadrature approximates the integral using a weighted sum of function values evaluated at the given points (or abscissas) within the domain of integration.[12] Figure 2 illustrates the posterior distribution of academic motivation for 10 individuals who had two different response patterns. That is, I estimate $f(\theta|r, W)$ and show the posterior distribution of the 5 individuals who had the response pattern {2,1,2,2,2} and the 5 individuals with the pattern {4,4,4,4,3}. This figure shows that individuals who give higher responses have a higher value of the latent variable θ. Even though they had the same response pattern, some individuals have a posterior with different location (and scale) because of the effects of the characteristics which are reported in Tables 10 and 11.

4 Associations of characteristics at age 11 with academic motivation and behavioral problems at age 16

Observable characteristics, such as the social environment of the child, influence how academic motivation and behavioral problems are distributed in the population. Tables 10 and 11 show the association between the characteristics at age 11 and the mean of the probability distribution of the three latent variables. The effects of the characteristics are additive and refer to deviations from the reference group since the values of the characteristics for the reference group are all standardized to 0. Statements such as 'children whose parents are interested in their education tend to have higher academic motivation' should be understood in a *ceteris paribus* sense. I am not claiming that these effects are causal. I would need to impose some further assumptions in order to do so. But I use characteristics at age 11 to rule out any simultaneity between the characteristics and the latent attitudes and behaviors at age 16.

The reference category is an individual who, at age 11, had no siblings, did not receive free school meals, did not receive help at school because of mental or educational backwardness, was in the second quartile of test scores in reading and mathematics comprehension tests, and was living with both her own parents at age 7, 11 and 16. The parents were of average age at their child's birth (27.6 for the mother and 30.5 for the father), had average years of education (10.1 for both the mother and father), were in the second quartile in the distribution of family income, and were not interested in their child's education. The mother never worked and the father had a non-manual occupation. The household did not have financial difficulties in

[12]The log-likelihood function is maximized using a Newton-type algorithm: more specifically, the BFGS method approximates the Hessian instead of computing it numerically.

the previous year. In the accommodation occupied by the household when the child was 11 years old, there was 1 person per room at most and the house was not in poor conditions.

Most of the results presented in Tables 10 and 11 are not counterintuitive. The estimates usually have the expected sign. The results suggest that the associations of characteristics with behavioral problems as reported by the teacher have the same sign as the associations of characteristics with behavioral problems as reported by the mother but not always the same magnitude. In few cases, the effects of the characteristics on the measure of noncognitive abilities as reported by the teacher are statistically significant while this is not the case for the measure as reported by the mother and *vice versa*.

White robust standard errors are reported in parenthesis next to the estimated coefficients. I also computed gradient and Hessian standard errors. Unless a model is incorrectly specified, these 3 different standard errors should be equal (asymptotically). I found that gradient, Hessian and White standard errors are very similar. Inferences about statistical significance of the estimated coefficient are thus not sensitive to whether the Hessian, gradient or White standard errors are used.

Parents' age and years of education are the only characteristics that are semi-continuous. All other characteristics are binary and the estimated coefficient reported hence refers to a discrete change from 0 to 1. Tables 10 and 11 show that there is a positive association between mother's age and the three latent variables (except for males where there is no effect on behavioral problems as reported by the teacher). Older mothers thus tend to have daughters who are more motivated in school and behave better. The association is much lower for father's age and hardly statistically significant. Parents' years of educations are not associated with adolescent attitudes and behaviors, except for a positive effect of father's years of education on academic motivation for males.

Mother's interest in the education of their child (which was assessed by the teacher when the child was 11 years old) is strongly associated with adolescent attitudes and behaviors. When the mother is not interested in her child's education (the omitted category), the child behaves worse and is less motivated. For males, there is a similar pattern for father's interest (except for behavioral problems as reported by the mother where there is no association). For females, father's interest is positively associated only with behavioral problems as reported by the mother. This suggests that adolescent attitudes and behaviors of females depend on mother's interest in their education while males are affected by the interest of both parents.

There is no association between employment status of the mother and the latent variables. There is a literature on the effect of working mothers on the behavioral problems of infants. But we are talking here about adolescents. Having a father from a manual social class is not associated with academic motivation or behavioral problems as reported by the

teacher. Actually, children with manual father tend to have less behavioral problems when the measure as reported by the mother is used. Children who were not living with both parents at age 7, 11 and 16 tend to behave a bit worse when the measure of behavioral problems as reported by the teacher is used but there is no association with the other two latent variables. This is consistent with Segal (2008) who only uses a measure of behavior as reported by the teacher and finds that children who live with both of their parents are less likely to misbehave.

There is no association between the latent variables and financial hardship of the family (except for behavioral problems as reported by the mother). And males who receive free school meals at age 11 tend to be less motivated at age 16 but there is no association for females or with behavioral problems (for both gender). A similar pattern is observed for family income (classified in quartiles). Academic motivation is positively associated only with the 4th quartile of income. For males, there is no association with behavioral problems. For females, family income is also associated with behavioral problems. But the evidence is not clear-cut: when the index of behavioral problems as reported by the mother is used, both males and females in the first income quartile tend to behave *better* than children in the second group (the omitted category). There is no association between the number of persons per room and any of the three latent variables (except for more than 1.5 person per room and behavioral problems as reported by the teacher). The indicator of poor housing conditions is not associated with adolescent attitudes or behaviors. This variable is often considered as an asset indicator which proxies household long-run wealth.

For males, having 1, 2 or more older siblings is negatively associated with academic motivation and the index of behavioral problems as reported by the teacher (but not with behavioral problems as reported by the mother). For females, having more than 1 older sibling has an association that goes in the same direction as for males. But the index of behavioral problems as reported by the mother is positively associated with having older siblings. There is no association between the latent variables and having younger siblings. The evidence presented on the association with the number of siblings is not completely inconsistent with the literature on the trade-off between the quantity and quality of children. This literature usually finds that children from larger families and especially children with a higher birth order have lower education or IQ scores.[13]

Children who scored well in the mathematics and reading tests at age 11 have higher academic motivation and less behavioral problems at age 16. This is consistent with the

[13]See Hanushek (1992) and Black et al. (2005) for education and Black et al. (2010) for IQ scores. Using data on Israel, Angrist et al. (2010) do not find an effect of family size in the quantity-quality trade-off. But there is a difference between looking at family size and birth order, even though children from smaller families have a higher probability to have a lower birth order.

evidence presented in Segal (2012) who shows that test scores and intrinsic motivation are related. Moreover, the association of the test scores with lower behavioral problems is not very surprising as a high score test requires the capacity to sit and concentrate for a while. This evidence is also confirmed by the model of Cunha et al. (2010) who show that cognitive skills in a previous period (e.g. age 11) have an effect on socio-emotional skills in the next period (e.g. academic motivation and behavioral problems at age 16).

To summarize the most important findings, one should start by emphasizing the positive association between test scores and the three latent variables. One should also highlight the importance of parental interest in the education of their children. Moreover, the financial situation of the family (proxied by social class of the father, free school meals, financial hardship in the previous 12 months or financial income quartiles) does not have a strong association with the latent variables, both in magnitude and statistical significance. Parental investment seems to be crucial for the development of 'good' personality traits and its importance has been stressed in labor economics.[14] Parental investment does not appear to depend much on the wealth of the parents, it mainly depends on whether the parents care about the education of their children. One should also note that there are no large gender differences in the associations between characteristics and adolescent attitudes and behavior.

5 Associations of academic motivation and behavioral problems with adult social outcomes

The empirical model used in this paper has the following structural representation

$$Y = h(\theta_A, \theta_B, W, X, U) \tag{6a}$$

$$\theta_j = \varphi_j(W, V_j) \qquad j = \{A, B\} \tag{6b}$$

$$r_{jk} = g_{jk}(\theta_j, \varepsilon_{jk}) \qquad k = 1, \ldots, m \qquad j = \{A, B\} \tag{6c}$$

where Y denotes the outcome at adult age, θ_A and θ_B are continuous random variables denoting academic motivation and behavioral problems respectively, r_{jk} denotes item response k used to measure latent variable j, W are the characteristics affecting the latent variables and X other characteristics that affect the outcome but not the latent variables. The first equation states that adult social outcomes are affected by academic motivation, behavioral problems, individual characteristics and a random disturbance U through the function $h(\cdot)$. U and $h(\cdot)$ are specific to each outcome and it is assumed that $U \perp W$ and $U \perp X$. The

[14] See, e.g., Cunha et al. (2010) who focus on the importance of the timing of parental investments at different stages of childhood for the development of cognitive and noncognitive skills.

second equation allows for the possibility that individual characteristics affect the latent variables as discussed in the previous section. It is assumed that $V_j \perp W$, $V_j \perp X$ and $U \perp V_j$ for $j = \{A, B\}$. The third equation specifies the item responses to be a function of the latent variable. For each item response r_{jk}, it is assumed that $\varepsilon_{jk} \sim \mathcal{U}(0,1)$ and that g_{jk} is weakly increasing in ε_{jk} and strictly increasing in θ_j. It is also assumed that $\varepsilon_c \perp \varepsilon_d$ $\forall\ c \neq d$ and $\varepsilon_c \perp \theta_j\ \forall\ c$ and $j = \{A, B\}$. This implies that conditional on the latent variable, the measurements are independent: $r_{jc} \perp r_{jd} \mid \theta_j$.[15] It is also assumed that $\varepsilon_{jk} \perp W$, $\varepsilon_{jk} \perp X$, $\varepsilon_{jk} \perp U$ and $\varepsilon_{jk} \perp V$ for $j = \{A, B\}$ and $k = 1, \ldots, m$.

Estimates of θ_A and θ_B for each individual are recovered using the item response theory method of Spady (2007) described above. Using equation 5, I compute the expectation of the posterior distribution of the latent variables for each individual, i.e. $\int \theta f(\theta|r, W)d\theta = E(\theta|r, W)$.[16] The measures of the latent variables are then standardized to have mean 0 and variance 1 across individuals. This allows me to interpret a one unit increase in the latent variable as a one standard deviation increase. I then estimate the effects of academic motivation and behavioral problem on the outcomes of interest using a linear specification of equation 6a. Consider a linear single index model with the form

$$I_Y = \beta_1\theta_A + \beta_2\theta_B + \beta_3 X + U \tag{7}$$

where $D_Y = \mathbf{1}(I_Y > 0)$ is a binary variable that equals one if the individual reports a particular attitude or behavior at age 41 and zero otherwise, and θ_A, θ_B, X and U are as above. I estimate this linear additive separable model using binary probit estimation. This implies that I am assuming that U is normally distributed. I do not only consider binary responses. I also have some responses that are coded as ordered discrete. For these outcomes, I estimate a similar model to equation 7 using ordered probit estimation. I consider three different specifications of equation 7. The first examines the effects of academic motivation and behavioral problems on the outcomes without additional control. The second specification of the model also controls for final educational attainment. The third specification allows for a direct effect of the characteristics on the latent variable and educational attainment.

I consider the effects of adolescent attitudes and behaviors on a series of 9 binary outcomes. The estimates from probit estimation are reported in tables 12 and 13. Marginal effects from probit estimation at the mean of the continuous variables are reported in 14 and 15. Inference is based on bootstrap standard errors (with 1,000 replications) to take into

[15] To capture the discrete nature of the items, g_{jk} is specified as a threshold function. For instance (dropping the j subscript denoting latent variable j), $g_k(\theta, \varepsilon_k) = 2$ if $G_1(\theta) < \varepsilon_k \leq G_2(\theta)$. If there are 3 possible answers to an item and ε follow an uniform distribution, there will be two free thresholds.

[16] I also computed the value of θ at the median of the cumulative distribution of θ. Results using the median in the regressions presented below instead of using the expectation are virtually identical.

account the two steps in the estimation procedure. The tables show that the estimates are often of similar magnitudes when either of the two different measures of behavioral problems are considered. In few cases, the estimated coefficient on one of the latent variables is not statistically significant. Overall, one should note that they are no large differences across gender in the associations between the latent variables and the outcomes. One possible critique is that I only use measures of outcomes that are self-reported by the individuals under study. But this is almost inevitable when using survey data.

The results show that more academic motivation and lower behavioral problems at age 16 have a strong negative effect on the probability of regular consumption of cigarettes at age 41. The estimates are not affected by the inclusion of educational attainment and characteristics in the model. A one standard deviation increase in one of the latent variables reduce the probability of smoking between 4% and 10% depending on the specification of the model. Adolescent attitudes and behaviors also affect the probability of having ever tried illegal drugs. The effects go in the same direction when the outcome considered is whether individuals have consumed illegal drugs during the previous 12 months.[17]

Academic motivation has a positive effect on the probability of making regular exercise while more behavioral problems has a negative effect. Adolescent attitudes and behaviors also affect the probability to vote. We observe that academic motivation and behavioral problems affect the probability of being arrested by a police officer and taken to a police station. Individuals were also asked questions about self-assessment of their mental health and how they feel generally. Academic motivation and behavioral problems have a strong impact on the probability of often getting into a violent rage. The last two questions are as follows: 'I never really seem to get what I want out of life' or 'I usually get what I want out of life'; 'I usually have a free choice and control over my life' or 'Whatever I do has no real effect on what happens to me'. Academic motivation and behavioral problems affect the answers to those questions.

Tables 16 and 17 report estimates from ordered probit estimation for 9 different outcomes. We observe that having higher academic motivation at age 16 reduces the probability or reporting a difficult financial situation at age 41 while people with more behavioral problems tend to report a more difficult financial situation. Adolescent attitudes and behaviors are also associated with health status 25 years later.

[17]The list of illegal drugs includes: cannabis, ecstasy, amphetamines, lsd, popper (amyl nitrate), cocaine, temazepan, semeron, ketamine, crack, heroin and methadone. Because more than 30% of individuals in my sample have ever tried cannabis but less than 15% have ever tried other illegal drugs, I also conducted the analysis by making a distinction between any illegal drugs (including cannabis) and illegal hard drugs (excluding cannabis). Similarly, I also made a distinction between illegal drugs during the previous 12 months (including cannabis) and illegal hard drugs during the previous 12 months. Results are very similar when cannabis is included or excluded.

I also consider the association of the latent variables with opinions on 5 different questions about the labor market. Individuals with higher academic motivation and lower behavioral problems at age 16 tend to disagree more with the statement 'the effort of getting qualifications is more trouble than it's worth'. Academic motivation increases the probability that individuals will disagree with the statement 'for getting jobs, knowing the right people is more important than the qualifications?' (except for females where the estimated coefficient is no longer characteristics once educational attainment is controlled for). And behavioral problems decrease it. The next statement is 'big business benefits owners at the expense of the workers?': adolescent attitudes and behaviors have associations that go in the same direction. Having a higher academic motivation and lower behavioral problems also increase the degree to which individuals disagree with the statements 'management will always try to get the better of employees if it gets the chance?'. The last statement is 'ordinary working people do not get their fair share of the nation's wealth?'. We see that academic motivation decreases the degree to which people agree with this statement while behavioral problems increases it.

There are 2 outcomes related to self-assessment of skills at adult age. Individuals are asked to report whether they consider that their own ability is good, fair, poor or that they don't have the skill. More academic motivation and less behavioral problems increase the degree to which individuals consider they are good at the use of numbers and calculations. Academic motivation also has a positive impact on whether individuals consider they are good at problem solving. And behavioral problems has a negative impact.

6 Conclusion

This paper shows that academic motivation and behavioral problems at age 16 have an impact on adult attitudes and behaviors at age 41 including illegal drugs consumption, smoking, physical and mental health, criminal activity, political participation, self-confidence and opinions about the labor market. The results are very similar across gender. They suggest that interventions on adolescents should not only be targeted to improve their cognitive skills. Cognitive abilities are of course very important but personality traits matter as well. Cunha et al. (2006) argue that socio-emotional skills are more malleable at a later age than cognitive skills. This should be taken into account when thinking about policy programs that aim to raise the life prospects of disadvantaged adolescents. The results confirm the evidence presented in Heckman et al. (2010) and Segal (2008) which shows that there are important economic returns to the improvement in personality traits, even at adolescent age. By boosting their confidence and motivation, some adolescents may become better citizens.

I also find that parents have an important role to play for the development of the attitudes and behaviors of their children. Parental investment matters a lot! But in this case, parental investment does not necessarily imply money. What counts is parental attitudes towards the education of their children, not the financial situation of the family. Holmlund et al. (2011) review the recent research that has focused on the intergenerational transmission of education and human capital to investigate the high degree of persistence in economic status across generations. The results of this paper suggest that research on the intergenerational transmission of attitudes should be considered as well.

Figure 1: Item responses as a function of the latent variable

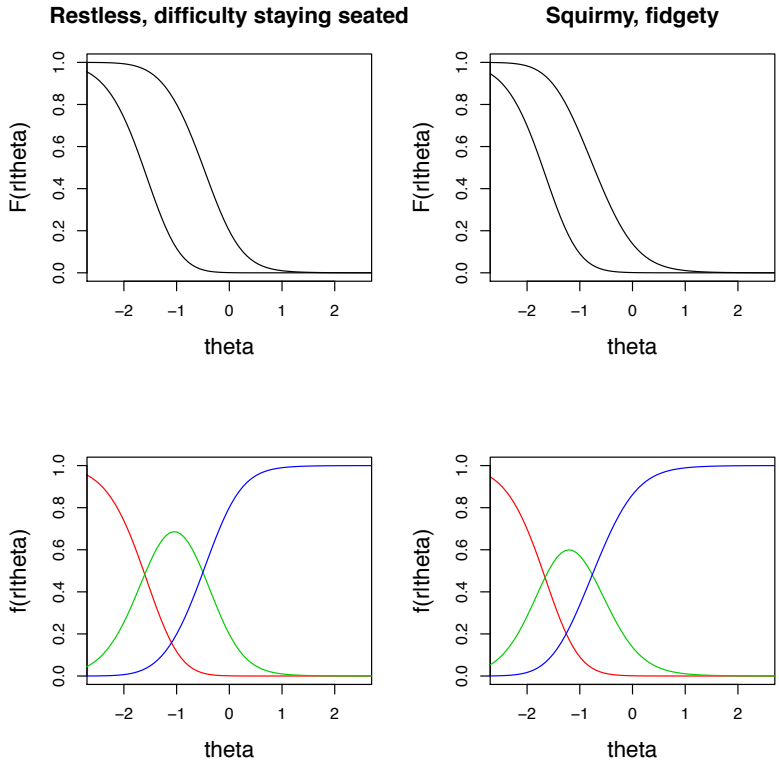

Figure 2: Posterior distributions of academic motivation for 10 individuals with two different response patterns

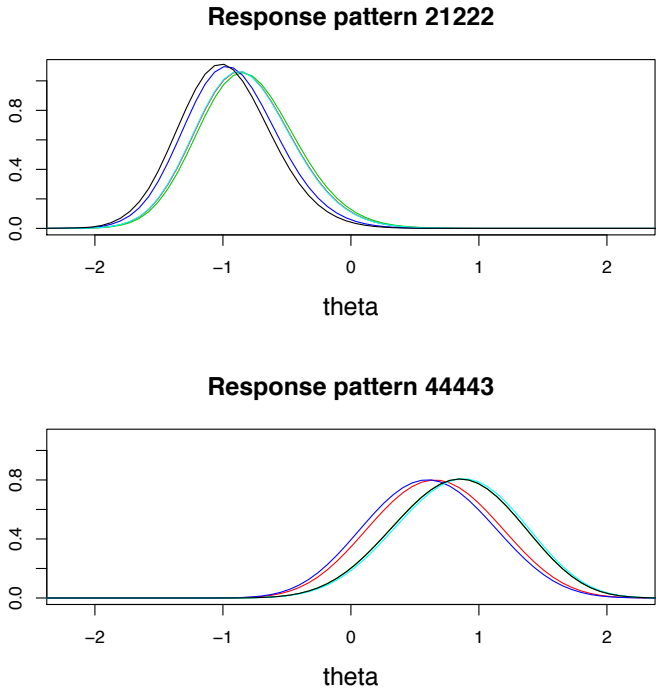

Table 1: Descriptive statistics for the characteristics

	Males		Females	
	Mean	SD	Mean	SD
Mother's age at child's birth	27.452	5.428	27.448	5.536
Father's age at child's birth	30.526	6.011	30.543	6.103
Mother's years of education	10.014	1.586	10.066	1.665
Father's years of education	10.083	2.031	10.056	1.992
Mother's age missing	0.037	0.188	0.039	0.193
Father's age missing	0.060	0.237	0.069	0.254
Mother's interest in education				
Very interested or over-concerned	0.420	0.494	0.450	0.498
Some interest	0.351	0.477	0.343	0.475
Little interest	0.119	0.324	0.103	0.304
Can't say	0.110	0.312	0.104	0.306
Father's interest in education				
Very interested or over-concerned	0.331	0.471	0.339	0.473
Some interest	0.278	0.448	0.254	0.435
Little interest	0.150	0.357	0.133	0.339
Can't say	0.239	0.426	0.269	0.443
Mother ever had paid work	0.571	0.495	0.579	0.494
Mother's work missing	0.036	0.187	0.041	0.198
Father in a manual occupation	0.595	0.491	0.600	0.490
Father's occupation missing	0.014	0.118	0.017	0.128
Financial difficulties in the previous year	0.089	0.285	0.100	0.300
Family income				
1st quartile	0.216	0.411	0.240	0.427
2nd quartile	0.206	0.404	0.192	0.394
3rd quartile	0.227	0.419	0.226	0.418
4th quartile	0.257	0.437	0.246	0.431
Missing information	0.094	0.292	0.095	0.294
Number of persons per room				
Up to 1	0.631	0.482	0.627	0.484
Over 1 to 1.5	0.269	0.443	0.271	0.444
Over 1.5	0.100	0.300	0.102	0.303
Poor housing conditions	0.099	0.299	0.106	0.308
Living with both parents at age 7, 11, 16				
No	0.105	0.306	0.124	0.329
Missing information	0.163	0.370	0.164	0.370
Receive free school meals	0.067	0.250	0.083	0.276
Receive help for mental backwardness				
Yes	0.075	0.263	0.049	0.215
Missing information	0.027	0.161	0.024	0.152
Sample size	3,113		3,340	

Table 1 – Continued

	Males		Females	
	Mean	SD	Mean	SD
Older siblings				
0	0.418	0.493	0.414	0.493
1	0.328	0.470	0.305	0.461
2 or more	0.253	0.435	0.281	0.449
Younger siblings				
0	0.351	0.477	0.361	0.480
1	0.323	0.468	0.322	0.467
2 or more	0.325	0.469	0.318	0.466
Mathematics test score				
1st quartile	0.175	0.380	0.185	0.388
2nd quartile	0.252	0.434	0.263	0.440
3rd quartile	0.271	0.444	0.296	0.456
4th quartile	0.302	0.459	0.256	0.437
Reading test score				
1st quartile	0.204	0.403	0.187	0.390
2nd quartile	0.215	0.411	0.232	0.422
3rd quartile	0.298	0.457	0.316	0.465
4th quartile	0.283	0.450	0.265	0.441
Sample size	3,113		3,340	

Table 2: Descriptive statistics for the educational levels (in percentage)

	Educ. level	Years of school	Males	Females
No qualification	0	9	5.01	7.40
Low level qualifications	1	10	8.13	12.43
O-level and equivalent qualifications	2	11	27.66	32.43
A-level and equivalent qualifications	3	13	21.97	14.55
First degree and equivalent qualifications	4	16	30.71	27.96
Higher degree and equivalent qualifications	5	17.5	6.52	5.24
Sample size			3,113	3,340

Table 3: Descriptive statistics for the outcomes

	Males		Females			
	Mean	SD	Mean	SD	Min	Max
Smoke	0.279	0.449	0.289	0.453	0	1
Ever drugs	0.400	0.490	0.248	0.432	0	1
Drugs past 12 months	0.097	0.296	0.051	0.220	0	1
Regular exercise	0.769	0.422	0.732	0.443	0	1
Vote	0.767	0.423	0.790	0.408	0	1
Police arrest	0.067	0.250	0.016	0.124	0	1
Violent rage	0.037	0.188	0.053	0.224	0	1
Never get what I want	0.232	0.422	0.206	0.404	0	1
No control over life	0.107	0.309	0.101	0.301	0	1
Financial situation	1.993	0.989	1.987	0.988	1	5
Health status	1.875	0.739	1.893	0.751	1	4
Effort of getting quals more trouble than worth	3.859	0.897	3.939	0.835	1	5
Knowing right people helps more than quals to get job	2.677	0.996	2.924	0.936	1	5
Big business benefits owners at expense of workers	2.414	1.078	2.484	0.960	1	5
Management get the better of employees	2.546	1.081	2.781	1.010	1	5
Ordinary people don't get fair share of nations wealth	2.312	0.956	2.373	0.897	1	5
How good at the use of numbers	1.481	0.608	1.697	0.658	1	4
How good at problem solving	1.453	0.550	1.616	0.583	1	4
	3,113		3,340			

Table 4: Kendall rank correlation coefficients for the items of academic motivation, males

	School waste of time	Homework is a bore	Difficult to keep mind	Never take work ser.	Don't like school
School is a waste of time	1				
Homework is a bore	0.323	1			
Diff. to keep mind on work	0.254	0.309	1		
Never take work seriously	0.377	0.317	0.388	1	
Don't like school	0.414	0.441	0.296	0.370	1

Table 5: Kendall rank correlation coefficients for the items of academic motivation, females

	School waste of time	Homework is a bore	Difficult to keep mind	Never take work ser.	Don't like school
School is a waste of time	1				
Homework is a bore	0.322	1			
Diff. to keep mind on work	0.283	0.296	1		
Never take work seriously	0.387	0.323	0.400	1	
Don't like school	0.430	0.410	0.311	0.391	1

Table 6: Kendall rank correlation coefficients for the items of behavioral problems as reported by the teacher, males

	Restless	Squirmy	Freq. fights	Irritable	Often disob.	Cannot settle	Tells lies	Bullies others
Restless	1							
Squirmy	0.647	1						
Frequently fights	0.318	0.290	1					
Irritable	0.379	0.358	0.437	1				
Often disobedient	0.462	0.404	0.447	0.438	1			
Cannot settle to anything	0.543	0.496	0.330	0.329	0.490	1		
Often tells lies	0.375	0.344	0.403	0.353	0.561	0.478	1	
Bullies other children	0.287	0.295	0.543	0.390	0.454	0.312	0.407	1

Table 7: Kendall rank correlation coefficients for the items of behavioral problems as reported by the teacher, females

	Restless	Squirmy	Freq. fights	Irritable	Often disob.	Cannot settle	Tells lies	Bullies others
Restless	1							
Squirmy	0.629	1						
Frequently fights	0.437	0.365	1					
Irritable	0.427	0.428	0.444	1				
Often disobedient	0.452	0.446	0.504	0.529	1			
Cannot settle to anything	0.562	0.536	0.366	0.374	0.468	1		
Often tells lies	0.385	0.343	0.428	0.395	0.570	0.385	1	
Bullies other children	0.317	0.316	0.603	0.331	0.417	0.314	0.358	1

Table 8: Kendall rank correlation coefficients for the items of behavioral problems as reported by the mother, males

	Restless	Squirmy	Freq. fights	Irritable	Often disob.	Cannot settle	Tells lies	Bullies others
Restless	1							
Squirmy	0.469	1						
Frequently fights	0.121	0.126	1					
Irritable	0.213	0.190	0.255	1				
Often disobedient	0.183	0.151	0.239	0.285	1			
Cannot settle to anything	0.332	0.298	0.166	0.198	0.198	1		
Often tells lies	0.150	0.173	0.227	0.233	0.364	0.264	1	
Bullies other children	0.093	0.069	0.346	0.195	0.222	0.115	0.232	1

Table 9: Kendall rank correlation coefficients for the items of behavioral problems as reported by the mother, females

	Restless	Squirmy	Freq. fights	Irritable	Often disob.	Cannot settle	Tells lies	Bullies others
Restless	1							
Squirmy	0.462	1						
Frequently fights	0.110	0.087	1					
Irritable	0.225	0.182	0.269	1				
Often disobedient	0.188	0.150	0.283	0.297	1			
Cannot settle to anything	0.360	0.307	0.150	0.197	0.204	1		
Often tells lies	0.141	0.155	0.243	0.236	0.379	0.177	1	
Bullies other children	0.084	0.074	0.327	0.177	0.202	0.071	0.203	1

Table 10: Estimates of the association between characteristics and latent variables, males

	Academic motivation		Behav. problems teacher		Behav. problems mother	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Mother's age	0.013**	(0.006)	0.009	(0.007)	0.013*	(0.007)
Mother's age missing	0.092	(0.181)	0.305	(0.188)	0.136	(0.185)
Father's age	0.000	(0.005)	0.011*	(0.006)	-0.002	(0.006)
Father's age missing	0.273*	(0.142)	-0.181	(0.146)	-0.135	(0.150)
Mother's years of education	-0.020	(0.015)	-0.006	(0.021)	-0.020	(0.019)
Father's years of education	0.027**	(0.013)	0.019	(0.016)	0.024	(0.016)
Mother's interest in child's education - very	0.479***	(0.096)	0.356***	(0.096)	0.517***	(0.104)
Mother's interest in child's education - some	0.262***	(0.084)	0.204**	(0.082)	0.369***	(0.093)
Mother's interest in child's education - can't say	0.261***	(0.102)	0.182*	(0.102)	0.258**	(0.112)
Father's interest in child's education - very	0.201**	(0.092)	0.269***	(0.101)	0.107	(0.105)
Father's interest in child's education - some	0.172**	(0.081)	0.277***	(0.084)	0.051	(0.094)
Father's interest in child's education - can't say	0.135	(0.082)	0.127	(0.084)	0.031	(0.093)
Mother ever had paid work	-0.057	(0.043)	0.027	(0.048)	-0.071	(0.049)
Mother ever had paid work - missing info.	-0.002	(0.145)	-0.136	(0.132)	0.012	(0.149)
Financial difficulties in the previous year	0.123	(0.076)	-0.027	(0.082)	-0.181**	(0.089)
1 older sibling	-0.132***	(0.048)	-0.219***	(0.056)	-0.036	(0.058)
2 older siblings or more	-0.199***	(0.062)	-0.367***	(0.068)	-0.008	(0.074)
1 younger sibling	0.050	(0.052)	0.025	(0.058)	0.091	(0.063)
2 younger siblings or more	0.068	(0.061)	-0.032	(0.069)	0.021	(0.075)
Receive free school meals	-0.275***	(0.090)	-0.092	(0.095)	-0.169	(0.107)
Receive help for mental backwardness	-0.018	(0.085)	0.009	(0.082)	0.166*	(0.091)
Receive help - missing info.	0.014	(0.148)	0.214	(0.154)	0.104	(0.166)
Family income - 1st quartile	0.022	(0.061)	0.065	(0.068)	0.214***	(0.069)
Family income - 3rd quartile	0.048	(0.060)	-0.082	(0.065)	0.108	(0.068)
Family income - 4th quartile	0.193***	(0.066)	-0.010	(0.074)	0.146*	(0.077)
Family income - missing info.	0.130	(0.083)	0.048	(0.085)	0.233**	(0.091)

Table 10 – Continued

	Academic motivation		Behav. problems teacher		Behav. problems mother	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Number of persons per room - over 1 to 1.5	-0.061	(0.052)	0.070	(0.059)	-0.062	(0.062)
Number of persons per room - over 1.5	0.113	(0.081)	0.054	(0.087)	0.095	(0.097)
Poor housing conditions	0.071	(0.069)	-0.068	(0.069)	-0.046	(0.083)
Father in a manual occupation	0.022	(0.049)	0.004	(0.056)	0.132**	(0.058)
Father's occupation missing	-0.096	(0.175)	-0.250	(0.183)	0.042	(0.185)
Maths test score - 1st quartile	-0.126*	(0.067)	-0.114*	(0.067)	-0.138*	(0.073)
Maths test score - 3rd quartile	0.319***	(0.062)	0.193***	(0.063)	0.202***	(0.067)
Maths test score - 4th quartile	0.428***	(0.067)	0.525***	(0.078)	0.314***	(0.077)
Reading test score - 1st quartile	0.012	(0.069)	-0.017	(0.068)	0.115	(0.073)
Reading test score - 3rd quartile	0.124**	(0.060)	0.163**	(0.064)	0.274***	(0.068)
Reading test score - 4th quartile	0.145**	(0.067)	0.192**	(0.076)	0.296***	(0.077)
Not living with both parents at age 7, 11, 16	-0.107	(0.071)	-0.181**	(0.076)	-0.117	(0.081)
Not living with both parents - missing info.	-0.031	(0.061)	-0.056	(0.070)	0.153**	(0.073)

Note: The sample size is 3,113. White robust standard errors in parenthesis. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 11: Estimates of the association between characteristics and latent variables, females

	Academic motivation		Behav. problems teacher		Behav. problems mother	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Mother's age	0.013**	(0.006)	0.017**	(0.007)	0.027***	(0.007)
Mother's age missing	0.097	(0.158)	0.392**	(0.170)	-0.088	(0.161)
Father's age	0.004	(0.005)	-0.005	(0.006)	-0.011*	(0.006)
Father's age missing	0.002	(0.121)	-0.240**	(0.120)	0.023	(0.120)
Mother's years of education	0.016	(0.014)	-0.005	(0.019)	0.007	(0.018)
Father's years of education	0.006	(0.012)	0.012	(0.016)	0.019	(0.015)
Mother's interest in child's education - very	0.399***	(0.097)	0.269***	(0.103)	0.360***	(0.109)
Mother's interest in child's education - some	0.339***	(0.085)	0.253***	(0.091)	0.308***	(0.096)
Mother's interest in child's education - can't say	0.186*	(0.102)	0.220*	(0.112)	0.267**	(0.116)
Father's interest in child's education - very	0.145	(0.092)	0.147	(0.107)	0.235**	(0.104)
Father's interest in child's education - some	0.102	(0.081)	0.145	(0.091)	0.215**	(0.091)
Father's interest in child's education - can't say	0.106	(0.081)	0.111	(0.090)	0.138	(0.089)
Mother ever had paid work	0.024	(0.042)	-0.072	(0.052)	-0.047	(0.049)
Mother ever had paid work - missing info.	0.036	(0.122)	-0.011	(0.147)	-0.191	(0.141)
Financial difficulties in the previous year	0.032	(0.072)	-0.141*	(0.078)	-0.331***	(0.081)
1 older sibling	-0.034	(0.049)	-0.066	(0.060)	0.112**	(0.056)
2 older siblings or more	-0.180***	(0.060)	-0.255***	(0.069)	0.148**	(0.070)
1 younger sibling	0.036	(0.049)	0.082	(0.062)	0.009	(0.061)
2 younger siblings or more	0.093	(0.062)	0.099	(0.075)	-0.048	(0.075)
Receive free school meals	-0.066	(0.085)	0.049	(0.093)	0.074	(0.094)
Receive help for mental backwardness	0.006	(0.101)	-0.020	(0.100)	0.224**	(0.114)
Receive help - missing info.	0.060	(0.140)	0.185	(0.160)	-0.057	(0.175)
Family income - 1st quartile	0.094	(0.060)	0.109	(0.070)	0.170**	(0.068)
Family income - 3rd quartile	0.061	(0.058)	0.120*	(0.068)	0.196***	(0.067)
Family income - 4th quartile	0.266***	(0.063)	0.166**	(0.079)	0.250***	(0.073)
Family income - missing info.	0.221***	(0.077)	0.154*	(0.091)	0.363***	(0.088)

Table 11 – Continued

	Academic motivation		Behav. problems teacher		Behav. problems mother	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Number of persons per room - over 1 to 1.5	-0.070	(0.051)	-0.068	(0.062)	-0.056	(0.060)
Number of persons per room - over 1.5	-0.102	(0.086)	-0.193**	(0.088)	0.041	(0.094)
Poor housing conditions	0.037	(0.070)	-0.084	(0.076)	-0.043	(0.074)
Father in a manual occupation	0.020	(0.048)	0.071	(0.057)	0.115**	(0.054)
Father's occupation missing	0.016	(0.148)	0.138	(0.170)	0.255	(0.200)
Maths test score - 1st quartile	-0.123*	(0.067)	-0.243***	(0.071)	-0.075	(0.070)
Maths test score - 3rd quartile	0.213***	(0.056)	0.195***	(0.066)	0.227***	(0.063)
Maths test score - 4th quartile	0.310***	(0.064)	0.286***	(0.080)	0.332***	(0.075)
Reading test score - 1st quartile	0.044	(0.066)	0.041	(0.071)	0.173**	(0.071)
Reading test score - 3rd quartile	0.212***	(0.058)	0.195***	(0.066)	0.285***	(0.064)
Reading test score - 4th quartile	0.190***	(0.067)	0.241***	(0.080)	0.386***	(0.077)
Not living with both parents at age 7, 11, 16	-0.089	(0.070)	-0.170**	(0.074)	-0.050	(0.075)
Not living with both parents - missing info.	0.032	(0.059)	-0.061	(0.073)	0.060	(0.074)

Note: The sample size is 3,340. White robust standard errors in parenthesis. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Table 12: Probit estimation: effects of academic motivation (AM) and behavioral problems as reported by the teacher (BP) on adult attitudes and behaviors

		Males			Females		
Outcome		(1)	(2)	(3)	(1)	(2)	(3)
Smoke	AM	-0.196***	-0.164***	-0.170***	-0.235***	-0.212***	-0.202***
		(0.028)	(0.029)	(0.033)	(0.027)	(0.028)	(0.030)
	BM	-0.225***	-0.195***	-0.193***	-0.313***	-0.296***	-0.286***
		(0.027)	(0.028)	(0.031)	(0.026)	(0.026)	(0.029)
Ever drugs	AM	-0.052**	-0.103***	-0.153***	-0.078***	-0.164***	-0.199***
		(0.026)	(0.028)	(0.028)	(0.027)	(0.028)	(0.030)
	BM	-0.077***	-0.122***	-0.191***	-0.078***	-0.144***	-0.200***
		(0.026)	(0.027)	(0.031)	(0.027)	(0.027)	(0.030)
Drugs last 12 months	AM	-0.097***	-0.125***	-0.150***	-0.164***	-0.199***	-0.228***
		(0.036)	(0.038)	(0.044)	(0.040)	(0.045)	(0.047)
	BM	-0.110***	-0.130***	-0.149***	-0.063	-0.083*	-0.128***
		(0.034)	(0.036)	(0.039)	(0.041)	(0.044)	(0.047)
Regular exercise	AM	0.099***	0.054*	0.048	0.112***	0.065**	0.060**
		(0.028)	(0.031)	(0.031)	(0.027)	(0.028)	(0.028)
	BM	0.128***	0.090***	0.049	0.103***	0.061**	0.061**
		(0.027)	(0.029)	(0.031)	(0.025)	(0.026)	(0.028)
Vote	AM	0.108***	0.073**	0.061*	-0.132*	-0.133*	-0.130
		(0.029)	(0.028)	(0.033)	(0.067)	(0.070)	(0.083)
	BM	0.113***	0.085***	0.056*	-0.246***	-0.256***	-0.255***
		(0.029)	(0.027)	(0.032)	(0.055)	(0.055)	(0.067)
Police arrest	AM	-0.048	-0.012	-0.012	-0.132*	-0.133*	-0.130
		(0.039)	(0.043)	(0.048)	(0.067)	(0.070)	(0.083)
	BM	-0.275***	-0.244***	-0.213***	-0.246***	-0.256***	-0.255***
		(0.037)	(0.038)	(0.045)	(0.055)	(0.055)	(0.067)
Violent rage	AM	-0.147***	-0.145***	-0.140**	-0.139***	-0.119***	-0.133***
		(0.051)	(0.054)	(0.056)	(0.042)	(0.041)	(0.044)
	BM	-0.137***	-0.133***	-0.145***	-0.127***	-0.104***	-0.090**
		(0.046)	(0.049)	(0.050)	(0.035)	(0.037)	(0.041)
Never get what I want	AM	-0.143***	-0.091***	-0.071**	-0.166***	-0.121***	-0.115***
		(0.029)	(0.031)	(0.031)	(0.028)	(0.028)	(0.030)
	BM	-0.072***	-0.024	0.044	-0.072***	-0.035	-0.009
		(0.027)	(0.029)	(0.032)	(0.026)	(0.027)	(0.029)
No control over life	AM	-0.153***	-0.092**	-0.065*	-0.173***	-0.114***	-0.104***
		(0.034)	(0.037)	(0.038)	(0.033)	(0.034)	(0.036)
	BM	-0.099***	-0.045	0.006	-0.074**	-0.027	0.006
		(0.033)	(0.034)	(0.039)	(0.030)	(0.034)	(0.038)
Educational levels		No	Yes	Yes	No	Yes	Yes
Full set of controls		No	No	Yes	No	No	Yes

Note: The sample size is 3,113 for males and 3,340 for females. Bootstrap standard errors with 1,000 replications in parenthesis.

Table 13: Probit estimation: effects of academic motivation (AM) and behavioral problems as reported by the mother (BP) on adult attitudes and behaviors

		Males			Females		
Outcome		(1)	(2)	(3)	(1)	(2)	(3)
Smoke	AM	-0.257***	-0.208***	-0.206***	-0.304***	-0.266***	-0.249***
		(0.027)	(0.030)	(0.031)	(0.026)	(0.027)	(0.027)
	BM	-0.142***	-0.118***	-0.114***	-0.220***	-0.202***	-0.190***
		(0.026)	(0.026)	(0.029)	(0.024)	(0.026)	(0.027)
Ever	AM	-0.083***	-0.136***	-0.190***	-0.101***	-0.191***	-0.226***
drugs		(0.024)	(0.026)	(0.028)	(0.025)	(0.028)	(0.030)
	BM	-0.014	-0.041*	-0.083***	-0.036	-0.087***	-0.153***
		(0.024)	(0.024)	(0.027)	(0.025)	(0.027)	(0.030)
Drugs	AM	-0.125***	-0.152***	-0.177***	-0.165***	-0.204***	-0.238***
last 12		(0.035)	(0.037)	(0.042)	(0.037)	(0.040)	(0.043)
months	BM	-0.083**	-0.097***	-0.113***	-0.085**	-0.103***	-0.135***
		(0.034)	(0.034)	(0.036)	(0.040)	(0.039)	(0.046)
Regular	AM	0.127***	0.068**	0.055*	0.134***	0.075***	0.073***
exercise		(0.027)	(0.028)	(0.031)	(0.025)	(0.025)	(0.027)
	BM	0.105***	0.080***	0.041	0.077***	0.047*	0.022
		(0.027)	(0.027)	(0.030)	(0.024)	(0.025)	(0.028)
Vote	AM	0.142***	0.095***	0.073**	-0.201***	-0.191***	-0.185**
		(0.026)	(0.029)	(0.031)	(0.063)	(0.072)	(0.076)
	BM	0.060**	0.039	0.018	-0.178***	-0.182***	-0.185***
		(0.026)	(0.027)	(0.030)	(0.060)	(0.063)	(0.063)
Police	AM	-0.140***	-0.081*	-0.066	-0.201***	-0.191***	-0.185**
arrest		(0.038)	(0.042)	(0.046)	(0.063)	(0.072)	(0.076)
	BM	-0.141***	-0.111***	-0.069*	-0.178***	-0.182***	-0.185***
		(0.035)	(0.037)	(0.042)	(0.060)	(0.063)	(0.063)
Violent	AM	-0.144***	-0.150***	-0.155***	-0.157***	-0.128***	-0.142***
rage		(0.052)	(0.055)	(0.058)	(0.040)	(0.038)	(0.042)
	BM	-0.265***	-0.266***	-0.283***	-0.144***	-0.133***	-0.114***
		(0.042)	(0.043)	(0.047)	(0.037)	(0.037)	(0.042)
Never	AM	-0.138***	-0.077***	-0.051*	-0.165***	-0.113***	-0.109***
get		(0.028)	(0.029)	(0.030)	(0.027)	(0.028)	(0.029)
what	BM	-0.126***	-0.098***	-0.060**	-0.115***	-0.090***	-0.058**
I want		(0.026)	(0.027)	(0.029)	(0.025)	(0.026)	(0.028)
No	AM	-0.153***	-0.082**	-0.052	-0.177***	-0.108***	-0.096***
control		(0.033)	(0.036)	(0.039)	(0.032)	(0.034)	(0.033)
over	BM	-0.156***	-0.122***	-0.091***	-0.097***	-0.071**	-0.044
life		(0.030)	(0.031)	(0.034)	(0.031)	(0.031)	(0.037)
Educational levels		No	Yes	Yes	No	Yes	Yes
Full set of controls		No	No	Yes	No	No	Yes

Note: The sample size is 3,113 for males and 3,340 for females. Bootstrap standard errors with 1,000 replications in parenthesis.

Table 14: Marginal effects from probit estimation: effects of academic motivation (AM) and behavioral problems as reported by the teacher (BP) on adult attitudes and behaviors

		Males			Females		
Outcome		(1)	(2)	(3)	(1)	(2)	(3)
Smoke	AM	-0.065***	-0.054***	-0.055***	-0.078***	-0.070***	-0.067***
		(0.009)	(0.010)	(0.011)	(0.009)	(0.009)	(0.010)
	BM	-0.074***	-0.064***	-0.063***	-0.104***	-0.098***	-0.094***
		(0.009)	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)
Ever	AM	-0.020**	-0.040***	-0.059***	-0.025***	-0.051***	-0.060***
drugs		(0.010)	(0.011)	(0.011)	(0.008)	(0.009)	(0.009)
	BM	-0.030***	-0.047***	-0.074***	-0.024***	-0.045***	-0.060***
		(0.010)	(0.010)	(0.012)	(0.008)	(0.008)	(0.009)
Drugs	AM	-0.016***	-0.020***	-0.023***	-0.016***	-0.019***	-0.019***
last12		(0.006)	(0.006)	(0.007)	(0.004)	(0.004)	(0.004)
moths	BM	-0.018***	-0.021***	-0.023***	-0.006	-0.008*	-0.011***
		(0.006)	(0.006)	(0.006)	(0.004)	(0.004)	(0.004)
Regular	AM	0.030***	0.016*	0.014	0.037***	0.021**	0.020**
exercise		(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
	BM	0.038***	0.027***	0.015	0.034***	0.020**	0.020**
		(0.008)	(0.009)	(0.009)	(0.008)	(0.008)	(0.009)
Vote	AM	0.033***	0.022**	0.018*	0.042***	0.027***	0.025***
		(0.009)	(0.009)	(0.010)	(0.008)	(0.008)	(0.009)
	BM	0.034***	0.026***	0.017*	0.039***	0.027***	0.025***
		(0.009)	(0.008)	(0.009)	(0.007)	(0.007)	(0.008)
Police	AM	-0.006	-0.001	-0.001	-0.004**	-0.004**	-0.003
arrest		(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)
	BM	-0.032***	-0.028***	-0.022***	-0.007***	-0.007***	-0.005***
		(0.004)	(0.004)	(0.005)	(0.002)	(0.002)	(0.002)
Violent	AM	-0.011***	-0.010***	-0.009**	-0.014***	-0.012***	-0.012***
rage		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
	BM	-0.010***	-0.010***	-0.010***	-0.013***	-0.010***	-0.008**
		(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Never	AM	-0.043***	-0.027***	-0.021**	-0.047***	-0.034***	-0.032***
get		(0.008)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)
what	BM	-0.022***	-0.007	0.013	-0.020***	-0.010	-0.002
I want		(0.008)	(0.009)	(0.010)	(0.007)	(0.008)	(0.008)
No	AM	-0.027***	-0.016**	-0.011*	-0.029***	-0.019***	-0.016***
control		(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
over	BM	-0.018***	-0.008	0.001	-0.013**	-0.004	0.001
life		(0.006)	(0.006)	(0.007)	(0.005)	(0.006)	(0.006)
Educational levels		No	Yes	Yes	No	Yes	Yes
Full set of controls		No	No	Yes	No	No	Yes

Note: The sample size is 3,113 for males and 3,340 for females. Bootstrap standard errors with 1,000 replications in parenthesis.

Table 15: Marginal effects from probit estimation: effects of academic motivation (AM) and behavioral problems as reported by the mother (BP) on adult attitudes and behaviors

		Males			Females		
Outcome		(1)	(2)	(3)	(1)	(2)	(3)
Smoke	AM	-0.085***	-0.068***	-0.067***	-0.101***	-0.088***	-0.082***
		(0.009)	(0.010)	(0.010)	(0.009)	(0.009)	(0.009)
	BM	-0.047***	-0.039***	-0.037***	-0.073***	-0.067***	-0.063***
		(0.008)	(0.009)	(0.009)	(0.008)	(0.008)	(0.009)
Ever	AM	-0.032***	-0.053***	-0.073***	-0.032***	-0.059***	-0.069***
drugs		(0.009)	(0.010)	(0.011)	(0.008)	(0.009)	(0.009)
	BM	-0.006	-0.016*	-0.032***	-0.011	-0.027***	-0.046***
		(0.009)	(0.009)	(0.011)	(0.008)	(0.008)	(0.009)
Drugs	AM	-0.021***	-0.025***	-0.028***	-0.016***	-0.020***	-0.020***
last12		(0.006)	(0.006)	(0.007)	(0.004)	(0.004)	(0.004)
moths	BM	-0.014**	-0.016***	-0.018***	-0.008**	-0.010***	-0.011***
		(0.006)	(0.006)	(0.006)	(0.004)	(0.004)	(0.004)
Regular	AM	0.038***	0.021**	0.016*	0.044***	0.025***	0.024***
exercise		(0.008)	(0.009)	(0.009)	(0.008)	(0.008)	(0.009)
	BM	0.032***	0.024***	0.012	0.025***	0.015*	0.007
		(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.009)
Vote	AM	0.043***	0.029***	0.022**	0.048***	0.031***	0.028***
		(0.008)	(0.009)	(0.009)	(0.007)	(0.008)	(0.008)
	BM	0.018**	0.012	0.006	0.038***	0.029***	0.020***
		(0.008)	(0.008)	(0.009)	(0.007)	(0.007)	(0.008)
Police	AM	-0.017***	-0.010*	-0.007	-0.006***	-0.006***	-0.004**
arrest		(0.005)	(0.005)	(0.005)	(0.002)	(0.002)	(0.002)
	BM	-0.017***	-0.013***	-0.007*	-0.006***	-0.006***	-0.004**
		(0.004)	(0.004)	(0.005)	(0.002)	(0.002)	(0.002)
Violent	AM	-0.010***	-0.010***	-0.009***	-0.016***	-0.013***	-0.013***
rage		(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
	BM	-0.017***	-0.017***	-0.017***	-0.014***	-0.013***	-0.010***
		(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Never	AM	-0.042***	-0.023***	-0.015	-0.046***	-0.032***	-0.030***
get		(0.008)	(0.009)	(0.009)	(0.007)	(0.008)	(0.008)
what	BM	-0.038***	-0.029***	-0.018**	-0.032***	-0.025***	-0.016**
I want		(0.008)	(0.008)	(0.009)	(0.007)	(0.007)	(0.008)
No	AM	-0.027***	-0.014**	-0.009	-0.030***	-0.018***	-0.015***
control		(0.005)	(0.006)	(0.006)	(0.005)	(0.006)	(0.005)
over	BM	-0.027***	-0.021***	-0.015***	-0.016***	-0.012**	-0.007
life		(0.006)	(0.005)	(0.006)	(0.005)	(0.005)	(0.006)
Educational levels		No	Yes	Yes	No	Yes	Yes
Full set of controls		No	No	Yes	No	No	Yes

Note: The sample size is 3,113 for males and 3,340 for females. Bootstrap standard errors with 1,000 replications in parenthesis.

Table 16: Ordered probit estimation: effects of academic motivation (AM) and behavioral problems as reported by the teacher (BP) on adult attitudes and behaviors

		Males			Females		
Outcome		(1)	(2)	(3)	(1)	(2)	(3)
Financial	AM	-0.112***	-0.065***	-0.042*	-0.141***	-0.106***	-0.103***
situation		(0.022)	(0.023)	(0.024)	(0.021)	(0.022)	(0.024)
	BM	-0.094***	-0.049**	0.007	-0.095***	-0.064***	-0.045*
		(0.023)	(0.024)	(0.024)	(0.021)	(0.021)	(0.024)
Health	AM	-0.106***	-0.079***	-0.066***	-0.124***	-0.083***	-0.075***
status		(0.024)	(0.024)	(0.026)	(0.022)	(0.022)	(0.023)
	BM	-0.113***	-0.086***	-0.048*	-0.109***	-0.071***	-0.041*
		(0.023)	(0.022)	(0.026)	(0.022)	(0.022)	(0.023)
Effort of	AM	0.227***	0.138***	0.128***	0.192***	0.094***	0.073***
getting quals		(0.024)	(0.023)	(0.024)	(0.022)	(0.023)	(0.023)
more trouble	BM	0.113***	0.027	-0.017	0.150***	0.070***	0.037
than worth		(0.022)	(0.022)	(0.025)	(0.023)	(0.023)	(0.025)
Knowing	AM	0.134***	0.110***	0.107***	0.047**	0.019	0.021
right people		(0.021)	(0.024)	(0.023)	(0.020)	(0.021)	(0.022)
helps more	BM	0.090***	0.067***	0.054**	0.079***	0.059***	0.057**
than quals		(0.021)	(0.023)	(0.025)	(0.020)	(0.021)	(0.023)
Big	AM	0.091***	0.089***	0.079***	0.090***	0.093***	0.080***
business		(0.021)	(0.023)	(0.024)	(0.021)	(0.023)	(0.023)
benefits	BM	0.061***	0.057**	0.030	0.059***	0.057***	0.026
owners		(0.022)	(0.023)	(0.025)	(0.021)	(0.022)	(0.024)
Management	AM	0.176***	0.111***	0.088***	0.181***	0.122***	0.101***
get the		(0.022)	(0.022)	(0.023)	(0.020)	(0.022)	(0.023)
better of	BM	0.141***	0.081***	0.021	0.146***	0.097***	0.034
employees		(0.021)	(0.024)	(0.026)	(0.020)	(0.021)	(0.022)
Ordinary	AM	0.105***	0.087***	0.070***	0.099***	0.083***	0.069***
people		(0.022)	(0.022)	(0.024)	(0.022)	(0.022)	(0.024)
don't get	BM	0.110***	0.091***	0.050**	0.086***	0.071***	0.039
fair share		(0.023)	(0.023)	(0.025)	(0.022)	(0.023)	(0.024)
How good	AM	-0.248***	-0.175***	-0.120***	-0.126***	-0.093***	-0.080***
at the		(0.026)	(0.026)	(0.027)	(0.021)	(0.023)	(0.025)
use of	BM	-0.124***	-0.057**	0.058**	-0.077***	-0.042*	0.025
numbers		(0.024)	(0.025)	(0.028)	(0.022)	(0.022)	(0.025)
How	AM	-0.221***	-0.131***	-0.099***	-0.174***	-0.104***	-0.084***
good at		(0.026)	(0.025)	(0.029)	(0.021)	(0.024)	(0.024)
problem	BM	-0.095***	-0.011	0.046	-0.023	0.038	0.096***
solving		(0.024)	(0.026)	(0.029)	(0.022)	(0.023)	(0.026)
Educational levels		No	Yes	Yes	No	Yes	Yes
Full set of controls		No	No	Yes	No	No	Yes

Note: The sample size is 3,113 for males and 3,340 for females. Bootstrap standard errors with 1,000 replications in parenthesis.

Table 17: Ordered probit estimation: effects of academic motivation (AM) and behavioral problems as reported by the mother (BP) on adult attitudes and behaviors

		Males			Females		
Outcome		(1)	(2)	(3)	(1)	(2)	(3)
Financial	AM	-0.120***	-0.063***	-0.033	-0.159***	-0.116***	-0.111***
situation		(0.021)	(0.022)	(0.025)	(0.021)	(0.021)	(0.023)
	BM	-0.114***	-0.086***	-0.055**	-0.076***	-0.053**	-0.023
		(0.020)	(0.020)	(0.022)	(0.020)	(0.021)	(0.023)
Health	AM	-0.118***	-0.084***	-0.066***	-0.136***	-0.087***	-0.075***
status		(0.021)	(0.023)	(0.025)	(0.021)	(0.021)	(0.023)
	BM	-0.132***	-0.113***	-0.092***	-0.118***	-0.093***	-0.070***
		(0.021)	(0.021)	(0.023)	(0.020)	(0.020)	(0.023)
Effort of	AM	0.248***	0.138***	0.121***	0.220***	0.104***	0.080***
getting quals		(0.021)	(0.022)	(0.024)	(0.020)	(0.022)	(0.022)
more trouble	BM	0.101***	0.046**	0.019	0.120***	0.057***	0.019
than worth		(0.021)	(0.021)	(0.022)	(0.021)	(0.021)	(0.024)
Knowing	AM	0.162***	0.128***	0.119***	0.069***	0.034	0.033
right people		(0.021)	(0.023)	(0.024)	(0.020)	(0.022)	(0.021)
helps more	BM	0.039*	0.021	0.007	0.040**	0.020	0.012
than quals		(0.021)	(0.021)	(0.023)	(0.020)	(0.021)	(0.022)
Big	AM	0.105***	0.099***	0.085***	0.102***	0.101***	0.085***
business		(0.020)	(0.022)	(0.023)	(0.020)	(0.022)	(0.022)
benefits	BM	0.046**	0.043**	0.012	0.046**	0.048**	0.010
owners		(0.021)	(0.021)	(0.023)	(0.020)	(0.020)	(0.022)
Management	AM	0.210***	0.127***	0.093***	0.199***	0.129***	0.101***
get the		(0.020)	(0.022)	(0.024)	(0.020)	(0.020)	(0.022)
better of	BM	0.098***	0.058***	0.007	0.152***	0.115***	0.054**
employees		(0.021)	(0.022)	(0.024)	(0.019)	(0.019)	(0.022)
Ordinary	AM	0.124***	0.098***	0.075***	0.112***	0.092***	0.074***
people		(0.021)	(0.022)	(0.023)	(0.020)	(0.022)	(0.024)
don't get	BM	0.101***	0.090***	0.057**	0.078***	0.069***	0.029
fair share		(0.020)	(0.021)	(0.022)	(0.019)	(0.020)	(0.022)
How good	AM	-0.265***	-0.175***	-0.101***	-0.127***	-0.087***	-0.070***
at the		(0.024)	(0.025)	(0.027)	(0.021)	(0.022)	(0.023)
use of	BM	-0.137***	-0.094***	-0.026	-0.111***	-0.094***	-0.028
numbers		(0.023)	(0.022)	(0.027)	(0.021)	(0.022)	(0.023)
How	AM	-0.238***	-0.128***	-0.088***	-0.167***	-0.088***	-0.063***
good at		(0.024)	(0.026)	(0.027)	(0.022)	(0.023)	(0.024)
problem	BM	-0.087***	-0.032	0.009	-0.062***	-0.019	0.026
solving		(0.023)	(0.024)	(0.027)	(0.021)	(0.021)	(0.024)
Educational levels		No	Yes	Yes	No	Yes	Yes
Full set of controls		No	No	Yes	No	No	Yes

Note: The sample size is 3,113 for males and 3,340 for females. Bootstrap standard errors with 1,000 replications in parenthesis.

Appendix A. Data

A.1 Measures of academic motivation and behavioral problems at age 16

The measure of academic motivation is based on five questions that were asked to the child at age 16 about her feelings towards school: I feel school is largely a waste of time, I think homework is a bore, I find it difficult to keep my mind on work, I never take work seriously, I don't like school. They are coded 1 to 5 where 1 corresponds to 'very true', 2 to 'partly or usually true', 3 to 'cannot say, no feeling either way', 4 to 'partly or usually untrue', 5 to 'not true at all'. Tables 4 and 5 report the pairwise Kendall rank correlation coefficients between the items. Cronbach's alpha for this combination of 5 items is 0.77 for males and 0.771 for females.

The measure of behavioral problems as reported by the teacher is based on the following 8 items: very restless or has difficulty staying seated for long, squirmy or fidgety, frequently fights or is extremely quarrelsome with other children, irritable or is quick to "fly off the handle", is often disobedient, cannot settle to anything for more than a few moments, often tells lies, bullies other children. The item responses are coded 1 to 3 where 1 corresponds to 'certainly applies', 2 to 'applies somewhat' and 3 to 'does not apply'. The teacher had to fill the questionnaire and return the answers. Tables 6 and 7 show the pairwise Kendall rank correlation coefficients between the items. Cronbach's alpha for this combination of 8 items is 0.866 for males and 0.871 for females.

The second measure of behavioral problems is based on 8 identical questions that were read to the mother of the child. Tables 8 and 9 show the pairwise Kendall rank correlation coefficients between the items. Cronbach's alpha for this combination of 8 items is 0.718 for males and 0.708 for females. To measure academic motivation and behavioral problems, I have selected some specific questions. I did not use all the items that are available. When choosing among the different possible combination of items, it is important to test whether a particular combination is scalable. The combinations of items that I retained to estimate the three latent variables are also consistent with the graded response model of Samejima (1969).

A.2 Child and family characteristics at age 11

The following characteristics when the individual was 11 years old (unless reported otherwise) are taken into account: number of older and younger siblings, whether she received free school meals, whether she received help at school because of mental or educational backwardness,

quartiles in a mathematics test score, quartiles in a reading comprehension test score, and whether she was living with both her own parents at age 7, 11 and 16. I also take into account the following characteristics concerning the mother and the father when the individual was 11 years old (unless reported otherwise): age at child's birth, years of education, interest in the education of the child as assessed by the teacher (very interested, some interest, little interest, can't say), whether the mother ever had a paid job since her child's birth, and whether the father is in a manual occupation. The characteristics related to the household are the following: whether the household had serious financial difficulties in the previous year, quartiles of family income (based on father's and mother's weekly/monthly net pay and all other sources of weekly/net income), number of persons per room (up to 1 person, 1 to 1.5 person, over 1.5 person per room), an indicator of poor housing conditions (whether the the accommodation lacks a hot water supply, a bathroom, or an inside toilet). For some variables, when there was missing information at age 11, I have used information at age 7 (and then at age 16 if the information was still missing). Some descriptive statistics for the characteristics are provided in Table 1.

A.3 Outcomes at age 41

18 different outcomes are considered in this paper: 9 are binary and 9 are ordered discrete. Table 3 provides some descriptive statistics. I first consider a series of 9 binary outcomes related to attitudes and behaviors at at age 41: smoke cigarettes occasionally or every day, ever tried illegal drugs[18], consumed any illegal drugs during the previous 12 months, any regular exercise (at least once a month, for most of the year), voted in the last election, ever been arrested by a police officer and taken to a police station during the previous year. Individuals were also asked questions about self-assessment of their mental health and how they feel generally. One question is 'Do you often get into a violent rage?'. The next two questions are to do with how individuals feel about their life so far: 'I never really seem to get what I want out of life' or 'I usually get what I want out of life'; 'I usually have a free choice and control over my life' or 'Whatever I do has no real effect on what happens to me'.

I also consider 2 outcomes related to opinions and feelings about financial situation and health status. These variables are ordered discrete. 'How well would you say you yourself are managing financially these days. Would you say you are: living comfortably, doing alright, just about getting by, finding it quite difficult, or finding it very difficult.' This variable is coded 1 to 5. 'How would you describe your health generally? Would you say it is excellent, good, fair, poor?' This variable is coded 1 to 4. Note that this variable corresponds to a

[18]The list of illegal drugs includes: cannabis, ecstasy, amphetamines, lsd, popper (amyl nitrate), cocaine, temazepan, semeron, ketamine, crack, heroin, and methadone.

subjective assessment of health status by the individual.

Individuals were also asked the 5 following questions on opinions about the labor market. They were read the following text: 'People have very different opinions about things. The following are a list of statements on different topics. For each one, please enter the number which most closely represents how much you agree or disagree with it.' They could be answered as follows: strongly agree, agree, neither agree nor disagree, disagree, strongly disagree and are coded 1 to 5. The questions are: 'The effort of getting qualifications is more trouble than it's worth?'; 'For getting jobs, knowing the right people is more important than the qualifications?'; 'Big business benefits owners at the expense of the workers?'; 'Management will always try to get the better of employees if it gets the chance?'; 'Ordinary working people do not get their fair share of the nation's wealth?'.

Individuals were also asked the 2 following questions about self-assessment of skills. They were read the following text: 'People have a variety of skills. Some they use at work, others they use elsewhere. Some they are good at, others they are less good at. The next set of questions will show a number of skills. For each please say whether you consider that your own ability is good, fair, poor or that you don't have this skill?' The answers to theses questions are thus coded 1 to 4. The questions are: 'How good are you at the use of numbers and calculations?'; 'How good are you at problem solving?'.

A.4 Selection of the sample

The sample consists of all individuals who report information on the outcomes at age 41. They also have information at age 16 on at least 4 of the 5 questions related to academic motivation, at least 7 of the 8 questions related to behavioral problems asked to the teacher and at least 7 of the 8 questions related to behavioral problems asked to the mother. I drop from the final sample the 147 individuals who have missing information on any of the following characteristics at age 11: parents' years of education, parental interest in the education of their child, whether the household had serious financial difficulties in the previous year, number of siblings, whether the child received free school meals, number of persons per room in the accommodation occupied by the household, and the indicator of poor housing conditions (whether the the accommodation lacks a hot water supply, a bathroom, or an inside toilet). For each of these characteristics, the percentage of missing information was less than 0.7%. However, individuals with missing information on the following characteristics at age 11 (unless reported otherwise) are included in the sample: family income, whether the individual received help at school because of mental or educational backwardness, whether the father is in a manual occupation, whether the mother ever had a paid job since child's

birth, parental age at child's birth, and whether the individual was living with both her own parents at age 7, 11 and 16. For these variables, a dummy variable for missing information is added to the list of characteristics.

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