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ABSTRACT

Happier with Vocational Education?*

Using Italian data, I study the relationship between vocational education and self-reported happiness by focusing on individuals with at least a five-years high school degree, either vocational or academic. My instrumental variable strategy shows that individuals who have completed a vocational high school are more likely to report a high level of happiness than individuals who have completed an academic degree. I find no clear evidence that vocational graduates have a lower probability to be employed or earn lower wages than other graduates. I show that they live more than other graduates in small towns, where prices are lower and social life more rewarding, and have a less privileged parental background. Both facts may lead to more moderate aspirations and therefore contribute to higher happiness.

JEL Classification: I21, D90

Keywords: happiness, vocational education, Italy

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Introduction

Empirical studies typically find a positive relationship between the quantity of education and happiness. Oreopoulos and Salvanes, 2011, for instance, use the exogenous variation provided by compulsory school reforms to document that higher education causes higher satisfaction with individual life (see also Clark and Jung, 2017; Crespo and al, 2014).

Since higher education typically causes superior life outcomes, in terms of better employment prospects, higher earnings, and better health, it is natural to expect that it also leads to greater subjective wellbeing or happiness. However, higher education also raises individual aspirations (Clark et al, 2015; Dockery, 2010), which makes it difficult to attain higher levels of happiness. A positive effect of education on happiness requires that the effect on outcomes more than compensates the effect on aspirations (see Bertoni and Corazzini, 2018).

The small literature on the topic has focused exclusively on the quantity of education, therefore ignoring the question whether the contents of education also matter for happiness. In this paper, I try to fill this gap by asking whether individuals who have completed a vocational high school report a higher / lower level of happiness than individuals who have graduated from an academic high school of similar length (five years).

The answer to this question is not obvious a priori. While vocational education is formal learning devoted to the development of occupational skills (see Carruthers and Jepsen, 2019), academic education typically pursues the advancement of more general skills, as a pre-requisite for college education. On the one hand, vocational

graduates may end up with inferior economic outcomes, which reduces happiness. On the other hand, they may have lower aspirations than academic graduates, which increases happiness.

I focus on Italy, a country where high school education is organized in vocational and academic tracks, and draw my data from the survey PLUS (*Participation Labor Unemployment Survey*), which records not only the highest attained educational qualification – as done in most surveys – but also the type of high school degree being completed.

A challenge for the identification of the effects of the high school curriculum on happiness is that students who attend a vocational high school are likely to differ from those attending an academic high school because of several characteristics, some of them unobserved to the econometrician. I address selection into type of school using an instrumental variable strategy. The selected instrument is the predicted share of students enrolled in a vocational high school in the region where the individual was living at the time when he/she was 14, the typical age when high school starts in Italy.

Measuring self-reported happiness on a scale from 1 (lowest) to 7 (highest), I find that vocational education increases the likelihood that individuals report to be very happy (reported values: 6 or 7) and reduces the probability that they declare to be unhappy (reported values: 1 to 3) or moderately happy (reported values: 4 or 5).

I discuss potential mechanisms and show that there is no clear evidence that vocational education reduces wages or employability, in line with the recent literature reviewed below, or leads to lower household income per head. On the other hand, vocational graduates are more

likely to be married, have children, to live in small towns or villages, in a house owned by the household and with higher space per capita.

Small towns are both less expensive and more conducive to forming strong social bonds than big cities. The quality of their services is viewed as higher than elsewhere. In addition, people living in small towns have on average a less privileged parental background, which correlates negatively with individual aspirations. These facts are consistent with my key finding that vocational high school graduates are more likely than other graduates to report high level of happiness.

The paper is organized as follows. Section 1 briefly describes the institutional setup. Section 2 introduces the empirical strategy. Section 3 illustrates the data. Results are discussed in Section 4. Conclusions follow.

1. High School Education in Italy

In Italy, upper secondary education lasts between three and five years, typically starting at age 14 upon completion of junior high school, and is organized in academic and vocational curricula or tracks. The vocational track comprises three and five-year high schools with a predominant technical training (*scuole professionali, istituti tecnici e commerciali e per geometri*), and the academic track consists of four or five-year high schools with a more general education, which focuses on classical, scientific or linguistic and pedagogical studies (*licei* and *scuole magistrali*). The two tracks differ both in their orientation and in the learning objectives. In addition to specializing in their particular fields (humanities, the arts or science), the *licei* also include subjects such as maths, chemistry, physics and biology, history, geography and Italian language and literature. Vocational schools are more geared instead

towards technical and practical subjects such as technology, informatics, engineering, construction and accounting, and focus on developing industrial and administrative skills.

In order to compare tracks with different curricula but the same length, we consider only five-years programs, and therefore exclude both pedagogical studies lasting four years and short term vocational programs lasting three years. Access to tracks is based on individual and/or parental choice. In 2016, 60.5 percent of those who have completed at least a five-years high school have graduated from a vocational track. Typically, students from vocational high schools are less likely to complete college than those from an academic track. In our sample, 13.8 of the former went on to complete college in 2016, compared to 53.0 percent of the latter.[1]

Vocational high school graduates in Italy typically have poorer parental background than academic graduates. As shown in Table 1, their parents have lower education and their fathers are engaged in less prestigious occupations. In addition, their cognitive ability before entering high school – measured by the junior high school exit score – is significantly lower than for those who have completed an academic high school.

2. The Empirical Strategy

I estimate the following empirical specification

$$H_{i,rc} = X'_{i,rc}\beta + \alpha V_{i,rc} + \varepsilon_{i,rc} \qquad (1)$$

where the indices i, r and c indicate the individual, the region where the individual went to school and lived until age 18 and the cohort; H is self

[1] These data are from the PLUS survey.

–reported happiness, an ordinal variable that ranges from 1 to 7, X is a vector of controls and V is a binary variable equal to 1 if the individual has completed a five-years vocational high school and to 0 if she has completed a five-years academic high school. The vector X includes a quadratic in age, gender and year effects, and controls for early public childcare, parental education (mother's and father's education), father's occupation (main activity during his life) and for cognitive skills before high school entry, measured by the exit score at the end of junior high school.[2]

I estimate (1) using both a linear (OLS) and an ordered probit specification.[3] These estimates are biased because the analyst typically does not observe all the individual characteristics that affect the choice of type of school. For instance, if individuals with higher unobserved cognitive and non-cognitive abilities are more likely to report higher levels of happiness but enroll less in vocational education, OLS estimates are biased downward. An additional source of bias (attenuation) is measurement error in the reported high school curriculum.

A handful of studies have addressed selection into treatment by using exogenous policy changes and shown that there is no statistically significant effect of vocational education on individual earnings and employment probabilities. Oosterbeek and Webbink, 2007, evaluate the effect of extending 3-years basic vocational programs with one year of academic education – a policy that took place in the Netherlands in

[2] Italy has 20 regions. I pool tiny Val d'Aosta with Piedmont and classify the 19 regions into 5 areas (North-west, North-east, Centre, South and Islands). I interact the score with area dummies to account for the fat that grading practices vary across areas.
[3] In the latter case H is derived from a threshold crossing model based on a latent continuous happiness variable.

1975 - on later wages. Adopting a difference-in-differences strategy, they investigate the effect of the change on wages twenty years later, but find no effect.

Pischke and von Wachter, 2008, exploit the gradual adoption of a one-year increase in compulsory schooling in the lowest schooling track in Germany between the 1950 to the 1970s, and investigate the changes on long-term wages, but also fail to find an effect. Hall, 2012, evaluates a policy change in Sweden in 1991 that increased the academic education content of vocational schooling in the upper secondary level. Exploiting random differences in time and the regional implementation of a policy pilot, she finds no effects of the policy on the wages earned up to 16 years after the beginning of secondary school.

Using a natural experiment, Malamud and Pop-Eleches, 2010, find that vocational graduates in Romania are significantly more likely to be employed as manual workers and craftsmen. However, there is no significant difference between vocational and academic education in terms of participation rates, unemployment rates, periods of non-employment, and family income.

In this paper, I address the endogenous selection into treatment by using an instrumental variable strategy. I define the following first stage equation

$$V_{i,rc} = X'_{i,rc}\delta + \gamma Z_{rc} + u_{i,rc} \qquad (2)$$

where Z, the instrument, is the predicted share of students enrolled in a vocational high school in the region where the individual was living at the time when she/he was 14, the typical age when high school starts in Italy. The underlying idea is that 14 year old students, when choosing

the high school curriculum, are influenced by the local popularity of school type, measured by relative enrolment.[4]

I construct Z by computing: 1) the percentage $\mu_{r,1951}$ of individuals in region r who were enrolled in a five-years vocational high school in 1951, more than 10 years before 1964, when the first cohort in our data, born in 1950, started high school; 2) the predicted share of pupils enrolled in a vocational high school in the region and when the individual was aged 14, S_{Vrc}, obtained by multiplying the national stock of individuals enrolled in that type of school, S_{Vc}, by $\mu_{r,1951}$.

I proceed in a similar fashion for the share of individuals enrolled in five-years academic high schools, S_{Grc}. Finally, I obtain Z_{rc} as

$$Z_{rc} = \frac{\mu_{r,1951} S_{Vc}}{\mu_{r,1951} S_{Vc} + (1-\mu_{r,1951}) S_{Gc}} \qquad (3)$$

The instrument varies by region of birth (19 regions) and by cohort (47 cohorts). A potential concern with Z is that it cannot be excluded from the main regression (1). This might happen if region by cohort shocks affecting the share of students enrolled in a vocational high school when the individual was 14 have persistent effects that influence individual outcomes long after their realization. For instance, labor market conditions at age 14 may have long-term consequences on labor market

[4] A higher share of students enrolled in a vocational high school is positively correlated with the relative share of vocational high schools in the area. In recent years, a large literature has emerged that investigates the role of peers in major choice. De Giorgi et al. 2010, exploiting the random assignment of students to sections in mandatory courses in the initial semesters at Bocconi University, find that students are more likely to select a major that their peers choose.

outcomes and therefore on happiness (see for instance Oreopoulos et al, 2012).

In order to account for the permanent effects of these shocks, I include in vector X the unemployment rate and the nominal GDP in the region when individuals where living at age 14.[5] To validate my strategy, I test whether small deviations from excludability significantly affect my results, and find that they don't. I also add a second instrument (years of compulsory education), estimate an over-identified model and test the orthogonality of the instruments to the error term in (1) using the J test. I find that the test cannot reject the null.

3. The Data

I draw my data from the Italian PLUS survey, run by INAPP (National Institute for the Study of Public Policies) between 2005 and 2018. This survey, based on a stratified nationally representative sample of more than 50 thousand individuals aged 18 to 74, has several advantages with respect to more standard sources such as the Labor Force Survey.

First, it includes a question on self-reported happiness. Second, it has information both on the highest and on intermediate qualifications, which allows me to trace the education pathways from the end of junior high school (at age 14) to college. Last but not least, it contains relevant information on individual scores at the end of junior high school, when students take a national school leaving exam, and detailed information on parental education, occupation and the region were the individual grew up and went to school before college.

[5] Data on GDP and the unemployment rate are from the national statistical agency (ISTAT).

I use data from waves 2014 and 2016, which contain the same question on self-reported happiness,[6] and consider the 55,396 individuals born between 1950 and 1996 and aged 20 to 64 who have attained at least a five-years high school leaving certificate.[7]

All respondents are asked to evaluate their happiness in a scale from 1 (lowest) to 7 (highest). One may wonder about the interpersonal comparability of observed outcomes. Yet sseveral studies (see for instance Oswald and Wu, 2010) have provided descriptive evidence that happiness responses are comparable from one person to another.

Less than 5 percent of respondents indicated a low level of happiness (from 1 to 3), 37.1 percent reported moderate happiness and more than half (58.7) selected a high level of happiness (6 or 7). Table 2 presents the distribution of reported happiness by high school type and shows that the share of individuals reporting a very high degree of happiness is slightly higher among those who have completed a vocational high school (59.4 versus 57.5). Although mean happiness is slightly higher among the vocationally educated (5.63 versus 5.57), median happiness is the same across the two groups (6).

Recently, Schroder and Yitzhaki, 2017, and Bond and Lang, 2014 have shown that average ranking of observed happiness across groups can be arbitrarily reversed unless some unreasonably strong conditions are assumed. A solution to this problem is to focus on median rather than mean comparisons. Unlike the mean, the median respects the ordinal property of self-reported happiness data because it is "equivariant" to all increasing transformations (Chen et al, 2019).

[6] The question is framed differently in the 2018 wave.
[7] Some individuals may appear twice because the data include a panel component.

Table 3 shows the summary statistics of the variables used in the paper. The percentage of individuals who completed a five-years vocational high school is 61.2 percent; 53 percent are males and average age is 39.8; 25.9 percent obtained top grades in the junior high school exit exams, and 28.9 percent completed a tertiary degree.

4. Results

4.1 Baseline results

Table 4 presents the estimates of the first stage regression of the binary variable V on the instrument Z and other controls. I find that the probability of having completed a vocational high school increases with age, is higher for males than for females and for those: i) who did attend public childcare before age 3; ii) with a low junior high school exit score;[8] iii) whose parents have relatively low education and iv) with a father engaged in a blue collar job or in elementary occupations. This probability is also higher for individuals who experienced a higher local unemployment rate and a lower local GDP at age 14.

Conditional on these controls as well as on year effects, I estimate that a 10 percent increase in the predicted local share of students enrolled in a vocational school when the individual was 14 increases the probability that he/she chooses a vocational high school by 2.71 percent (0.061 x 0.445). The effect of Z on V is statistically significant at the 1 percent level of confidence, and the F test for the exclusion of the instrument is well above 10 (83.06), the threshold below which the instrument is considered to be weak.[9]

[8] The more 24 of area by score coefficients are not reported but are available from the author upon request.
[9] Standard errors are clustered by region of birth and cohort.

The ordered probit and the IV-ordered probit estimates of Eq. (1) are shown in Table 5.[10] The estimated coefficient of vocational education is positive, statistically significant and much larger when instrumental variables are used (0.624) than when they are not (0.085). This gap could be due to attenuation bias – because of measurement error – or because of omitted un-observables which affect happiness and enrolment in vocational schools in opposite directions.

The estimated marginal effect of vocational education – see Column (1) in Table 6 - varies with the level of happiness: it is negative for levels 1 to 5 (unhappy or moderately happy) and positive for levels 6 and 7 (very happy). For instance, a shift from academic to vocational high school reduces the probability of happiness taking value 3 or 5 by 3.1 and 10.1 percent respectively, and increases the probability of happiness taking value 7 by 17.9 percent.

Table 6 reports also the estimated marginal effects associated with gender (male), maternal education (mother has college), father's occupation (blue collar or elementary job) and age. Males and individuals with blue collar fathers or with mothers who are not college educated are more likely to be unhappy or moderately happy and less likely to be very happy. The probabilities of reporting to be unhappy or moderately happy and to be very happy decline and increase respectively with age.[11]

Sensitivities and extensions

[10] The IV-ordered probit is estimated using the cmp routine in Stata 16. The 24 score by area effects in the IV-ordered probit are not reported for brevity but are available from the author upon request.

[11] The relationship is convex for higher levels of happiness and concave for lower levels.

Table A1 shows the OLS and IV estimates of (1). As in Table 5, the estimated effect of vocational education on happiness is positive, statistically significant and much larger with IV than with OLS. The IV estimates shown in Tables 5 and A1 rely on the assumption that the instrument Z is excludable from Eq. (1). Following the local-to-zero approach by Conley et al., 2012, I verify whether these estimates are robust to small deviations from excludability. As in Conley et al. (see p. 268), I assume that the direct effect of Z on happiness is normally distributed with mean zero and standard deviation equals to $\rho\alpha$, where α is the IV effect of vocational education V estimated in Table A1 and ρ varies between 0 and 0.15.

This choice means that, in about 99 percent of cases, the direct effect of Z on H is between $-3\rho \times 100$ and $+3\rho \times 100$ percent of the baseline effect. I show in Figure 1 that the 95 percent confidence interval associated with the values of ρ between 0 and 0.15 does not include zero for most values of ρ, which supports the view that my results are robust to small deviations from excludability.

Since the model (1) - (2) is exactly identified, the Hansen-Sargan test of the null hypothesis that the instrument is orthogonal to the error term in (1) cannot be performed. I therefore add a second instrument, the number of years of compulsory education, which is equal to 8 for those born between 1950 and 1984, to 9 for those born between 1985 and 1991 and to 10 for those born from 1992 onwards.

The shift in the number of years was triggered by the 1999 reform, which increased minimum school leaving age from 14 to 15, and by the 2007 reform, which further raised leaving age to 16. By forcing students to stay in school longer, these reforms could have influenced the choice

between vocational and academic education. When I re-estimate a linear specification of (1) using Z and the additional instrument, I find that results are quite similar to those reported in Table A1 and that the Hansen J test is equal to 0.912 (p-value: 0.340). Therefore, I cannot reject the null that the orthogonality conditions are valid.

I verify whether my results are altered when I augment the baseline model with cohort trends that are specific to the area where the individual lived until age 18. I find that the estimated IV effect of vocational education on self-reported happiness is very similar to the one reported in Table 5 (0.637 with standard error 0.222).

Finally, I investigate whether the effect of vocational education on self-reported happiness varies with gender by interacting V with a dummy equal to one for females and to zero otherwise. As reported in Table 7, the IV – ordered probit estimates show that this interaction is not statistically significant, suggesting that the effect of interest does not vary by gender.

4.2 Mechanisms

As discussed in the introduction, the education curriculum – in the current context the type of high school – can affect happiness by having an impact both on economic and non-economic outcomes and on individual aspirations.

Concerning the latter, I have shown in Table 1 that vocational high school graduates are more likely to have a "poorer" socio-economic status (SES) than other graduates, as their parents have lower education and their father has a less rewarding occupation. The existing literature suggests that individuals with a poorer SES are more likely to have

lower aspirations (see Jenks et al, 1983; Guyon and Huillery, 2014; Berzin, 2010).

I investigate whether vocational graduates have poorer economic outcomes by considering the following indicators: 1) the probability of employment, including self-employment; 2) average net monthly wages for employees (in thousand euros);[12] 3) the probability of having a household net monthly income per capita below median. Respondents to the survey are asked to report their net monthly household income, which includes both labor and non-labor income, by choosing among five income brackets (below 1000, 1000 to 2000, 2000 to 3000, 3000 to 5000, above 5000 euros). I assign midpoint values to each range (500 to the bottom and 6000 to the top range) and divide by the number of household components. Although the information on household income is missing for about 25 percent of the sample, this variable has the advantage of covering both the employed and the inactive; 4) house ownership (binary variable); 5) the probability of living in a smaller than median place. I compute square meters per persons by dividing the total number of square meters in the house or apartment by the number of components; 6) college completion.

When outcomes are binary, I use a bi-variate probit specification,[13] and Z as the instrument for vocational choice V. Table 8 reports the marginal effects associated with a switch of the treatment from academic (0) to vocational (1). I find that having completed a vocational high school reduces the probability of graduating from college by close to 30 percent,

[12] I ignore the earnings reported by the self-employed because they are typically unreliable.

[13] While the linear IV model is a consistent estimator of an average effect of treatment, it is biased, and its small sample performance may be inferior to a correctly specified maximum likelihood model, as the bivariate probit model. See Nichols, 2011.

which may lead to expect I expect that vocational graduates earn lower wages than academic graduates (see for instance Card, 1999).

Yet, when I examine the impact of vocational education on the probability of employment and net monthly earnings, I find negative effects but with wide confidence internals that include zero. In particular, the estimated effect is -0.083 (confidence interval: -0.529 – 0.066) for employment and -0.301 (confidence interval: -1.092 – 0.489) for wages. I also find that the effect of vocational education on the likelihood of having a household income per capita below the median is negative (-0.081) but imprecisely estimated (standard error: 0.057).

When I examine the impact of vocational education on the probability of employment and on earnings (for the employed), however, my evidence is mixed. On the one hand, I find that vocational high school graduates have a lower employment probability (-9.4 percent, statistically significant at the 10 percent level of confidence). On the other hand, my estimate of the effect on earnings for the employed is negative, large (-0.278/1.429 or close to minus 19 percent) but too imprecise to warrant any conclusion.

There is also evidence that individuals with a vocational degree are more likely to live in a house or apartment owned by a household member and less likely to dwell in a smaller than median place. Since happiness does not depend only on monetary benefits, I also consider the following non-monetary outcomes: 1) the probability of being married; 2) the probability of having children; 3) self-reported poor health (binary variable); 4) the probability of living in a small city (at most 20,000 individuals); 5) the probability of living in the South of Italy; 6) participation to cultural activities on a weekly basis; 7) participation to

the local social life on a weekly basis; 8) volunteering activities on a weekly basis.

My evidence – also reported in Table 8 - suggests that vocational high school graduates are more likely to be married, have children and live in a small city with at most 20,000 inhabitants. They are less likely to live in the under-developed South and more likely to engage frequently in volunteer activities and be active in the local community.

Recent research has shown that life is less happy in big cities than in small towns and rural areas, in spite of the former having higher average incomes, lower unemployment rates and higher average education (see Helliwell et al, 2018). Small towns have less expensive housing, which might explain why vocational graduates are more likely to own a house or live in a larger apartment, and are more conducive than cities to forming strong social bonds, which accounts for the higher degree of involvement in local social activities, including volunteering, shown by vocational graduates.

According to survey respondents, small towns also provide better services than bigger cities. The percentage of individuals who evaluate the quality of services as high or medium to high is 54.6 in small towns versus 45.0 percent in bigger cities for local transport; 69.5 versus 67.1 for local health services; 52.7 versus 41.5 percent for other local services and 60.4 versus 59.4 for local schools.

In addition, life in a small town may be associated with more moderate aspirations, one reason being that the SES of its inhabitants is lower than in bigger places: the percent having a father with a low level occupation or a college educated mother is 55.6 and 23.2 percent, compared to 42.3 and 29 percent in bigger cities.

The lack of clear evidence that vocational education generates worse economic outcomes, the evidence on non - economic outcomes as well as the indirect evidence on individual aspirations are consistent with the finding that vocational graduates report to be very happy to a higher extent (and unhappy or moderately happy to a lower extent) than those with an academic education.

Conclusions

Using Italian data, I have studied the relationship between the educational curriculum and self-reported happiness by focusing on individuals who have completed at least a five-years high school degree, either vocational or academic. I have used an instrumental variable strategy to deal with the non-random selection of individuals into different curricula.

I have selected as instrument the predicted share of individuals enrolled in vocational education in the region where the individual grew up and measured this share at the time when she/he was 14 years old. I have shown that small deviations from the excludability of the instrument do not alter qualitatively my results. I have also tested the orthogonality conditions by estimating an over-identified model and failed to reject the null.

Using this empirical strategy, I have shown that individuals who have completed a vocational high school are more likely to be very happy than individuals who have completed an academic degree, and less likely to be moderately happy or un-happy. I have discussed mechanisms that could explain my results by considering the effects of vocational education on both monetary and non-monetary outcomes and on individual aspirations.

I have found no clear evidence that vocational graduates have a lower probability to be employed or earn lower wages than other graduates. I have shown that they live more than other graduates in small towns, where prices are lower and social life more rewarding, and have a less privileged parental background. Both facts may lead to more moderate aspirations and therefore contribute to higher happiness.

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Table 1. Observed characteristics of vocational and academic high school graduates

Variable	Vocational	Academic
Junior high school exit score:		
- Excellent	0.162	0.412
- Very good	0.246	0.282
- Good	0.289	0.141
- Sufficient	0.110	0.026
Education Mother		
- Primary	0.419	0.181
- Lower Secondary	0.331	0.243
- Higher Secondary	0.187	0.383
- College	0.020	0.165
Education Father		
- Primary	0.363	0.144
- Lower Secondary	0.341	0.242
- Higher Secondary	0.214	0.368
- College	0.030	0.211
Occupation Father		
- Manager or Professional	0.083	0.214
- Teacher or Technical Staff	0.049	0.099
- Clerk or Sales	0.276	0.370
- Blue Collar and other occupations	0.592	0.317
No public childcare at age less than 3	0.562	0.537

Notes: PLUS survey. Number of observations: 55,396. All means are weighted using the weights provided by the survey

Table 2. The distribution of happiness, by high school type

Variable	Vocational high school	Academic high school
1	0.94	0.71
2	0.88	0.87
3	2.30	2.62
4	7.96	8.60
5	28.50	29.60
6	37.01	38.43
7	22.40	19.16
Median value	6	6

Notes: number of observations: 55,396.

Table 3. Summary statistics

Variable	Mean	Standard Deviation
Happy	5.607	1.116
Vocational high school	0.612	
Age	39.792	12.266
Male	0.530	
Junior high school exit score:		
- Excellent	0.259	
- Very good	0.260	
- Good	0.232	
- Sufficient	0.077	
Education Mother		
- Primary	0.278	
- Lower Secondary	0.303	
- Higher Secondary	0.274	
- College	0.100	
Education Mother		
- Primary	0.326	
- Lower Secondary	0.297	
- Higher Secondary	0.263	
- College	0.077	
Occupation Father		
- Manager or Professional	0.134	
- Teacher or Technical Staff	0.068	
- Clerk or sales employee	0.312	
- Blue collar and other occ.	0.485	
Local Unemployment Rate at age 14	9.380	5.474
Local log GDP at age 14	11.537	0.953
Z	0.608	0.117
College Education	0.289	
Poor self-reported health	0.195	
No public childcare before age 3	0.547	
Has own activity	0.069	
Household income per capita below median	0.416	
Married	0.477	
Lives in a small city or village	0.464	
Owns house	0.891	
House smaller than 100 square meters	0.358	
Employed	0.677	
Average net monthly wage (thousand euros)	1.676	1.792
Lives in the South	0.337	
Participates to cultural events	2.351	0.889
Engages in volunteering activities	1.709	0.977
Participates to local social activities	1.884	1.007

Notes: number of observations: 55,396 (with exception of participation to cultural events and engagement in volunteering – 45,452 – and of participation to local social activities – 28,250). The categories of junior high school exit scores and parental education do not add up to 1 because of missing values. All means are weighted using the weights provided by the survey.

Table 4. First stage regression of vocational education V on controls and the instrument Z. Linear probability model.

Variable	Coefficient	Standard error
Z	0.445***	0.049
Age	0.007***	0.002
Age squared x 100	-0.018***	0.002
Gender (male=1)	0.115***	0.004
Father's occupation		
- Teacher or technician	0.025***	0.009
- Clerk or sales employee	0.021***	0.007
- Blue collar and elementary jobs	0.089***	0.007
Mother's education		
- Lower secondary	-0.049***	0.007
- Upper secondary	-0.175***	0.008
- College	-0.295***	0.009
Father's education		
- Lower secondary	-0.052***	0.006
- Upper secondary	-0.136***	0.008
- College	-0.284***	0.010
No public childcare before age 3	-0.015***	0.005
Local unemployment rate at 14	0.004***	0.001
Local log GDP at 14	-0.107***	0.018
F test first stage	83.06	
Observations	55,396	
Year effects	Y	

Note: robust standard errors clustered by year and region of birth. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence. Mother's and father's primary education and professional father in the constant. The regression includes a constant and area by junior high school exit score dummies.

Table 5. Ordered probit and IV-ordered probit estimates of the effects of vocational education on self-reported happiness.

Variable	Ordered probit coefficient	Standard error	IV ordered probit coefficient	Standard error
Vocational high school	0.085***	(0.011)	0.624***	(0.207)
Age	-0.001	(0.004)	-0.010**	(0.005)
Age squared x 100	0.007	(0.000)	0.021***	(0.006)
Gender	-0.131***	(0.010)	-0.190***	(0.023)
Local unemployment rate at 14	-0.003**	(0.002)	-0.004***	(0.002)
Local log GDP at 14	0.079**	(0.040)	0.115**	(0.037)
Father's occupation				
- Teacher or technician	-0.042**	(0.021)	-0.054***	(0.021)
- Clerk or sales employee	-0.006	(0.016)	-0.017	(0.016)
- Blue collar or elementary jobs	-0.026	(0.017)	-0.073***	(0.024)
Mother's education				
- Lower secondary	0.018	(0.016)	0.045***	(0.018)
- Upper secondary	0.019	(0.019)	0.103**	(0.040)
- College	0.031	(0.024)	0.191***	(0.066)
Father's education				
- Lower secondary	0.011	(0.016)	0.040**	(0.018)
- Upper secondary	0.023	(0.019)	0.097***	(0.034)
- College	0.006	(0.023)	0.162**	(0.065)
No public childcare before age 3	0.024**	(0.012)	0.029**	(0.011)
Mean dependent variable	5.607		5.607	
Observations	55,396		55,396	55,396
Year effects	Y		Y	

Note: robust standard errors clustered by year and region of birth. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence. Mother's and father's primary education and professional father in the constant. The regression includes a constant and area by junior high school exit score dummies.

Table 6. Marginal effects of vocational education and other covariates on happiness levels. IV-ordered probit estimates

Happiness	Vocational education	Male	College educated mother	Father has blue collar or elementary job	Age x 100
1	-0.019*	0.006***	-0.005*	0.002**	0.033
2	-0.014**	0.004***	-0.004**	0.002**	0.024*
3	-0.031***	0.009***	-0.009**	0.003**	0.053**
4	-0.067***	0.020***	-0.020***	0.008***	0.116**
5	-0.101***	0.031***	-0.031***	0.012***	0.174**
6	0.056***	-0.017***	0.015***	-0.006***	-0.095***
7	0.179***	-0.054***	0.056***	-0.020***	-0.307**

Notes: number of observations: 55,396.

Table 7. IV-ordered probit estimates of the effects of vocational education on self-reported happiness. Vocational education interacted by gender.

Variable	IV ordered probit coefficient	Standard error
Vocational high school	0.612***	(0.196)
x female dummy	-0.026	(0.017)
Age	-0.010**	(0.005)
Age squared	0.020***	(0.000)
Gender	-0.202***	(0.023)
Local unemployment rate at 14	-0.004***	(0.002)
Local log GDP at 14	0.112**	(0.037)
Father's occupation		
- Teacher or technician	-0.053***	(0.021)
- Clerk or sales employee	-0.017	(0.016)
- Blue collar and elementary jobs	-0.071***	(0.024)
Mother's education		
- Lower secondary	0.043***	(0.018)
- Upper secondary	0.108***	(0.040)
- College	0.183***	(0.066)
Father's education		
- Lower secondary	0.038**	(0.018)
- Upper secondary	0.094***	(0.034)
- College	0.155**	(0.061)
No public childcare before age 3	0.029**	(0.011)
Mean dependent variable	5.607	
Observations	55,396	55,396
Year effects	Y	

Note: robust standard errors clustered by year and region of birth. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence. Mother's and father's primary education and professional father in the constant. The regression includes a constant and area by junior high school exit score dummies.

Table 8. Effects of vocational education on other outcomes. Bivariate probit estimates. Marginal effects.

Mechanisms	IV effect of having done a vocational high school
Completed college	-0.333***
	(0.017)
Employed	-0.083
	(0.054)
Net earnings per month (thousand euros)^	-0.301
	(0.403)
Household income per capita below median	-0.081
	(0.057)
Owns house	0.072***
	(0.027)
Lives in a small house (less than 100 square meters)	-0.128**
	(0.052)
Poor health	-0.036
	(0.035)
Married	0.146***
	(0.023)
Has children	0.109***
	(0.022)
Lives in a small city or village	0.290***
	(0.029)
Lives in the South	-0.020*
	(0.012)
Participation to cultural events	-0.033
	(0.024)
Engaged in volunteering	0.039*
	(0.022)
Active in local social activities^	0.055***
	(0.014)

Note: robust standard errors clustered by year and region of birth within parentheses. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence. ^: only 2014. ^ Standard IV regression for net earnings per month, number of household members, number of household members with earnings or pensions. Mother's and father's primary education and professional father in the constant. Each estimate includes a constant and area by junior high school exit score dummies.

Table A1. OLS and IV estimates of the effects of vocational education on self-reported happiness.

Variable	OLS coefficient	Standard error	IV coefficient	Standard error
Vocational high school	0.079***	(0.012)	0.709**	(0.286)
Age	-0.007	(0.004)	-0.019**	(0.006)
Age squared x 100	0.013**	(0.004)	0.030**	(0.000)
Gender	-0.134***	(0.010)	-0.206***	(0.035)
Local unemployment rate at 14	-0.004**	(0.002)	-0.004***	(0.002)
Local log GDP at 14	0.061*	(0.042)	0.104**	(0.048)
Father's occupation				
- Teacher or technician	-0.036*	(0.022)	-0.052**	(0.024)
- Clerk or sales employee	-0.005	(0.017)	-0.018	(0.019)
- Blue collar and elementary jobs	-0.024	(0.017)	-0.079**	(0.031)
Mother's education				
- Lower secondary	0.032*	(0.017)	0.063***	(0.023)
- Upper secondary	0.026	(0.020)	0.137**	(0.054)
- College	0.042	(0.026)	0.229**	(0.088)
Father's education				
- Lower secondary	0.004	(0.017)	0.038*	(0.023)
- Upper secondary	0.015	(0.020)	0.103**	(0.044)
- College	-0.044	(0.026)	0.177*	(0.086)
No public childcare before age 3	0.034***	(0.013)	0.040***	(0.014)
Mean dependent variable	5.607		5.607	
F test first stage			83.06	
Observations	55,396		55,396	
Year effects	Y		Y	

Note: robust standard errors clustered by year and region of birth. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence. Mother's and father's primary education and professional father in the constant. Each estimate includes a constant and area by junior high school exit score dummies.

Figure 1. 95% confidence intervals of parameter α as parameter δ varies between 0 and 0.15. Conley's test.