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ORIGINAL RESEARCH

Overeducation and Mental Health in Spain

Víctor M. Montuenga[1] · **Inmaculada García-Mainar**[1]

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Abstract
Prior studies have identified a positive effect of an individual's educational attainment on their mental well-being. However, this effect appears to be less pronounced among university graduates. Two potential explanations for this phenomenon are overeducation and the possible existence of reverse causality. The aim of this study is to examine the relationship between overeducation and indicators of poor mental health, among highly educated workers in Spain, considering the possible mutual influence between these variables. To this end, the Simulated Maximum Likelihood method is employed to control potential simultaneity effects, using data from the last two waves (2014, 2020) of the European Health Interview Survey. The results obtained suggest that, among highly educated workers, overeducation does not appear to result in a decline in mental health. Conversely, they indicate that mental conditions may play a role in the phenomenon of overeducation in the workplace. Different arguments are posited as potential explanations for the outcomes observed.

Keywords Overeducation · Mental health · Higher education · Simultaneity · Causality · Spain

1 Introduction

In recent years, scholars have challenged the empirical evidence that a higher level of education has a protective effect on the individual's state of health—regardless of the variable used to express this state (Lorant et al., 2003; Crespo et al., 2014). First, scholars have noted that in highly educated advanced economies, the causal effect does not increase continuously and can only be confirmed for individuals up to the secondary level of education. The

✉ Víctor M. Montuenga
vimontue@unizar.es

Inmaculada García-Mainar
igarcia@unizar.es

[1] Department of Economics and Institute on Employment, Digital Society and Sustainability (IEDIS), University of Zaragoza, Gran Vía de Ramón y Cajal, 2, Zaragoza 50005, Spain

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relationship weakens in the case of higher studies (Smith & Frank, 2005; Fletcher, 2008). Second, the effect diminishes (Hamad et al., 2018), or even vanishes (Xue et al., 2021) when the possible reverse causality between education and health is taken into account. This weakening or absence of a correlation between health and high educational levels is much more evident in the case of mental health (Dahmann and Schniztein, 2019; Amin et al., 2023).[1] These scholarly criticisms shape the scope of the research on the relationship between an individual's education level and their health status.

Several reasons have been suggested to explain why the positive relationship between education and mental health disappears at higher levels of education. First, higher education affords access to jobs with better conditions, even though such jobs may also involve greater responsibility, leading to greater psychosocial stress (Mirovsky and Ross, 2003; Dahmann and Schniztein, 2019). Second, the general increase in educational attainment can lead to overeducation if people take up jobs for which they are under-qualified.

Two main explanations have been put forward for the generalization of overeducation in many Western countries: (i) the fact that the observed increase in educational attainment has not been matched by a corresponding increase in occupational upgrading and the demand for skilled labor; or (ii) the fact that workers use their "excess" schooling to compensate for their lack of other qualifications or to improve their chances of qualifying for a limited supply of good jobs. It has been found that overeducation is associated with lower job satisfaction (see Wiedner, 2022, and Zhao et al., 2024 for recent contributions and Harari et al., 2017, for a survey), increased stress and poor mental health (Faragher et al., 2005; Dudal & Bracke, 2019).

A third argument challenging the causal relationship between education and health refers to possible reverse (selection) or spurious (confounding) causality between the two variables (Montez & Friedman, 2015; Lynch & von Hippel, 2016). In such cases, education and health exhibit a positive relationship; however, the direction of causality is often reciprocal (i.e., individuals with higher levels of education tend to have better health), or the health gradient in education may be attributable to shared influences between education and health, such as psychosocial strengths, genetics, or family background, which impact both schooling and health. When these possibilities are controlled for in the causal regression of education on health, the estimated coefficient associated with educational attainment is frequently found to be statistically non-significant. Consequently, these arguments posit a two-way relationship between education and mental health, with no a priori concrete causality (Hultin et al., 2016; Amin et al., 2023). It is necessary to take this two-way direction into account when studying the phenomenon.

Against this background, our research question is whether overeducation and mental health problems can also be bidirectionally caused. Thus, overeducated individuals may have mental health problems if they feel dissatisfied and stressed in the job they possess.

[1] Certain studies find a positive relationship between educational level and health at higher levels of education. In China, Jiang et al. (2020) and Wang (2021) analyze how education affects mental health, focusing on the changes in compulsory education laws in the mid-1980s, concluding that individuals with significantly more education are less likely to experience depression (see also Xu & Chen, 2024). Fletcher (2008) examines adolescent depression and educational attainment, obtaining different results for men and women, with adolescent women with depression found to be less likely to graduate than those without depression. Amin et al. (2023) studies the relationship between education and adult mental health in the UK in a sample of siblings and shows that education reduces the development of mental health problems, even when there is a genetic propensity to have this type of disease.

But individuals with poor mental health may be in jobs for which they are overeducated. Although healthier individuals more frequently select into higher education than those with health problems, it might happen that less healthy individuals pursue higher education to become a better candidate for accessing the labor market or to signal more ability than it is supposed they possess. It has been found that overeducation can serve less skilled individuals as a way of avoiding being unemployed (Green et al., 2002) or in temporary contracts (Ortiz, 2010); to move ahead in the queue for accessing employment (Lene, 2011), to speed promotion within the firm (Bedemariam & Ramos, 2021), or as a way to compensate for the skills diminished by their illness.[2] Eventually, these individuals may land in a job for which they are overeducated when their true ability is revealed. Additionally, it is also possible that workers in poor health are discriminated against and are more likely to suffer the consequences of overeducation than other workers (Madden, 2004; Jones, 2006).

More specifically, this paper aims to analyze the relationship between overeducation and the mental health of workers with higher education in Spain, allowing for the possibility that the two variables influence each other. According to Eurostat (2022), Spain is among those countries with the highest rates of overeducation at 35.9%, which is well above the EU average of 22.2%, especially among young people (38%, as reported by Albert et al., 2023). Mental health has historically been neglected and stigmatized in Spanish society to such an extent that, even after the Great Recession, few studies have focused on the impact of the economic situation on mental health (Bartoll et al., 2014).

Overall, our contribution is unique in the following three aspects. First, we study the relationship between overeducation and mental health without imposing any direction of causality. Second, an important novelty of our study is that, in addressing the question of endogeneity raised by the bidirectional causality between overeducation and mental illness, it uses appropriate econometric tools. In particular, maximum likelihood estimation with simulated conditional mixed process models is applied to the joint estimation of a two-equation model, with discrete endogenous variables mutually influencing each other (Heckman, 1978, 1979). Third, we focus on a country characterized by high levels of overeducation, where mental health problems have traditionally been ignored. Our results suggest that poor mental health leads to more educated workers accepting jobs for which they are overeducated, with no evidence that being overeducated leads to poorer mental health. Thus, our study shows that there are different mechanisms underlying the relationship between overeducation and mental health, and that rigorous research on this topic should take these mechanisms into account.

[2] See García-Mainar and Montuenga (2019) and Green and McIntosh (2007) on how overeducation serves to address workers' deficiencies in terms of competencies, skills or abilities, or to improve access to employment or to improved job-related attributes. This case elucidates the distinction between overeducation and the related concept of overqualification. As not all the skills or abilities required for a job are obtained through formal education, it is possible for individuals to have adequate training for a job but lack some of the skills necessary to perform it properly: the individual is said to be underqualified for the job. In such circumstances, some individuals may seek to have a surplus of education to compensate for lower skills than those required by the job, so that they become overeducated for the job. The term "overqualification" is employed when an individual's skill set, abilities, or competencies exceed the requisites for a specific position. Our data only provide information on formal education and so only the situation of overeducation is considered in the analysis.

2 Literature Review

The most common argument for the existence of a positive relationship between health and education is based on the role of health as a component of human capital (Grossman, 1972; Becker, 2007). Mirowsky and Ross (1998, 2003) develop this idea by distinguishing between the allocation and socialization functions of human capital. The allocation function reflects the fact that a higher level of education gives a person access to jobs with better pay, status, and working conditions, thereby allowing for a better quality of life. The socialization function (or learned effectiveness) represents the fact that more highly educated individuals have effective agency (i.e., the ability to initiate and control their actions) with greater autonomy and possess emotional intelligence and control that motivates them to opt for a healthier lifestyle and thereby enables them to face everyday life problems. Simultaneously, the socialization function empowers individuals to access better social support networks (Bracke et al., 2013; Hultin et al., 2016).

More recent studies question whether continuing education has a positive impact on physical and mental health (see Bracke et al., 2013; and Xue et al., 2021, for a meta-analysis). One argument states that, although more education allows access to better jobs (with higher salary, status, and job security), such jobs entail greater demands and responsibility, which can generate more psychosocial stress (Dahmann & Schnitzlein, 2019; Hultin et al., 2016). The prevalence of mental health issues, including depression and anxiety, among higher education students has increasingly been documented. In addition to well-established related academic factors, such as academic stress, transitional stress, or academic anxiety, new factors have emerged in recent years. These include social isolation, financial strain, and a lack of culturally sensitive resources (Hyseni Duraku et al., 2024). However, the stress endured by individuals pursuing extended study careers can also serve as a catalyst for adapting to such a career in terms of self-esteem and self-autonomy (Burger et al., 2024). Consequently, an escalating prevalence of mental illness has been observed among new entrants into the labor market.

A second argument derives from an alternative view to the human capital theory: credentialism (Collins, 1979). In this view, educational attainment serves to rank candidates entering the labor market; thus, workers increasingly desire higher education as it allows them to gain a competitive advantage in the job market. However, the generalized growth in the education level of the population observed in recent decades has not always been fully matched by a corresponding occupational upgrading and an increase in the demand for skilled labor, thereby generating the phenomenon of overeducation.

Overeducation may impact workers' mental health in several ways. The status inconsistency literature (Lenski, 1954) argues that educational mismatches result in negative psychosocial states such as stress, anxiety or dissatisfaction for the individual (Wiedner, 2022) and eventually to poor mental health (Zhao et al., 2024). Within this general view, both the identity conflict (Stryker & Macke, 1978) and the relative deprivation (Runciman, 1966) theories claim that the comparison with their peers in jobs that match their education level generates uncertainty about the individual's identity and status, leading to unmet aspirations or expectations that result in frustration, anger and other negative psychosocial consequences. The difference between both theories lies in that, according to the relative deprivation theory, only the overeducated may suffer such consequences, whereas according to identity conflict theory both overeducated and undereducated would be affected. In

this vein, a similar prediction is derived from the job demand–control theory (Karasek, 1979), by which mismatched individuals experience challenges in decision-making related to managing the demands of a job. Most empirical evidence indicates that overeducation (although not undereducation) is associated with lower job satisfaction (Maynard et al., 2006; Artes et al., 2013; Bedemariam & Ramos, 2021; Wiedner, 2022; Zhao et al., 2024, among others).

The relative deprivation theory is reinforced by the sense of effort-reward imbalance (ERI) and unfairness, according to which high effort is under-rewarded, causing emotional distress (Madsen and Kittelsen-Roberg, 2021; Adriaans, 2023). This ERI model (Siegrist, 1996) is somewhat rooted in the theory of distributive injustice (Colquitt et al., 2001), according to which overeducated people feel unfairly treated. One additional explanation is that of the person-job fit (Edwards, 1991), according to which a better fit is associated with higher job satisfaction, motivation, and physical and mental health. Overeducation reflects a poor fit between demand-abilities and supply-needs, i.e. a mismatch between what the job provides and what individuals need from their jobs (Hultin et al., 2016; Erdogan & Bauer, 2021).

Regardless of the mechanism through which overeducation is related to mental health, the consequence is clear: overeducation may produce psychosocial stress or act as a work stressor, depreciating cognitive skills, reducing job satisfaction and psychosocial well-being (see Erdogan & Bauer, 2021, and the meta-analysis by Harari et al., 2017), all associated with an increase in depression and other mental problems. To the best of our knowledge, Johnson and Johnson (1999) were the first to find a negative relationship between different types of underemployment, including perceived overqualification, and mental health, pointing out that the characteristics associated with the jobs held by the overeducated generate this poorer health status. The overeducated occupy positions that are associated with characteristics such as risk, insecurity, instability, or promotion prospects that are worse than those of better-adjusted workers (see also Scott-Marshall et al., 2007).

Bracke et al. (2013, 2014), Dudal and Bracke (2019), and Delaruelle et al. (2018, 2020) related educational level to health indicators for a set of countries—considering different characteristics of the countries' citizens or institutions (gender, curricular choice, unemployment level, etc.)—and found a negative relationship between both variables. For example, Bracke et al. (2014), study of 21 EU countries found that, at the individual level, the overqualified have systematically worse health than their better-adjusted peers and that, at the population level, mental health returns to education decline as educational attainment increases. Dudal and Bracke (2019) showed that overeducation is positively associated with depressive symptoms, with the unemployment rate stimulating a direct effect on depression.

One final argument that challenges the alleged positive effect of education on health is based on the possible existence of reverse causality, or selection mechanisms, by which those individuals with mental health illness find it more difficult to reach higher educational attainment. Meta-analyses show that depression diagnosis leads to lower educational attainment (Wickersham et al., 2021). Also, it is possible that confounding factors simultaneously affect both education and health-related decisions. In this context, when simultaneity is addressed, the causal effect of education on health attenuates or even vanishes (Montez & Friedman, 2015; Lynch and con Happel, 2016; Albarran et al., 2020).

In many studies showing the negative effect of overeducation on mental health, the issue of the direction of causality is not questioned; thus, causality is only intuited or based on cer-

tain controls included in the regression analyses. When, in other studies, it comes to controlling possible endogeneity biases, the relationship between overeducation and psychosocial stress remains unclear. Fischer and Sousa-Poza (2009) find that, in Germany, job satisfaction positively influences a range of health indicators, after controlling for unobserved heterogeneity (personality traits). Hultin et al. (2016) found that overeducated women—but not men—in Stockholm County have poorer mental health than their peers in matched positions but present no difference from those with less education in the same position. They concluded that this negative relationship is not due to being overeducated per se; the positions that individuals hold lead to a higher risk of mental problems.

Zhu and Chen (2016) used fixed effects to control for unobserved individual heterogeneity, with data from Australia, and found that the negative relationship is confirmed between individuals with a skill mismatch and poor mental health, but not between those with overqualification and poor mental health. Similarly, and also for Milner et al. (2017) use panel data and instrumental variable analysis to show that objective measures of status inconsistency had no significant association with mental health (when using perceived lack of skill measures, a small increase in depressive and symptoms was observed). Madsen and Kittelsen-Roberg (2021) used data from Norway and found that the negative relationship between being overqualified and the probability of requiring long-term sick leave is reduced when unobserved individual heterogeneity is controlled. However, they point out that all existing endogeneity remains unaccounted for due to time-varying individual heterogeneity and reverse causality. Zhao et al. (2004) find that overeducation hurts mental health in China, using instrumental variable estimations.

Our study aims to investigate the relationship between overeducation and mental illness, taking into account the possibility of bidirectional causality. No prior study has investigated this relationship in Spain (in papers tackling multi-country analyses (Bracke et al., 2013, 2014), Spain has not been considered). A cross-country study by Albarran et al. (2020) on the causality between education and various health measures mentions Spain, but only to state that the country was excluded from the final analysis because the instrument consisting of a change in the compulsory schooling law showed no effect on education levels for Spain. Certain studies have confirmed a negative relationship between overqualification and job satisfaction (Peiro et al., 2010; Artes et al., 2013; Beldemariam and Ramos, 2021; Voces & Caínzos, 2021) but this relationship is not as clear for all dimensions of job satisfaction (García-Mainar and Montuenga-Gómez, 2020).

The case of Spain is worth studying since it is a member of the European Union, with the highest rates of overqualification (near 36%, Eurostat, 2022). Rapid growth in higher education has not been accompanied by a general increase at all levels, with the result that the structure of the Spanish workforce in terms of educational attainment has the shape of an hourglass, with near 50% being highly educated and with less than 25% having non-compulsory secondary education. In this context, many intermediate positions can be filled by workers with higher education, leading to a downgrading of qualifications.

Spain is also a country with significant numbers of unemployed. The average calculated over the last 30 years is close to 15% and during the Great Recession it exceeded 26%. The minimum value since 1980 was reached in 2008, 8%, and today it is over 10%. Under these circumstances, the stigma associated with being overeducated is lower than that associated with being unemployed, although both situations are quite commonly accepted socially. Bracke et al. (2014) and Dudal and Bracke (2019) show an enhancement of the negative

consequences of overeducation on mental health in countries with higher and more sustained unemployment rates. Similarly, several indicators of job insecurity are very high in Spain: the temporary employment rate reached values consistently close to 30% until 2021, while the part-time rate has increased since the 2012 labor reform. Bedemariam and Ramos (2021) showed that this lack of job security in the Spanish economy exacerbates individuals' sense of relative deprivation. Finally, the tracking system in Spain is not especially rigid (tracking starts when students turn 16 years old). The negative relationship between overeducation and mental health is stronger in societies that are more strictly tracked (Delaruelle et al., 2020).

3 Data

This study analyzes microdata published by the European Health Interview Survey (EHIS), coordinated by Eurostat, for the last two available years, 2014 and 2020. The variables of interest in our study include various indicators of mental health status and whether the worker is overeducated. In addition, other personal, employment, and place of residence variables are included as controls.

Mental health status is represented by a series of dichotomous variables capturing different diagnosed illnesses. The first variable (Q1) is elaborated from the answer (Yes/No) to the question: *Do you have or have you ever had a diagnosis of chronic depression*, *anxiety or other mental illness?* This encompasses the most general notion of poor mental health within the survey. A second variable (Q2) refers only to the notion of depression, the most commonly diagnosed mental illness in our database. The question reads: *Do you have or have you ever had a diagnosis of chronic depression?* A third version of the mental health variable is very similar to the second but limited to the past 12 months (Q3): *Did you have a diagnosis of chronic depression during the past 12 months?* We use this variable to elucidate whether recent diagnosis has a different behavior with respect to being diagnosed at any time in the past.

There are three main approaches to the measurement of overeducation: subjective, objective and statistical. The first is based on workers' self-assessment of the level of education required/most appropriate for their job. In the second, experts assign job requirements to particular occupational codes in occupational classifications. In the third, the degree of appropriateness of the education is established from realized matches in the understanding that the most common match – correspondence between each occupation and a certain level/field of education – is the correct one. Thus, a typical measure is obtained by comparing years of education attained with the average (or modal) education level within the occupation of the worker.

All these measures have their pros and cons. Although there is some reason to beware of upward bias in subjective measurements, they are often the best available measure (Hartog, 2000). Conceptually, the objective is the best measure, but it is often difficult to implement and keep up-to-date, due to high costs and frequent changes in occupation classification, along with the escalation of job-requirements, and of the skills necessary to fill them. The choice of statistical as opposed to other measures of over-education is dictated by data availability. In their meta-analytic review, Groot and Maassen van den Brink (2000) show that this statistical definition yields the lowest estimate of over-education. Regardless of

each method's strengths and weaknesses, researchers hardly ever choose between these strategies, as they are constrained by the data set they are handling. Our database does not provide subjective information on the job-education match. We use several variants of the realized matches method and a quite general objective measure. We can only accept the shortcomings of the strategy we employ and interpret the results with the necessary caution. For recent surveys on measuring overeducation, see Leuven and Oosterbeek (2011) and McGuinnes et al. (2018). For a comparison between different measures, see Capsada-Munsech (2019).

We use various measures of overeducation. The first follows the statistical method. The survey records the educational level attained by a worker and we impute for each individual the number of years of education from the number of years required to reach each educational level. We then compute the most frequent value of the number of years for each of the 62 occupations at the 2-digit 2008 International Standard Classification of Occupations (ISCO-08) disaggregation level (considering all individuals in the whole sample). Accordingly, we take a person in the sample as overeducated when their number of years of study exceeds the modal value of the educational level of all workers in their occupation. As alternative measures, we also use the mean (plus one standard deviation) and the 80th percentile of the number of years within each occupational group (Ortiz & Kucel, 2008). In consequence, workers are considered to be overeducated in the given job match if the number of years exceeds the mean (plus one standard deviation) or the 80th percentile, respectively, of the distribution of observed number of years in the given occupation. We also employ an objective measure based on the assumption that graduate workers should be employed in categories 1 to 3 in the 1-digit ISCO-08 classification. Consequently, any individual in the sample working in an occupation corresponding to groups 4 to 9 of such classification must be considered as overeducated. This definition is identical to that used by Eurostat (2022).

The personal variables used as controls are gender, age, whether the individual is married (or living with their partner), whether they are a foreigner (born outside the country), and whether they have a university education (ISCED-11 groups 6, 7, and 8), as opposed to those with a non-university higher education (ISCED-11 group 5). ISCED-11 is the 2011 International Standard Classification of Education. In addition, four dummy variables indicating participants' body mass index (BMI) are used, which act as a control for the person's general health status. Concerning the employment variables, we have a dummy variable indicating whether the respondent works as a salaried employee and four dummy variables denoting the sector of activity in which they are employed. We then consider a variable on the place of residence, which consists of the number of hours of sunshine in their region (expressed in thousands of hours per year) as evidence has shown that exposure to the sun is positively correlated with mental health (Razzaque, 2018).

We limit our analysis to respondents to the EHIS who supply all the relevant information, are employed, and have completed higher education. The selection of only workers who have completed higher education is an attempt to focus on the link between overeducation and mental health in the workplace. As indicated in the literature review, since the positive relationship between education and health is less obvious in this group of workers (Bracke et al., 2013; Dudal & Bracke, 2019), the possible existence of a negative relationship between overeducation and mental health will be more easily identifiable if we focus on workers with higher educational attainment, in terms of both university and non-university education. The resulting total sample after selection was 8,460 observations. The selection

procedure of the sample is as follows: the initial sample had 22,842 observations for 2014 and 22,072 for 2020. We drop observations of those who are not employed and are lacking information for some of the relevant variables, leaving a total of 9,719 individuals for 2014 and 9,799 for 2020. We retained the observations of those who graduated, amounting to 4,202 for 2014 and 4,258 for 2020, respectively.[3]

4 Methodology

The econometric analysis of the relationship between the variables that approximate mental health and overeducation requires consideration of the possibility of a double causality between them. The model we propose is the estimation of the following simultaneous system of two Eq. (1), wherein the dependent variables influence each other:

$$MH_{it} = \alpha + \beta_0 X_{it} + \beta_1 Z_{it} + \gamma_0 \hat{OE}_{it} + \epsilon_{1it}$$

,

$$OE_{it} = \lambda + \mu_0 X_{it} + \mu_1 W_{it} + \delta_0 \hat{MH}_{it} + \epsilon_{2it} \quad (1)$$

,

where *MH* denotes the mental health status variable, *OE* denotes overeducation, *X* is a set of regressors common to both equations, *Z* is a set of regressors involved only in the mental health equation, and *W* is a set of regressors involved only in the educational mismatch equation. *X*, *Z*, and *W* are considered predetermined when not exogenous. The disturbances are assumed to follow a bivariate normal distribution. In the estimation, the unobserved latent variables of mental health status MH_{it} and overeducation OE_{it} are approximated by dichotomous variables based on whether a person is diagnosed with some mental illness ($\hat{MH}_{it}$) and whether there is overeducation ($\hat{OE}_{it}$).

Although the original theoretical model (1) is not recursive, the model that will be finally estimated is recursive (Roodman, 2011). Thus, to determine the estimates of all the coefficients of system (1), we must estimate it following a simultaneous equations approach by three-stage least squares or the generalized method of moments. However, as the dependent variables are both dichotomous and we have assumed normality in the distribution of the disturbances, we can consider maximum likelihood estimation with simulated conditional mixed process models (command "cmp" in Stata; Roodman, 2011), which is statistically more efficient. This approach consists of the joint estimation of system (1) as in the general class of multiple equations models, with discrete endogenous variables (Heckman, 1978, 1979).

Note that the correlation between education and mental health may also be attributed to the existence of factors not considered here that are common to both magnitudes and influence them simultaneously (confounders). Apart from those genetic components that

[3] Data for 2020 contain information before and after confinement. The National Institute of Statistics, responsible for the survey in Spain, indicated that the observations made before, during, and after confinement cannot be identified. In estimations, the variable indicating the period is not significant, so we can assume that this problem does not condition our results.

predispose individuals in one way or another, the degree of involvement of parents, relatives, and the social network in childcare may affect both aspects simultaneously. Similarly, the temporal scope of preferences may lead individuals to invest more, or less, in education and healthcare over time. Failure to control for these omitted variables may lead to biased (overestimated) estimates of the true impact of education on health. The joint modeling of the equations allows for the error terms to be correlated across the equations; thus, any endogeneity in the modeled equations can be corrected by way of the error correlation estimates (Roodman, 2011). The cross-equation correlations of estimated errors (ρ) are performed to test for the endogeneity of regressors: when ρ is significantly different from zero, the exogeneity of the variables is rejected.

The regressors considered allow for the efficient estimation of the system. The set of regressors X contains variables common to both equations, such as gender, age, whether a participant lives with their partner, and the year of the survey. The set Z comprises variables that are thought to be related to health status but not to overeducation in the workplace, including the variables of individual BMI and the number of sunny days in the autonomous community. The set W comprises variables related to overeducation but not to health status, such as nationality, type of higher education, and work-related variables.

5 Results

Table 1 shows the mean values of the variables, distinguishing between the subsamples of both overeducated and non-overeducated workers. Note that our baseline criterion for overeducation is the modal value, as defined above. The number of overeducated among the highly educated workers (1,965) is 23.2% of the total (8,460).[4] The variables under study show differences between the two subsamples. The variables capturing the diagnosis of some type of mental illness show higher mean values in the case of the overeducated. Overeducation has more impact on men, younger people, immigrants, individuals with non-university higher education, self-employed individuals, and non-service workers. Regarding the outcome for young people, according to human capital theory overeducation is a transitory phenomenon, more common in the initial stages of a professional career due to mismatches or rigidities in the search and matching process between workers and companies. Over time, workers end up in positions that match their qualifications (stepping-stone process). However, the most recent empirical evidence casts doubt on this view and more frequently an overeducation trap seems to be at work (see Baert et al., 2013), especially in Southern Europe (Meroni & Vera-Toscano, 2017). In the case of mental health among immigrants, it is usually found that this group can lose occupational status when arriving at the receiving country (Croillard et al., 2012; Dunlavy et al., 2016).

It is noteworthy that overeducation is more common among workers with non-university higher education. As found by Delaruelle et al. (2020), individuals who have completed upper-secondary vocational education (ISCED-11 group 5) are generally more vulnerable to

[4] The share of the overeducated varies with the measure. When using 80% of the number of years of the occupational group, the rate of overeducated is 15.6%. According to the mean (plus a standard deviation), the share increases to 30,6%. Therefore, our chosen measure of the modal value yields a rate that is somewhat in the middle between both measures. The use of the objective measure yields a 36.3% share of overeducated, resembling the value reported by Eurostat (2022).

Table 1 Summary statistics

	Overeducated		Not overeducated	
	Mean (sd)	Max/min	Mean (sd)	Max/min
Mental health variables				
Depression, anxiety or other mental illness (Q1)	0.06 (0.24)	1/0	0.05 (0.23)	1/0
Depression (Q2)	0.04 (0.20)	1/0	0.03 (0.18)	1/0
Depression 12 months (Q3)	0.03 (0.16)	1/0	0.02 (0.15)	1/0
Personal variables				
Gender (1 man, 0 woman)	0.52 (0.50)	1/0	0.45 (0.50)	1/0
Age	42.25 (9.68)	69/18	43.80 (9.89)	81/20
Cohabiting	0.58 (0.49)	1/0	0.60 (0.49)	1/0
Foreigner	0.14 (0.35)	1/0	0.05 (0.23)	1/0
University education	0.46 (0.50)	1/0	0.79 (0.41)	1/0
BMI < 18.5	0.02 (0.03)	1/0	0.02 (0.03)	1/0
18.5–25	0.44 (0.50)	1/0	0.43 (0.50)	1/0
25–30	0.38 (0.48)	1/0	0.38 (0.48)	1/0
>30	0.17 (0.37)	1/0	0.17 (0.38)	1/0
Job-related variables				
Wage-earner	0.78 (0.41)	1/0	0.85 (0.36)	1/0
Industry				
Primary	0.06 (0.08)	1/0	0.02 (0.03)	1/0
Manufacturing	0.15 (0.36)	1/0	0.11 (0.31)	1/0
Construction	0.04 (0.20)	1/0	0.03 (0.18)	1/0
Services	0.75 (0.43)	1/0	0.84 (0.37)	1/0
Residence variable				
Regional sunlight exposure	2.55 (0.53)	3.2/1.5	2.60 (0.49)	3.2/1.5
Observations	1,965		6,495	

Note: An individual is overeducated if the number of years of education attained is higher than the modal value within their occupational group

poor health than individuals who have pursued academic qualifications. We test for this possibility differentiating between one and another type of study. In Spain, there is a substantial gap in educational levels, with 30% of the total number of workers having completed only compulsory schooling and 46% having completed higher education. Thus, only the remaining 24% of workers have completed non-compulsory secondary education (Spanish Labor

Force Survey, 2022). Workers with non-university higher studies may eventually occupy positions that would correspond to secondary studies, reinforcing a certain signaling of superiority of highly educated workers in Spain (García-Mainar and Montuenga, 2019).

Table 2 shows the results of the marginal effects estimated from system (1) for the three variables of mental illness considered. There is little qualitative difference in the estimated effects, so we will comment on the results of the sets of estimates now. In the estimation of the first of the system's equations, that of mental health, the variable "overeducation" is not statistically significant in either of the three cases, indicating that when simultaneity is controlled for, overeducation does not lead to a higher likelihood of diagnosing any mental illness. Regarding other variables, poor mental health is higher among women and older adults, whereas living with a partner or having a low BMI reduces the probability of depression. Results in the literature tend to show that those with a BMI far from the standard are more likely to suffer from some type of mental problems (see Badillo et al., 2022, Noh et al., 2015). Hours of sunlight exposure in the place of residence are significant, as suffering from some poor mental health is associated with low exposure to sunlight. This result is in line with prior findings of the protective role of sunlight against physical and mental illnesses (for example, Razzaque, 2018; Luo et al., 2022; Wang et al., 2023). This is important in the case of Spain as sunlight hours vary across regions. For example, in 2014, there were 1,529 h of sunlight in Cantabria and 3,239 in the Canary Islands (in our data, the depression rate in Cantabria is 3.6%, three times that found in the Canary Islands, 1.16%). Finally, the variable identifying the year to which the sample observation belongs is non-significant.

Regarding the mismatch equation, the probability of being overeducated is higher among men, immigrants, those living with a partner, self-employed individuals, those working in the primary sector, and for the year 2020. In contrast, overeducation is less common among older workers and individuals who have completed university studies. More importantly, there is a very strong direct effect of the mental illness indicators of overeducation, which clarifies the direction of the relationship between both variables.

Another important variable to analyze is the coefficient ρ in the estimation, capturing the effect of the omitted variables in the estimation. Its significance confirms the endogeneity of both variables. In contrast, the negative sign indicates that factors not considered in the study that are negatively associated with overeducation tend to be positively associated with depression. For example, highly responsible or demanding jobs, usually held by highly educated and well-adjusted workers, can generate psychosocial stress.

5.1 Robustness Checks

Taken together, the estimates of system (1) show that the direction of causality goes from mental health to overeducation when simultaneity issues are tackled. To check for robustness of the estimates, we have repeated the analysis considering different alternatives, as described below. In all cases, Q1 is taken as the variable capturing diagnosed mental illness, provided that more restricted definitions yield similar results. Table 3 retains the marginal effects for the variables of interest - overeducation in the mental health equation and the variable Q1 in the overeducation equation. Additionally, the estimate of the ρ-coefficient is presented along with the number of observations. First, we estimate for the two time periods separately (columns 1 and 2). Second, we group all workers without distinguishing between university and non-university graduates (column 3). Third, since overeducation is

Table 2 Maximum likelihood estimation of simultaneous system (1). Marginal effects

	Depression, anxiety or other mental illness (Q1)	Depression (Q2)	Depression 12 months (Q3)
Mental Health equation	Marg. effect (sd)	Marg. effect (sd)	Marg. effect (sd)
Gender (1 man, 0 woman)	-0.042*** (0.06)	-0.027*** (0.005)	-0.018*** (0.005)
Age	0.002*** (0.000)	0.002*** (0.001)	0.002*** (0.001)
Cohabiting	-0.023*** (0.006)	-0.020*** (0.004)	-0.012*** (0.004)
BMI < 18.5	-0.020** (0.010)	-0.019** (0.009)	-0.020* (0.009)
18.5–25 (ref.)			
25–30	0.001 (0.001)	-0.001 (0.004)	0.001 (0.002)
>30	-0.001 (0.001)	-0.001 (0.004)	-0.001 (0.003)
Region sunlight exposure	-0.001** (0.000)	-0.001*** (0.000)	-0.001** (0.000)
Overeducation	**0.006 (0.006)**	**0.013 (0.009)**	**0.021 (0.015)**
Year (1 = 2020, 0 = 2014)	-0.003 (0.006)	-0.006 (0.005)	-0.006 (0.005)
Overeducation equation			
Gender (1 man, 0 woman)	0.115*** (0.027)	0.086*** (0.026)	0.085*** (0.019)
Age	-0.004*** (0.001)	-0.003*** (0.000)	-0.003*** (0.000)
Cohabiting	0.041*** (0.013)	0.034*** (0.009)	0.035** (0.009)
Foreigner	0.182*** (0.009)	0.170*** (0.004)	0.166*** (0.005)
University education	-0.203*** (0.009)	-0.202*** (0.009)	-0.197*** (0.008)
Wage-earner	-0.051*** (0.012)	-0.042*** (0.011)	-0.039*** (0.010)
Primary (ref.)			
Manufacture	-0.093*** (0.026)	-0.090*** (0.009)	-0.087** (0.044)
Construction	-0.112*** (0.031)	-0.112*** (0.030)	-0.099** (0.027)
Services	-0.095*** (0.030)	-0.099*** (0.022)	-0.097*** (0.023)
Mental Health variable	**0.164*** (0.034)**	**0.154*** (0.026)**	**0.158*** (0.031)**
Year (1 = 2020, 0 = 2014)	0.031** (0.016)	0.028** (0.014)	0.031*** (0.009)
ρ (coefficient and s.d.)	-0.518*** (0.180)	-0.690*** (0.138)	-0.804*** (0.134)
Log Likelihood	-5525.73	-4883.86	-4570.73
Observations	8,460	8,460	8,460

Abbreviation used: ref. (reference category). Marginal effects with their standard errors in parentheses. * $p<0.1$, ** $p<0.5$, *** $p<0.01$

Table 3 Robustness checks. Mental health variable: Q1 depression, anxiety or other mental illness

	2014	2020	Without university variable	Without over-education in health eq	Age<40	Age>39	Overeducation 80%	Overeducation Mean+s.d.	Overeducation Occupation group>3
Mental Health equation									
Overeducation	0.003 (0.010)	0.009 (0.089)	0.006 (0.006)		0.002 (0.009)	0.006 (0.009)	0.010 (0.007)	0.003 (0.006)	0.010 (0.07)
Overeducation equation									
(Q1) Depression, anxiety or other	0.168*** (0.054)	0.152*** (0.057)	0.158*** (0.043)	0.163*** (0.034)	0.142** (0.071)	0.162** (0.082)	0.132*** (0.050)	0.148*** (0.052)	0.169*** (0.060)
ρ coefficient (s. d.)	-0.843*** (0.110)	-0.647*** (0.194)	-0.664*** (0.160)	-0.831*** (0.092)	-0.619*** (0.234)	-0.402* (0.229)	-0.117** (0.059)	-0.374** (0.178)	-0.179** (0.081)
Log Likelihood	-2583.89	-2926.10	-5832.90	-5523.67	-1955.63	-3563.53	-4861.98	-6368.35	-5919.91
Observations	4202	4258	8460	8460	3494	4966	8460	8460	8460

Note: Marginal effects (standard errors in parentheses). * $p<0.1$, ** $p<0.5$, *** $p<0.01$

non-significant in the mental health equation, we estimate system (1) removing that variable (column 4). Fourth, we distinguish between young and old individuals to control for some possible cohort effects or changes in educational laws (columns 5 and 6). Qualitative results remain unchanged: the marginal effect estimated is non-significant in the mental health equation, whereas suffering from poor mental health leads to overeducation in the workplace. The three last columns present the estimated effects for each of the three alternative measures of overeducation described above. In all cases, the results obtained confirm those presented in Table 2. The whole sets of estimates for these regressions are presented in Table A in the Appendix.

6 Conclusion

The supposed positive effect of individual educational level on mental health status may have certain limitations, especially at higher levels of education (Bracke et al., 2013; Dudal & Bracke, 2019). Possible explanations for this finding include the expected negative effect of overeducation, leading to psychosocial stress; lower job satisfaction; and a feeling of relative deprivation, frustration, or limited control (Madsen and Kittelsen-Ryberg, 2021). All these can worsen mental health thus counteracting the potential protective effect of education on health. Other explanations are based on reverse causality and selection, whereby it is good mental health that leads to higher educational attainment, or that both phenomena, education and health, are simultaneously affected by common, confounding, external factors (Montez & Friedman, 2015; Lynch and von Kippel, 2016).

In this study, we examine the association between overeducation and mental health status in Spain, considering the potential bidirectional relationship between these two variables. Our objective was to ascertain whether overeducation leads to poorer mental health or if there exists a reverse causality, whereby individuals with mental disorders subsequently occupy roles for which they are overeducated. To achieve this objective, a system of equations is estimated using a maximum likelihood method that controls for factors that may be correlated among the equations. This approach ensures that any potential endogeneity is captured.

Our results indicate that the causality between these variables runs from health status to overeducation and not the other way around: a worker with a diagnosed mental illness experiences greater difficulty finding a job commensurate with their educational level than one who does not suffer from it. These results are robust to different definitions of mental health and overeducation measures as well as to the moment of time considered.

One limitation of our study is that the methodology applied allows for controlling endogeneity, but it does not permit us to identify the specific drivers of causality. We can only hypothesize some potential explanations for the results observed, based on prior findings from the literature. Thus, Artes et al. (2013) and Hultin et al. (2016) found that it is the characteristics of the jobs, but not the fact of being overeducated, that was associated with lower mental health. Specifically, Artes et al. (2013), in the case of Spain, showed that the overeducated had lower job satisfaction than those with the same level of qualification who are in matched jobs, but they did not achieve less job satisfaction than those in the same jobs. The credentialist perspective on education is a second hypothesis, since it can elucidate the phenomenon of individuals with poor mental health pursuing higher educa-

tion and eventually attaining an excess of credentials. This phenomenon can be attributed to the possibility that individuals with mental illness may exhibit lower productivity compared to those without such conditions. In such cases, the educational surplus can serve as a compensatory mechanism, potentially offsetting the lower skills associated with their poor health status. This educational surplus functions as a mechanism to circumvent the risk of unemployment (Green et al., 2002), to secure more permanent employment contracts (Ortiz, 2010), to ascend within the employment hierarchy (Lene, 2011), or to expedite professional advancement within the organization (Bedemariam & Ramos, 2021).

In a somewhat related issue, Jones and Sloane (2010) showed that the disabled are more prone than the non-disabled to educational mismatch. Although some type of discrimination may underly this result, unobserved productivity factors also explain part of the differences (Jones, 2006). A similar argument can be applied to the case of those with poor mental health. Several factors influencing productivity are unknown to us: genetic features, personality traits, parental influence, or the health status when individuals were students. Panel data would help in dealing with such unobserved heterogeneity, but the unavailability of longitudinal data that could control individual variables that do not change over time, such as personality, cognitive skills, or baseline health status, prevents it. We have tried to reduce the sample selection problem by focusing only on workers with a high level of education.

The present study would benefit from the incorporation of indicators that measure not only the incidence of mental illness, but also its severity and frequency. Notwithstanding these limitations, our findings call into question the causal relationship between overeducation and mental health status among college-educated workers, thereby establishing a basis for future research. The identification of the direction and intensity of causality between these variables serves as a starting point for future research, which could encompass an expanded analysis of the entire working population or a comparative analysis with other analogous societies. In this sense, while comparisons with recent research in China or the Nordic countries, like those mentioned in this paper, may be of interest, the characteristics of Spanish society are more closely aligned with those of Southern and Mediterranean European countries, which could also be a topic for future research.

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Declarations

Ethics Approval and Consent to Participate Not applicable.

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