

DOES EDUCATIONAL MISMATCH HAVE AN IMPACT ON THE HEALTH OF INDIVIDUALS IN ITALY?

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Abstract: Our study investigates the health consequences of educational mismatch by considering both over-education and under-education within the working population of Italy. The educational mismatch is the difference between the individual's attained qualifications and those required to perform their current job. According to the OECD (2019) Skills and Work report, approximately 38% of workers in Italy are classified as educationally mismatched. To date, very few studies have examined the relationship between educational mismatch and health. Our study aims at bridging this gap.

Our study is based on data from the 'Aspects of Life Survey' by ISTAT (2021). The dependent variable is self-reported health, measured on an ordinal and categorical scale. We measure educational mismatch (over- and under-education) following the methodology of Verdugo and Verdugo (1989). An individual is classified as over-educated (under-educated) if their attained level of education exceeds one standard deviation above (below) the average years of education in their professional sphere. We focus exclusively on individuals in the labour force, resulting in a final sample of about 15800 individuals.

Our study includes a gender-specific analysis and estimates ordered probit models for our categorical dependent variable. Our econometric specification incorporates sociodemographic controls such as age, marital status, education and economic conditions, as well as work-related controls such as employment industry, self-employment status and level of physical activity involved in the job. We also control for geographical location and health behaviours (obesity and smoking). The results of our gender-specific analysis reveal that while educational mismatch (over-education and under-education) does not significantly impact the health of women, undereducation has a detrimental effect on the health of males in Italy.

1. Introduction

Our study investigates the health consequences of educational mismatch by considering over-education within the working population of Italy and exploiting data from the "Aspects of Life Survey" by ISTAT (2021). Economic efficiency, a global concern, requires aligning individuals to the jobs that suit their abilities and training. Addressing these inefficiencies through policy has been a pivotal focus for international organisations such as the OECD and the International Labour Organization (Cervantes and Cooper, 2022). The disparity between the actual knowledge and skills individuals have and the labour market's requirements shows the existence of structural

inefficiencies, commonly known as educational mismatch. These structural inefficiencies might be due to imbalances in the labour market or institutional factors, among other factors, such as technological change or economic recession.

Educational mismatch refers to the difference between an individual's attained level of education and the level required for his/her current job. This educational mismatch is further classified into vertical mismatch and horizontal mismatch. About vertical mismatch, if an individual's attained level of education surpasses (falls short of) their job's educational requirement, they are categorised as over-educated (under-educated). Differently, a horizontal mismatch occurs when the individuals' field of study differs from the field of their occupation.

The presence of educational mismatch has already been observed in developed economies (Ghaffarzadegan, Xue, and Larson 2017). In the last few years, there has been a significant increase in the share of educational and skill mismatches (Esposito and Scicchitano, 2019). According to the OECD Skills for Jobs database (2019), 32% of the average workers across the European Union are educationally mismatched, around 16% are undereducated, and 15% are over-educated. Similarly, around 32% of the average workers faced horizontal mismatch across European economies in 2019. However, the number of educationally mismatched individuals is expected to increase across Europe (Cedefo, 2018). This phenomenon can negatively impact an economic system's competitiveness, with negative implications at both macroeconomic and microeconomic levels. At the macroeconomic level, underutilising workers' potential due to overeducation across the economy wastes human capital resources and adversely affects productivity growth and innovation activities (Mcgowan and Andrews, 2015). At the microeconomic level, overeducation impacts workers' job satisfaction (Boll *et al.*, 2016), leading to higher workforce turnover (Sloane *et al.*, 1999). Furthermore, overeducation is also associated with a loss in earnings; as an example, over-educated workers have been shown to earn more than their job colleagues but less than the educationally matched workers with similar education (Boll and Leppin, 2014).

Since the 1970s, when the study by Freeman (1975) started to raise a concern about the phenomena of overeducation, much work has been done to explore its relationship with macroeconomic and social factors. Numerous studies have attempted to explain the impact of educational mismatch on labour market outcomes such as wages and return to education (Cervantes and Cooper, 2022; Caroleo and Pastore, 2018 and Cattani *et al.*, 2014), job satisfaction (Shi *et al.*, 2023), earnings and job search (Quintano *et al.*, 2008). These studies mostly show that over-educated workers suffer a wage loss and are less satisfied with their jobs. Other studies in the domain of educational mismatch explore the relationship of overeducation with spatial mobility of individuals (Croce and Ghignoni, 2015) and interregional migration (Iammarino and Marinelli, 2015; Van Wolleggem *et al.*, 2023).

The relationship between educational mismatch and health has also been explored in the last decade. Recent studies suggest that there is an association of overeducation with poor health (Dunlavy *et al.*, 2016; Vasiakina and Robone, 2018), suffering from diabetes (Padkapayeva *et al.*, 2022), higher mortality (Garcy 2015), higher risk of hospitalisation for psychiatric and somatic diseases (Brendler-Lindqvist *et al.*, 2022), long-term sickness (Madsen and Kittelsen Røberg, 2021), higher level of depressive symptoms and less satisfaction with lives across individuals (Bracke *et al.*, 2013; Wassermann and Hoppe, 2019; Espinoza-Castro *et al.*, 2019). The studies presented so far provide evidence that, in general, over-educated individuals suffer from poorer health, have higher depressive symptoms and are less satisfied with their lives compared to their matched counterparts.

The studies in this literature which exploits data from Italy consider several research questions, such as the impact of overeducation on wages (Ordine and Rose, 2015), the effect of time and effort spent studying at university on labour market outcomes (Boccuzzo *et al.* 2016), the role of interregional migration and spatial mobility in deriving the education-job match (Iammarino and Marinelli, 2015; Croce and Ghignoni, 2015), the relationship between educational mismatch and unemployment risk in Italy (Esposito and Scicchitano, 2022) and to what extent over-education might affect migrants (Van Wolleggem *et al.*, 2023).

Despite the evidence of the influence of vertical education mismatch on health reported in the literature, no study has considered this relationship with regard to the Italian context so far. Our study fills this gap in the literature by exploiting data from the "Aspects of Life Survey" by ISTAT, wave 2021. The dependent variable in our study is self-reported health by individuals, measured on an ordinal and categorical scale. In our study we measure educational mismatch (over- and under-education) by following the approach of Verdugo and Verdugo (1989). We only consider individuals in the labour force, and our final sample comprises about 15800 individuals. We conduct a gender-specific analysis and estimate ordered probit models for our categorical dependent variable. The results indicate that educational mismatch (over-education and under-education) does not have any considerable impact on the health of women. However, undereducation negatively influences the health of males in Italy.

2. Data

We conducted our analysis by exploiting the survey data from the "Aspects of Life Survey" ("Aspetti della Vita Quotidiana") by ISTAT in 2021 (AVQ onwards). AVQ is an annual survey carried out by interviewing a sample of 20,000 households, including

about 50,000 individuals.¹ For our analysis, we consider only those working and who have reported their professions and educational status.² The dependent variable in our analysis is a self-reported categorical health variable measured on the ordinal scale from 1 to 5. The AVQ survey asked respondents about their health in general and provided them with five options on an ordinal scale, that is “very good”, “well”, “neither good nor bad”, “bad”, and “very bad”. In our analysis, we combine the two responses “bad” and “very bad” together and rename them “poor health”.

Educational mismatch is one of the main variables in our analysis. Broadly, three approaches are documented in the literature to measure educational mismatch: subjective, empirical, and job evaluation. The subjective approach is based on the workers' self-assessment of their qualifications and profession (Bracke *et al.*, 2013; Madsen and Kittelsen Røberg, 2021). The principal disadvantage of this approach is that the respondents might exaggerate their occupational or qualification status, leading to a downward bias (McGuinness, 2006). Secondly, the empirical approach, known in the literature as the “realised method approach”, was first introduced by Verdugo and Verdugo in 1989. This compares, for each respondent, the respondent's attained level of education with the average level of education for individuals in his/her occupational class (Garcy, 2015; Dunlavy *et al.*, 2016b; Vasiakina and Robone, 2018; Pholphirul, 2017; and Padkapayeva *et al.*, 2022). If the respondent's attained level of education is above (below) the mean years of schooling in his/her occupation, he/she is classified as over-educated (under-educated). The major drawback of this empirical approach is that it does not account for the actual skill requirements of the job because it is based on the average credentials of workers in the context of years of education in their occupation (McGuinness, Pouliakas, and Redmond 2018).

The third approach reported in the literature to calculate the educational mismatch is the Job-evaluation approach. It is based on the assessment of professional job analysts who measure the academic requirements of occupations by constructing some dictionaries and comparing individuals' attained levels of education with those

¹ The AVQ is part of the integrated social survey system of Italian households collecting information on individuals' daily lives. This survey aims to understand the lives of Italian families and individuals and the problems they face in their everyday lives. Thematic areas covered in the survey on the social aspects of life allow us to understand how individuals are living their lives and how satisfied they are with their living conditions, including the economic situation, the social aspects of the life of individuals, i.e., the functioning and availability of public services that contribute to improving quality of life. This also includes data on work conditions, family and relationship life, free time, political and social participation, health, lifestyles and access to services are investigated.

² Our analysis is based on a rigorous selection process. We only consider those available respondents who responded to the questions related to their professional and qualification level. This meticulous approach ensures the accuracy and reliability of our findings.

dictionaries. Examples of such dictionaries are O*Net in the United States and Standard Occupational Classification (SOC) in the United Kingdom (McGuinness *et al.*, 2018).³

This study uses the “empirical approach” of Verdugo and Verdugo (1989) to measure educational mismatch because our analysis is based on survey data collected by ISTAT (2021), which does not include information on the workers' self-assessments of their qualifications and current job match. The AVQ does not provide information on the exact number of years of education of the respondent but instead classifies the respondents based on their attained level of education into four categories (undergraduate/postgraduate, diploma, middle school diploma, elementary school/no qualifications). We create a variable “years of education” by assigning to each individual the number of years that he/she had to be in education to obtain his/her educational qualification. The AVQ survey classifies all working individuals into four categories. The first category includes managers, self-employed an entrepreneur and freelancers; the second category comprises executives; the third category includes worker leaders, subordinate workers and apprentices working from home on behalf of a company; and lastly, self-employed workers, cooperative members to produce goods/services and occasional workers.

Due to data limitations, this study is only considering vertical educational mismatch because the information on the individuals' qualifications (like having a degree in accounting or engineering) along with that professional occupational title (like accountant or engineer) is not reported in the AVQ survey, and this kind of information is required to measure horizontal mismatch. To calculate the vertical educational mismatch, firstly, we estimate the average years of education in each of the four occupations classified by the “AVQ”, and then we compare it with the individuals' attained years of education in the occupation from which they belong. If the “attained year of education” is one standard deviation above (below) the average year of education in his/her occupation, the individual is classified as overeducated (undereducated).

In our regression model, we include socio-demographic characteristics such as age, marital status, and economic condition.⁴ We also include work-related controls such as employment industry, self-employment status, and level of physical activity involved in the job. Furthermore, we control for the geographical location and health behaviours such as obesity and smoking. Table 1 describes the variables used in the regression model, and Table 2 reports the summary statistics of these variables.

³ Madsen and Kittelsen Røberg (2021) and Frank and Hou (2018) have used the job evaluation method to measure educational mismatch. Cattani *et al.* (2014) used the job-analyst approach and allocated each of the official 800 Italian occupational categories into four groups. They distinguish them into graduate and non-graduate groups based on their relative level of knowledge and skills requirements following the British SOC (2010) classification.

⁴ We are using satisfaction with the economic condition in last 12 months as a proxy because the data on the income of the individuals are not reported in the ISTAT dataset.

Table 1 – *Description of the variables used in the regression analysis.*

Variable Name	Description
Under Education	If individuals' attained level of education is one standard deviation below the average years of education in their professional sphere.
Over Education	If individuals' attained level of education is one standard deviation above the average years of education in their professional sphere.
Health	Self-reported health on a scale of 1 to 5. The last two categories, bad and very bad, are merged into one category: poor health.
Age	Age of Individuals (Number of years)
Gender	Dummy variable for gender (Male = 1, Female= 2)
Years of Education	Total years of education decoded from the attained level of degrees of the individuals
Northwest	Dummy variable, 1 if the individual is based in the Northwest of Italy, 0 otherwise
Centre	Dummy variable, 1 if the individual is based in the Centre of Italy, 0 otherwise
South	Dummy variable, 1 if the individual is based in the South of Italy, 0 otherwise
Islands	Dummy variable, 1 if the individual is based in the Islands of Italy, 0 otherwise
Freelancer	Dummy variable for the individuals working as freelancers
Executives	Dummy variable for the individuals holding the position of Executive
Work Leader	Dummy variable for the individuals working as Work leaders
Self Employed	Dummy variable for the self-employed individuals
Working (Agri-Sector)	Dummy variable of the individuals working in the agriculture sector
Working (Construction)	Dummy variable for the individuals working in the construction industry
Working (Services-Sector)	Dummy variable for the individuals working in the services sector
Working (Rest of the Sectors)	Dummy variable for the individuals who are working in the rest of the sectors
Poor Physical activity at work	Dummy for the individuals who reported that there is poor physical activity involved in their jobs
Overweight	Dummy variable is for individuals classified as overweight based on their Body Mass Index (BMI).
Smoking	Dummy variable for the individuals who report to be smoking currently
Satisfied with economic Condition	Dummy variable for the individuals who are satisfied with their economic conditions

Table 2 –Summary Statistics of the variables used in the regression analysis.

Variable	Male (n=9,011)				Female (n=6,789)			
	M	SD	Min	Max	M	SD	Min	Max
Under Education	0.13	0.34	0.00	1.00	0.09	0.29	0.00	1.00
Over Education	0.14	0.35	0.00	1.00	0.28	0.45	0.00	1.00
Age	45.69	12.32	18.00	92.00	45.37	12.36	18.00	96.00
Health	2.02	0.67	1.00	4.00	2.14	0.70	1.00	4.00
Years of Education	12.10	3.05	5.00	16.00	13.01	2.95	5.00	16.00
Northwest	0.24	0.43	0.00	1.00	0.27	0.44	0.00	1.00
Centre	0.20	0.40	0.00	1.00	0.21	0.41	0.00	1.00
South	0.25	0.43	0.00	1.00	0.21	0.40	0.00	1.00
Islands	0.09	0.29	0.00	1.00	0.08	0.27	0.00	1.00
Freelancer	0.17	0.37	0.00	1.00	0.10	0.31	0.00	1.00
Executives	0.33	0.47	0.00	1.00	0.55	0.50	0.00	1.00
Work Leader	0.36	0.48	0.00	1.00	0.25	0.43	0.00	1.00
Self Employed	0.14	0.35	0.00	1.00	0.10	0.30	0.00	1.00
Working (Agri-Sector)	0.06	0.23	0.00	1.00	0.02	0.15	0.00	1.00
Working (Construction)	0.13	0.34	0.00	1.00	0.14	0.35	0.00	1.00
Working (Services-Sector)	0.48	0.50	0.00	1.00	0.70	0.46	0.00	1.00
Working (Rest of the Sectors)	0.30	0.46	0.00	1.00	0.09	0.28	0.00	1.00
Poor Physical activity at work	0.25	0.43	0.00	1.00	0.24	0.43	0.00	1.00
Overweight	0.42	0.49	0.00	1.00	0.22	0.41	0.00	1.00
Smoking	0.27	0.44	0.00	1.00	0.19	0.39	0.00	1.00
Satisfied with economic Condition	0.06	0.24	0.00	1.00	0.06	0.24	0.00	1.00

Notes: *M* shows the mean value, *SD* is the standard deviation.

3. Estimation Methods

In our study we conducted a gender-specific analysis and estimated ordered probit models for our categorical dependent variable. Let h_i^S be a self-reported health response from the individual i and assumed to be generated by the true latent health

$$h_i^{S*} = x_i\beta + \varepsilon_i^S \sim N(0,1) \quad (1)$$

here in equation (1) x_i is a vector of observed respondent characteristics and ε_i^S is a random error term that is independent of x_i . The latent variable is unobserved, and its

observed counterpart is categorical; neither the scale nor the location is identified; for this reason, the variance of the error term is normalised to 1 and the constant term to 0 (Jones *et al.*, 2013). The observed categorical response h_i^s relates to h_i^{s*} in the following way:

$$h_i^s = k \leftrightarrow \mu^{k-1} \leq h_i^{s*} < \mu^k, k = 1, \dots, 4 \quad (2)$$

Where $\mu^0 < \mu^1 < \dots < \mu^3 < \mu^4$, and $\mu^0 = -\infty$ and $\mu^4 = \infty$

The assumption of homogenous reporting inherent to the ordered probit model arises from the assumption that cut point μ^k are constant (Jones *et al.*, 2013).

4. Results and Discussion

Table 3 reports the results obtained from the ordered probit model described in Section 3 by considering self-reported health as our dependent variable. Age appears to affect individuals' health significantly and negatively, showing that individuals with higher age report not having good health despite their gender and educational mismatch status. The results of the economic condition coefficient show that individuals who reported being satisfied with their economic conditions are more likely to have a positive and significant effect on their health. The coefficient of marital status shows that unmarried individuals, particularly women, are more likely to have negative health consequences. The individuals who suffer from health conditions like obesity, irrespective of their gender and educational mismatch status, reported negative consequences on their general health. All these results are consistent with previous literature.

Table 3 – Probit model, estimated coefficients and standard errors for the Self-Assessed Health Variable (SAH).

Dependent Variable (Health)	Full Sample	Men	Women
	Coef/Se		
Over-Education	-0.015	-0.089	0.048
	0.054	0.08	0.075
Under-Education	-0.073**	-0.119***	-0.01
	0.031	0.039	0.05
Age	-0.023***	-0.025***	-0.021***
	0.001	0.001	0.001

*p<0.10, **p<0.05, ***p<0.01

Table 3 (cont.) – Probit model, estimated coefficients and standard errors for the Self-Assessed Health Variable (SAH).

Dependent Variable (Health)	Full Sample	Men	Women
	Coef/Se		
Economic Condition	0.440*** 0.039	0.507*** 0.051	0.361*** 0.059
Not Married	-0.046** 0.019	-0.035 0.026	-0.055* 0.028
Working (Agr-Sector)	0.05 0.048	0.09 0.055	-0.071 0.099
Working (Construction-Sector)	0.041 0.031	0.076** 0.039	-0.029 0.041
Working (Services-Sector)	0.016 0.022	0.034 0.027	-0.034 0.041
Self Employed	-0.009 0.03	0.004 0.038	-0.012 0.049
Female	-0.225*** 0.019		
Smoking	-0.011 0.021	-0.032 0.027	0.017 0.035
Obesity	-0.070*** 0.02	-0.056** 0.024	-0.095*** 0.033
No Physical Activity at Work	-0.117*** 0.022	-0.105*** 0.029	-0.134*** 0.033
Northwest	-0.058** 0.026	-0.060* 0.035	-0.061 0.038
Centre	0.007 0.027	0.018 0.037	-0.008 0.041
South	0.026 0.027	0.028 0.036	0.024 0.042
Island	0.047 0.036	0.086* 0.047	-0.012 0.057

As far as the results of the vertical educational mismatch are concerned, the negative and significant coefficient of under-education for men indicates that those who are vertically mismatched (under-educated) are more at risk of having adverse health consequences as compared to their counterparts who are matched; however, no statistically significant effect is reported for women. These findings contradict the findings of Vasiakina and Robone (2018), who find that the impact of educational mismatch is significantly prevalent among Russian female workers.

Despite the original contribution that our study provides to the literature, our study has some limitations, mostly due to data availability. For instance, regarding the calculation of horizontal educational mismatch, the match between the information on the individual's qualification (like having a degree in accounting or engineering) and their professional occupational title (like accountant or engineer) is not reported in the ISTAT dataset. Moreover, the information on the individual's profession is classified into four categories, which are too broad for our aim. More disaggregated information would help investigate the phenomenon of educational mismatch in Italy. This paper considers only one wave of AVQ (2021); however, as a future line of research, we intend to extend the analysis by considering a longer time span.

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