How Covid-19 changed economic and health-related worries in Italy

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Abstract
The Covid-19 pandemic has been a huge challenge for governments all over the world, as well as for the World Health Organization (WHO) and the pharmaceutical companies in charge of creating the vaccines against the coronavirus. The success of all the efforts and the measures put in place to contain the spread of the contagion and to immunize people, however, also depends on people social compliance. In this study, we thus investigate how demographic and socio-economic variables affected individuals’ economic and health-related worries due to the Covid-19 pandemic. Using questions created by the WHO, we surveyed about 3000 Italians between May and June 2020. Our results show that individuals’ socio-demographic and socio-economic characteristics are engaged with distinct types of worries due to Covid-19, such as health-related worries, economic-related worries and worries connected to restrictions on movements. Our findings have implications for decision makers and policy makers in showing how important is to consider demographic and socio-economic differences between individuals, to better understand how people are differently affected by different worries and which actions and policies may be more effective in protecting and supporting people especially the most vulnerable ones.

Keywords Covid-19 coronavirus pandemic · Demographic and socio-economic individual characteristics · Economic worries · Health-related worries · Italy

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Introduction and literature review

The Coronavirus pandemic is one of the greatest challenges of recent decades. Governments struggled to implement measures to contain the virus spreading. Almost everywhere, governments proposed “soft measures” such as disinfection guidelines and behavioral recommendations, but as the situation worsen, they took drastic measures, such as lockdowns.

Italy was an exception as the government quickly decided to move from soft to hard containment measures, due to the severity of Covid-19. At the beginning of the pandemic, before it started to hit other European countries, a debate on the existence of an “Italian case” asked why Italy was so deeply impacted by coronavirus compared to other European countries. The Italian government was accused to have acted poorly to contain the virus and it was perceived as creating the conditions for the virus to spread. However, later on, the opposite seemed true, and it was understood that being the first western country severely hit by the Coronavirus, Italy had just been ill-fated, and it was simply unprepared to face this huge challenge. Eventually, it has been internationally recognized that the measures put in place by the Italian government to contain the virus were probably among the most effective ones (Armillei and Filippucci 2020). If on one hand the total lockdown served to save thousands of lives, on the other hand it had a tremendous impact from an economic point of view, in a sort of macabre trade-off between economic and casualties’ numbers. It is important to stress that the effectiveness of government measures depends on citizens’ social compliance and responsibility, that, in turn, depend on how worried people are, both from a health and economic point of view.

Müller and Rau (2021) propose a survey study, analyzing the extent to which three key economic preferences (risk, time, trust) are able to predict citizens’ social compliance to government’s policy measures. They investigate how economic preferences and social responsibility shape people’s perception of the dangers associated with coronavirus as well as people behaviors related to avoiding crowds, staying at home, panic buying, and willingness to get tested for Covid-19. They found that higher risk tolerance is associated with a lower propensity to avoid crowds, higher patience increases compliance with government’s measures, while present bias leads to panic buying. Furthermore, they find a positive relationship between social responsibility and compliance to government’s measures.

Our main goal is to discern which were the main economic and health worries of people during the pandemic, classifying people depending on demographic and socio-economic variables to verify if these variables are able to explain why different people were impacted differently by the distinct worries connected to the Coronavirus. As shown by Cervellati et al. (2022), while socio-economic characteristics are usually considered as mere control variables, in the new pandemic context, they may represent important explanatory variables as the coronavirus differently affected people with distinct individual characteristics.

Based on previous findings in the literature, we consider the following variables: age, gender, civil status, education, work status, income, area of residence, economic satisfaction changes due to the pandemic (described in detail below).
With regard to age, it should be considered that younger people are likely to have a better general health condition, as well as to (subjectively) feel more vigorous, compared to older ones, thus they may have been less worried about the health issue. Older people, instead, are on average more likely to health problems compared to younger ones. In addition, this awareness of greater vulnerability was probably intensified by the pandemic’s toll among elders, as the number of casualties due to the Covid-19 were terrible among older Italians in the first months of the pandemic in spring 2020. Thus, older people may have been more worried (or even scared) of getting the virus, compared to younger ones. On the other hand, older people typically have higher accumulated wealth than younger ones, so they may be less worried from a personal economic point of view, which is about not being able to purchase what they need, even in case of shortages that could have driven up prices. In addition, the sudden deprivation of social contact (e.g., dating, hanging out with friends, parties, sports—that is particularly important to young people—due to the lockdown and to the other restrictions on movements, may have been more stressful to them than to older people. Thus, we may expect younger people to be more worried than older ones about restrictions on movements.

Gender differences may explain different behaviors and degrees of life and economics satisfaction. During the lockdown, women in general bore the greatest part of household duties and children care, having to combine them together with smart working. In some cases, women eventually resigned from their job to take care of their families. Of course, also some men did so, but to a lesser extent. Thus, gender appears to be an important explanatory variable of the economic worries. With regard to health-related worries, Cervellati et al. (2022) showed that Italian men exhibited less healthy behaviors than women, probably due to trait impulsivity Clay and Parker (2020), which is the tendency to act without adequate forethought.

During the pandemic period, especially during the lockdown months, civil status played a major role with respect to changes in life and economic satisfaction and to health-related and economic worries. People happiness is affected by the time people spend with others, thus, during the lockdown, it made a difference if individuals were alone or with their spouse, kids, parents, and etcetera. Adjusting for several socio-demographic and economic variables, Cervellati et al. (2022) find that satisfaction among married people increases as the time spent with the spouse increases. Since the lockdown forced married people to spend time with their spouses, the author’s simulations show that their happiness increased compared to before the lockdown. Instead, their happiness decreased when they were losing work time (for example due to child caring) or when their income decreased. For singles, on the other side, life satisfaction decreased as time spent alone increased: lockdown forced solitude on singles and their happiness decreased in general (they were alone to cook, grocery shopping, etcetera, but also in terms of affect they may feel alone), in particular for whom also suffered income and work time losses. Huebener et al. (2020) investigate the effects of movement restrictions that the German government put in place to contain the spread of the virus on individuals with dependent children. Through a survey administered in May and June 2020, when day care centers and school were closed in Germany, but other government’s measures had been relaxed and new infections were low, the authors’ goal was to analyze the effect of
such closures on parental wellbeing. They find that the Covid-19 crisis decreased the wellbeing of individuals with children, especially for those with young children, for women, and for people with lower levels of education. Thus, their study shows that government’s measures to contain crisis such as Covid-19 do have large effects on family wellbeing, with implications both for parents’ work and for child development. With regard to Italy, Cervellati et al. (2022) found that married individuals (single, divorced, or widowed) behaved in a healthier way compared to unmarried ones. They were probably able to eat healthier than unmarried ones that, in addition, probably due to loneliness caused by isolation during the lockdown months and consequent higher levels of stress and worries, tended to drink more alcohol and to exhibit more precautionary buying than married ones. This evidence is in line with previous studies showing how alcohol misuse (Clay and Parker 2020) and unhealthy eating (Rundle et al. 2020) have been more common among unmarried people. At the same time, unmarried people adhered more closely to social distancing practices than married ones. If, on one hand, single, divorced, and widowed people may have felt deeply the loneliness, stress, and worries caused by the pandemic, especially during the lockdown, thus being tempted to meet family members and friends, on the other hand they may have preferred to comply with social distance to protect themselves and others. In addition, it should be kept in mind that every person in a household adds to the size of its network of social contacts, thus to the desire and need for contact with others. Not all couples, however, agreed with regard to how many visitors to allow in their home or who to visit. Unmarried people living alone, instead, being alone, had full control over these decisions, not having to compromise with a spouse. Thus, in respect to restriction on movements worries, we do not have an aprioristic expectation, given the above-mentioned contrasting evidence.

Education is usually significant in explaining individual differences, and all other things being equal, increases the levels of life and economic satisfaction. However, in the novel coronavirus environment it is not straightforward to discern what kind of impact education had on health and economic worries. It could be that more educated people did trust the “experts” (e.g., government officials and scientists) more than less educated people, recognizing the role of experts for guidance, or vice versa that less educated people trusted and followed experts more than more educated ones that could have been more skeptical. In this respect, Cervellati et al. (2022) found that more educated people were more resilient in responding to the pandemic, keeping more healthy habits compared to less educated ones. As a possible explanation, the authors claim that it could be that higher educated people may engage in healthier behaviors because they better consider the future consequences of less healthy choices, for them and others, compared to less educated ones. Following their reasoning, we may thus expect that more educated people may be more sensitive to health-related worries, as well as to country economic worries. We do not have a prior, instead, with regard to their personal economic worries, since on one hand more educated people may worried, anticipating also for themselves financial difficulties in the future, on the other hand they are, on average, higher income earner, thus they may be less worried about their personal economic situation.

We additionally claim that work status is important in explaining the differences in life and economic satisfaction during the lockdown, because individuals’
personal situation changed dramatically if they were occupied (full vs. part-time) or unemployed. At the same time, as suggested by Cervellati et al. (2022), it is also important to consider the joint effect of demographic and socio-economic variables. In this respect, they found that young people possess, on average, lower level of income and poorer working status compared to older ones, thus we may expect younger respondents to our survey to be more worried than older ones from an economic point of view.

Of course, also income is connected to both economic worries and health-related ones since people with higher income may be less worried about incurring in financial difficulties due to the pandemic or not being able to cover health-related expenses.

We also consider people area of residence, distinguishing between small towns and big cities (based on the number of inhabitants), to ascertain if the size of the city where respondents live had an effect on changes in life and economic satisfaction and (economic and health-related) worries during the pandemic. The reason of considering the area of residence is that previous studies in the literature on life satisfaction (e.g., Helliwell et al. 2020) show that, in normal situations, life satisfaction in industrialized countries is usually higher in big cities with respect to small towns. However, the novel Covid-19 situation was far from normal, thus we want to understand if and how life satisfaction changed during the pandemic for people living in big cities versus small towns.

Armillei and Filippucci (2020) found that in Italy the epidemic had a geographical heterogeneous impact, also within most highly infected zones. They relied on a novel dataset with wide granular information, finding that higher mortality rates across municipalities were associated to people with low education and income levels, as well as with low household dimension. This evidence suggests that peripheral areas were more severely hit by the virus. We also found differences in people worries, depending on if they were living in big cities or small towns. A first possible explanation of this evidence is that since in Italy the first cases of Covid-19 were discovered in small towns, while in big cities the coronavirus seemed initially to spread less—as a matter of fact a lively debate followed trying to understand the reasons of this initial evidence—people living in small towns may have been more worried about the virus. A second potential explanation is that the spread of information differs depending on the city dimension. In small towns, people may be more affected by their small circles of acquaintances or misinterpret contagion data based on “small sample bias”. Still with regard to the Italian case, Cervellati et al. (2022) found that people living in smaller towns also displayed more precautionary buying compared to people living in bigger cities, probably because smaller cities could have lower food supplies during the pandemic, compared to big cities. Therefore, we may expect people living in small towns to be more worried than people living in big cities.

Finally, with regard to changes in economic satisfaction—that is if respondents to our survey claimed that their economic situation worsen, stayed constant, or improved during the pandemic—we expect people claiming that their economic situation improved to be less worried than others, especially from an economic
point of view, but potentially also with regard to health-related worries, since they may have felt more confident in facing potential health-related expenses.

**Data and methodology**

We collected data through questionnaires administered in Italy from the beginning of May 2020 until the end of June 2020. We used the Computer Assisted Web Interview (CAWI) survey methodology. We invited to participate about 3000 randomly selected individuals, and ended up with collecting 2950 questionnaires that, after cleaning them canceling the ones with missing values, reduced to 2872. The questionnaire included socio-economic information and worries related the health and economic domains, as well as to restrictions to movements.

With regard to worries, we used the first release of the “Survey Tool and Guidance: Behavioural Insights on COVID-19” issued by the World Health Organizations (WHO). As far as we know, we are among the first ones to use the WHO tool in Italy (see also Cervellati et al. 2022), and we use the first release of it, including questions on worries that the second release does not include. In Table 1, we describe the variables that we use and how we codified them for the analyses that follow.

To analyze the impact of Covid-19 on respondents’ worries, we used 14 specific questions provided in the first release of WHO (2020). To answer, respondents used a 10-point Likert scale ranging from 1 (Don’t worry at all) to 10 (Worry a lot), as shown in Table 2.

| Table 1 | Variables’ descriptions and codification |
|---------|----------------------------------------|
| Variable | Description and codification            |
| Age      | Respondent’s age                        |
| Gender   | Female = 0; male = 1                    |
| Civil status | Single = 1; married = 2; divorced = 3; widowed = 4 |
| Education | 0–9 Years = 1; 9–12 years = 2; more than 12 years = 3 |
| Work status | Full-time (> 35 h/week) = 1; part-time (< 35 h/week) = 2; housekeeper = 3; student = 4; retired = 5; disabled or unable to work = 6; unemployed = 7 |
| Income   | < €10,000 = 1; between €10,000 and €20,000 = 2; between €20,000 and €40,000 = 3; between €40,000 and €80,000 = 4; > €80,000 = 5; refuse to answer = 99 |
| Area of residence | Small towns (< 20,000 inhabitants) = 1; City (> 20,000 inhabitants) = 2 |
| Economic satisfaction changes | Better = 1; worse = 2; unchanged = 3 |
Results

Descriptive results

Respondents’ age ranges from 18 to 96 years, with an average of 41.67 years, and a standard deviation (SD) of 14.20. Respondents are almost equally distributed between women (47.9% of the sample) and men. With regard to civil status, 45.6% of respondents were married, 42.3% single, 8.8% divorced and 3.3% widowed. Regarding education, 14.9% of respondents completed less than 9 years of education, 23.3% between 9 and 12 years, and 62.5% more than 12 years. In terms of work situation, 49.7% of respondents worked full time, 16.2% part-time, 4.9% were housekeepers, 16.4% students, 6.3% retired, 0.6% disabled or unable to work, and 6% unemployed. By “housekeeper” we mean a man or a woman staying at home, keeping care of the house, that is, we do not mean a professional hired housekeeper. With regards to income, 19.2% preferred not to answer; 8.6% had an annual income of less than €10,000; 23.3% between €10,000 and €20,000; 31.7% between €20,000 and €40,000; 13.8% between €40,000 and €80,000; 3.5% had an income of more than €80,000. In terms of area of residence, 71.7% of respondents lived in a city (more than 20,000 inhabitants) whereas 28.3% in a small town (less than 20,000 inhabitants). Regarding income variable, the option “Preferred not to say”, coded 99, was omitted from the descriptive analysis to avoid abnormal fluctuations in the values of the average and, consequently, of the standard deviation. Thus, for this variable the number of observations is lower, that is, 2320.

The changes about economic satisfaction related to the effects of Covid-19 shows that 41.7% of respondents declared that their economic satisfactions

| Item | Worries | Range |
|------|---------|-------|
| 1    | Losing someone I love | 1–10  |
| 2    | Health system being overloaded | 1–10  |
| 3    | My own mental health | 1–10  |
| 4    | My own physical health | 1–10  |
| 5    | My loved ones’ health | 1–10  |
| 6    | Restricted liberty of movement | 1–10  |
| 7    | Loosing vacation opportunities | 1–10  |
| 8    | Small companies running out of business | 1–10  |
| 9    | Economic recession in my country | 1–10  |
| 10   | Restricted access to food supplies | 1–10  |
| 11   | Becoming unemployed | 1–10  |
| 12   | Not being able to pay my bills | 1–10  |
| 13   | Not be able to visit people who depend on me | 1–10  |
| 14   | Having to defend a decision not to participate in a social event which my family or friends expect me to attend | 1–10  |
decreased during the pandemic, 50.9% claimed that their situation remained unchanged and only 7.3% to be better off.

**Factor analysis**

We conducted a factor analysis (using SPSS 26 software). The Kaiser–Meyer–Olkin (KMO) index is equal to 0.853, whereas the Bartlett test is significant ($p = 0.000$). These results reject the null hypothesis that the matrix of correlations between variables is an identity matrix. (Hair et al., 1995). According with the K1 criterion (Kaiser 1960), factor analysis proposes the extraction of four factors, which explain in cumulative terms 70.195% of the variance. According with the standards of Peterson (2000), in Table 3, we show that the explained variance (59.23%) can be considered acceptable.

We analyzed the information provided by the worries questions through a maximum likelihood (ML) factor analysis with Promax method. Indeed, Maximum Likelihood algorithm allows reducing the dimension analysis, optimizing the dimensionality of our indicator in order to yield a more robust statistical analysis (Costello and Osborne 2005). The Pattern matrix shows that the four-factor solution is clean. The pattern matrix detects the loading of each item on the factors. Specifically, the matrix highlights whether the correlation between each item and the factor. See Table 4. The matrix has only one cross loading to be managed present in the second factor which presence, according to Krishnan (2011), is not so relevant.

We named the four factors as follows: (1) Health Worries; (2) Personal Economic Worry; (3) Country Economic Worry; (4) Restrictions on Movements Worry. We thus distinguish between health-related, economic-related worries—further dividing the latter in worries related to the personal situation from the ones related to the overall country economic situation—and worries related to restrictions on movements. We use each one of the above-mentioned four factors as dependent variables in the linear regression models that follow (see Table 6 later on). For the reasons described in detail in “Introduction and literature review”, we use as independent variables the demographic and socio-economic variables presented in Table 1.

**Table 3  Total variance explained**

| Factor | Initial eigenvalues | Extraction sums of squared loadings | Rotation sums of squared loadings |
|--------|--------------------|-----------------------------------|----------------------------------|
|        | Total | % Of variance | Cumulative % | Total | % Of Variance | Cumulative % | Total |
| 1      | 5.437 | 38.834 | 38.834 | 4.976 | 35.54 | 35.54 | 4.266 |
| 2      | 1.895 | 13.535 | 52.369 | 1.437 | 10.263 | 45.803 | 3.529 |
| 3      | 1.279 | 9.139 | 61.509 | 0.904 | 6.457 | 52.26 | 2.826 |
| 4      | 1.216 | 8.687 | 70.195 | 0.976 | 6.975 | 59.235 | 2.612 |

Extraction method: maximum likelihood
Table 4  Pattern matrix

| Factors                              | Item | (1) Health worries | (2) Personal economic worries | (3) Country economic worries | (4) Restrictions on movement worries |
|--------------------------------------|------|--------------------|-------------------------------|-------------------------------|--------------------------------------|
| Losing someone I love                | 1    | 0.938              |                               |                               |                                      |
| My loved ones’ health                | 5    | 0.894              |                               |                               |                                      |
| Health system being overloaded      | 2    | 0.768              |                               |                               |                                      |
| My own physical health               | 4    | 0.555              |                               |                               |                                      |
| My own mental health                 | 3    | 0.512              |                               |                               |                                      |
| Not be able to visit people who depend on me | 13 | 0.352              |                               |                               |                                      |
| Not being able to pay my bills       | 12   |                    | 0.991                         |                               |                                      |
| Becoming unemployed                  | 11   |                    | 0.873                         |                               |                                      |
| Restricted access to food supplies   | 10   |                    | 0.421                         |                               |                                      |
| Economic recession in my country     | 9    |                    |                               | 0.833                         |                                      |
| Small companies running out of business | 8  |                    |                               | 0.813                         |                                      |
| Loosing vacation opportunities       | 7    |                    |                               |                               | 0.777                                |
| Restricted liberty of movement       | 6    |                    |                               |                               | 0.689                                |
| Having to defend a decision not to participate in a social event which my family or friends expect me to attend | 14 | 0.316 | 0.405 |

Maximum likelihood as the estimation method and a promax as rotation method
Correlation matrix

Before presenting our regression analyses, in Table 5, we show the correlation between economic and health-related worries and the above-mentioned demographic and socio-economic variables. The correlations are high and statistically significant, suggesting that individual’s demographic and socio-economic characteristics may help explaining different degrees of worries related to the Covid-19.

Investigating the correlation matrix, it is useful to discuss the linkages among demographic and socio-economic variables and between these variables and economic and health-related worries. Later on, discussing the empirical findings resulting from our regression analysis, we will discuss further the importance of demographic and socio-economic variables in defining economic and health-related worries related to the Covid-19 pandemic.

The negative correlation coefficient between education and age (−0.134) suggests that in our sample older respondents possess a lower level of education. The negative coefficient between work status and age (−0.053), instead, suggests that older respondents are better employed compared to younger ones, as we could expect. Instead, the positive correlation between income and age (0.116) suggests, in line with our intuition, that older people possess, on average, higher income. The correlation coefficients of age with “Area of residence” (0.002), “Economic satisfaction changes” (−0.016) and “Health Worry” (0.012) are not statistically significant suggesting no big differences in these dimensions depending on age. Instead, “Economic Worry” correlation with age is negative and statistically significant (−0.125), suggesting that older respondents worry less than younger ones from an economic point of view, maybe also because, as mentioned above, they appear to be better employed. Interestingly, the correlation coefficient between age and “Country Economic Worry” (0.083), as well as “Restriction of Movements Worry” (−0.079) suggest that older respondents are more worried compared to younger ones. These two statistically significant positive correlation coefficients seem to suggest that older people are more worried for the economic perspective of the country, in contrast with their personal economic situation. A possible explanation is that while on one hand they may count on a better employment compared to younger people, older respondents appear to me more worried for the perspective of the country as a whole, from an economic point of view. On the other hand, older people may be more worried about restrictions of movement for several reasons, for example with regard to the possibility of not being able to meet their children or grandchildren, their families and friends, more in general.

With regard to gender, men seems to possess, on average, a slightly lower level of education with respect to women, given the negative correlation coefficient (−0.046). The negative coefficient between gender and work status (−0.066) seems instead to indicate that women are, on average, slightly better employed than men. The correlation is instead positive between gender and income (0.113) suggesting that men, all other things being equal, earn higher levels of income compared to women. The correlation between gender and area of residence is slightly positive (0.040), suggesting that there are, among our respondents, slightly more men than women in bigger cities. The coefficients related to both “Economic satisfaction
Table 5 Correlations matrix between socio-economic variables and worries related to the Covid-19

| No | Variable                              | 1   | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    |
|----|---------------------------------------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1  | Age                                   |     |       |       |       |       |       |       |       |       |       |       |       |
| 2  | Gender                                | 0.039* |       |       |       |       |       |       |       |       |       |       |       |
| 3  | Civil status                          | 0.504*** | −0.071*** |       |       |       |       |       |       |       |       |       |       |
| 4  | Education                             | −0.143*** | −0.046** | −0.078*** |       |       |       |       |       |       |       |       |       |
| 5  | Work status                           | −0.053*** | −0.066*** | −0.153*** | −0.090*** |       |       |       |       |       |       |       |       |
| 6  | Income                                | 0.116*** | 0.113*** | 0.119*** | 0.223*** | −0.163*** |       |       |       |       |       |       |       |
| 7  | Area of residence                     | 0.002 | 0.040** | −0.037** | 0.131*** | −0.067*** | 0.161** |       |       |       |       |       |       |
| 8  | Economic satisfaction changes         | −0.016 | 0.075*** | −0.028 | 0.056*** | −0.016 | 0.210** | 0.03* |       |       |       |       |       |
| 9  | Health worry                          | 0.012 | −0.221*** | 0.031* | 0.043** | 0.005 | −0.086** | −0.043** | −160*** | 1     |       |       |       |
| 10 | Economic worry                        | −0.125*** | −0.125*** | −0.028 | −0.045** | 0.044** | −0.235** | −0.108*** | −0.277*** | 0.543*** | 1     |       |       |
| 11 | Country economic worry                | 0.083*** | −0.158*** | 0.066*** | 0.091*** | −0.056*** | 0.003 | −0.016 | −0.144*** | 0.577*** | 0.394*** | 1     |       |
| 12 | Restriction of movements worry        | −0.079*** | −0.055*** | −0.022 | −0.007 | 0.011 | −0.006 | −0.024 | −0.048** | 0.443*** | 0.598*** | 0.305*** | 1     |

Asterisks indicate the significance of the coefficients at 10% (*), 5% (**) and 1% (***)
changes”, “Economic Worry” “Restrictions on Movements worries” are not statistically significant, suggesting no big differences between men and women. Instead, men seem to be more worried than women in terms of “Health worry” (0.031) and “Country economic worry” (0.066).

With regard to education, in contrast with our intuition, the negative correlation coefficient (− 0.090) suggests that, among our respondents, the higher the respondents’ level of education, the worse their employment status. Of course, there may be several explanations of this evidence, depending on the field of study of our respondents and on other socio-economic and demographic characteristics. The regression analysis will be useful to shed additional light on this issue. Instead, in line with our intuition, the correlation coefficient between education and income is positive (0.223) indicating higher income levels as the education level increases. Also, in line with our expectations, people living in bigger cities possess a higher level of education (0.131). Big cities usually offer more opportunities both from an educational point of view, but also in terms of job perspectives, attracting more educated people.

The positive correlation coefficient between education and “Economic satisfaction changes” (0.056) suggests that the personal economic situation of more educated respondents improved during the observation period. Among worries, the only not statistically significant is the one related to “Restrictions on Movements worries”. Instead, with regard to economic and health-related worries, in line with our intuition, the negative correlation coefficient (− 0.045) suggests that more educated people were less worried about their personal economic situation—probably because, as mentioned above, the higher the level of education, the higher the income—while instead more worried about “Health worry” and “Country Economic Worry”, suggesting that less educated people may have underestimated the negative effects of the pandemic.

With regard to the work status, as expected, we find a negative correlation with income (− 0.163)—since the scale of “work status” takes higher values passing from fully employed to unemployed—suggesting that the better the employment, the higher the income. Respondents living in big cities seem to have a better employment (correlation equal to − 0.067). There were no statistically significant differences with respect to changes in economic satisfaction during the period. The only worries to be statistically significant are the economic ones, while the ones related to health and to restrictions to movements seem not to significantly worry the respondents. Interestingly, personal “Economic worry” display a positive correlation, meaning that they are higher among unemployed people, as we might expect. Instead, the coefficient associated with “Country Economic Worry” is negative, suggesting that better employed people were more worried about the country economic perspectives, with respect to respondent with worse employment situation, probably because they were more focused on their personal economic situation.

With regard to the income variable, we find it to be positively correlated with living in bigger cities (0.161)—as expected since they typically offer better employment opportunities, but also because the cost of living is usually higher, thus discouraging lower earning people—as well as with increases in economic satisfaction, suggesting that the pandemic hit more the lower earning respondents. It is interesting to note that the coefficients related to “Health worry” and “Economic worry” are
both negative (respectively, equal to $-0.086$ and $-0.235$), suggesting that higher earning people were less worried both from an economic point of view, but also with respect to health. Instead, the coefficients related to both “Country economic worry” and to restrictions to movements are not statistically significant.

With respect to changes in economic satisfaction, our respondents claimed that their situation improved more if they lived in bigger cities ($0.031$), while, as expected, we find a negative correlation with economic-related worry ($-0.108$) and health-related worries ($-0.043$), since a decrease in economic satisfaction is usually linked to a worsening of the economic situation. Instead, worries related to “Country economic worry” and to restrictions to movements are not statistically significant.

As expected, all the correlation coefficients linking changes in economic satisfaction to worries are all negative and statistically significant, suggesting that respondents which situation improved during the pandemic were also less worried on an economic ground, in line with our intuition, but also with respect to health-related worries.

Interestingly, all worries are positively correlated with other worries, health-related, economic-related and the ones associated to restrictions of movements. Thus, it seems that the pandemic impacted negatively on all respects and that they are linked to one another.

In the regression analyses that follow, we test if the above-mentioned evidence in terms of correlation coefficients are supported from an econometric point of view.

**Regression results**

In Table 6, we present the results from four regression analyses using the same demographic and socio-economic explanatory variables, but distinct dependent variables, related to the four above-mentioned worries: health-related, personal economic worries, country economic worries, and worries related to restrictions on movements.

Before commenting in detail the findings of the four regression analyses, we underline that in all models the demographic and socio-economic variables are often statistically significant, highlighting their importance in helping explain different degrees of worries between different people, in line with our previous results in terms of correlations and with previous findings in the literature (see Cervellati et al. 2022).

In regression model 1, we use as dependent variable the first factor found through the factor analysis, that we called “Health Worries” because all the worries that constitute the components of this factor relate to worries associated to the health sphere. Except for “Work Status”, all the explanatory variables in this model are statistically significant. In particular, the positive coefficient associated with Age suggest that older respondents were more worried regard their health, with respect to younger ones. This result is in line with our expectations, as during the first phase of the pandemic in Italy, older people were hit more severely by the coronavirus, both in terms of contagions and of casualties. The negative coefficient associated with the dummy variable Gender suggests that women were
more worried than men with regard to their health. A possible explanation of this evidence is that men are on average more overconfident than women, thus they may have underestimated the threat of Covid-19. A second explanation is that women have a stronger attitude to self-care compared to men. A third one is that since men, compared to women, on average display more trait impulsivity (i.e., the tendency to act without proper forethought), they may be less worried from a health-related point of view, thus displaying less healthy attitudes and behaviors (Clay and Parker 2020).

The positive coefficient associated with Education seems to suggest that the higher the number of years of education, the higher the worries with regard to health. More educated respondents could have a better appraisal of how serious the situation was and how high were the dangers for their health. Work Status is not statistically significant, suggesting no relevant differences with regard on health worries among (fully or partially) employed or unemployed respondents. As a matter of fact, work status may affect more economic worries than health worries. The negative coefficient associated with Income suggests that the higher the annual personal income, the lower the health worries. Respondents with higher income may count on more money to face medical expenses. The negative

| Table 6 | Regression models with robust errors |
|---------|-------------------------------------|
|         | Model 1 Health worries | Model 2 Personal economic worries | Model 3 Country economic worries | Model 4 Restrictions on movements worries |
| Age     | 0.004**               | − 0.010***             | 0.007***              | − 0.006***             |
| Gender  | − 0.408***            | − 0.172***             | − 0.294***            | − 0.104**              |
| Civil status | − 0.115***         | 0.0329                | − 0.069**             | 0.010                 |
| Education | 0.060**               | − 0.023                | 0.120***              | − 0.032               |
| Work status | − 0.007               | − 0.005                | − 0.022**             | 0.006                 |
| Income  | − 0.040*              | − 0.134***             | 0.014                 | 0.026                 |
| Area of residence | − 0.086**         | − 0.154***             | − 0.043               | − 0.031               |
| Economic satisfaction changes | − 0.206***        | − 0.352***             | − 0.195***            | − 0.055*              |
| σ       | 0.80                  | 0.137                  | 0.60                  | 0.013                 |
| Adjusted $R^2$ | 0.076                | 0.134                  | 0.057                 | 0.010                 |
| No      | 2872                  | 2872                   | 2872                  | 2872                  |

*p < 0.05, **p < 0.01, ***p < 0.001
coefficient associated with *Area of residence* suggests that people living in smaller towns are more worried about health with respect to respondents living in bigger cities. Big cities usually have better hospitals, thus reassuring the people living there. The negative coefficient associated with *Economic Satisfaction Changes* suggests that people that saw their personal situation improved during the pandemic were less worried with regard to their health.

In regression model 2, we use as dependent variable the second factor found in the factor analysis, that we called personal “personal economic worries” because all the worries that are the components of this factor relate to worries associated to the respondents’ personal economic sphere. In this second regression, not only *work status*, but also *civil status* and *education* are not statistically significant. In addition, the coefficient of *Age* is now negative, suggesting that the older the respondent, the lower the economic worries. As mentioned above, on average older people have higher income and better employment position, thus they may be less worried of not being able to pay their bills or having a restricted access to food supplies or even becoming unemployed, with respect to younger ones that on average have lower available income and more precarious jobs. As for health worries, also with regard to economic worries men appear to be less worried. While similar explanation can be used for economic worries as for health worries, in terms of income and occupancy, men have on average higher income and better jobs. As a matter of fact, *Income* appears to be the variables that mostly affect economic worries, with a coefficient equal to $-0.134$, suggesting that respondents with higher income, in line with intuition, are less worried in economic terms, counting on higher available income and better jobs. The coefficients associated with *Area of residence* is negative as in regression model 1, suggesting that respondents living in bigger cities are less worried not only with respect to the health dimension, but also with regard to the economic sphere. Respondents living in bigger cities may also be less worried in general about becoming unemployed and finding a new job is usually easier in bigger cities. Finally, also with respect to “personal” economic worries, as for health worries, respondents with an improvement in economic satisfaction during the pandemic, record lower levels of economic worries.

In our third econometric model, as dependent variable, we use the third factor determined through our factor analysis, that we name “Country Economic Worries”, which components are worries related to a possible economic recession in Italy and to the possibility that small companies could run out of business. The second component, related to small companies, is particularly relevant in Italy because the Italian economic system is dominated by small firms. Some results are in line with our regression model 1, dealing with “personal” economic worries, while other are at the opposite. In particular, the coefficient associated with *Age* is negative, while it was positive with respect to “personal” economic worries. While older people may be less worried about their personal economic situation, because on average they have higher available income and better jobs, it seems that they are more worried for the country as a whole, with respect to younger respondents. The reason could be that older people are more patriotic, or also that being less worried for their personal situation, they may see the “big picture” of the country or being more worried for their children, grandchildren or for young people (future generations) in general. This
evidence may be coupled with the one on Civil Status, which negative coefficients suggest that married respondents are more worried for the economic condition of the country as a whole, probably again because of the worries for their children and future generations. As before, instead, men are less worried than women also with regard to the country economic situation. Even in this case, the above-mentioned explanations applied, together with a probable higher level of confidence that usually characterize more men than women. Interestingly, this is the only econometric model in which Work Status is statistically significant. The Work Status variable goes from full employment to unemployment and the negative coefficient suggest that respondents with poorer job positions worries a country economic downturn more than fully employed people. As in the previous two regression models, also in the third one a higher Economic Satisfaction Changes is associated with lower worries, also in terms of Country Economic Worries.

Finally, in our fourth regression model, we analyze the fourth factor found in the factor analysis, which we called “Restrictions on Movements worries” since its constituents all refer to restrictions to movements. Interestingly, older respondents appear to be less worried compared to younger ones with respect with such a dimension. A possible explanation is that, given the fact that on average they were more severely hit by the pandemic, during the lockdown they did not want to move as much as younger people did. On the other hand, being older could also be associated with a higher degree of social responsibility. Even in this case men are less worried than women, as found in the other regression models. Interestingly, civil status, education, work status, area of residence and even income are not statistically significant. Thus, it seems that these variables do not play a role in explaining differences in worries with regard to the freedom of movement. The only other statistically significant variable in the fourth regression model is Economic Satisfaction Changes, stressing even further the importance of such a construct.

**Conclusions**

The purpose of this study is to investigate how demographic and socio-economic variables affected individuals’ economic and health-related worries due to the Covid-19 pandemic. To achieve our aim, we conducted a survey in Italy in May and June 2020 on about 3,000 individuals. Italy represents an interesting case because it was the first western country to be severely hit by the pandemic, but also because the Italian government put in place strong measures to contain the virus such as the full lockdown of the country. The effectiveness of these measures also depends on citizens’ responsibility in complying with them, that, in turn, depends on how worried people are, both from a health and economic point of view. This is why it is important to analyze how different demographic and socio-economic characteristics differently affected individuals’ economic and health-related worries.

Our main goals are thus on one hand to discern which were the main economic and health-related worries of people during the pandemic, classifying them based on demographic and socio-economic characteristics and, on the other hand, to verify if these variables are able to explain why different people were impacted differently.
by the distinct worries connected to the Coronavirus. While these characteristics are usually considered as mere control variables, in the new pandemic context, our findings support the idea that they represent important explanatory variables to understand how people with distinct individual characteristics were differently worried about the Covid-19.

We consider the following variables: age, gender, civil status, education, work status, income, area of residence, economic satisfaction changes due to the pandemic. Our results show that indeed individuals’ demographic and socio-economic characteristics are related with distinct types of worries due to Covid-19, which are health-related worries versus economic-related worries—further dividing the latter between worries on the personal economic situation versus worries on the whole Country economic situation—and finally on worries connected to restrictions on movements.

Based on the empirical evidence, we can draw the following main conclusions.

We find women and people that are older, unmarried, more educated, low earning, living in small towns, and for which the economic satisfaction worsen during the pandemic, to be more worried about health-related issues. With respect to personal economic worries, we find that women and people that are younger, low earning, living in small towns, and for which the economic satisfaction worsen during the pandemic, to be more worried. Instead, with regard to the general economic situation of the country, we find that women and people that are older, unmarried, more educated, unemployed, and for which the economic satisfaction worsen during the pandemic, to be more worried. Finally, we find higher health-related worries among older people, women, single, less educated, lower income earners, living in small towns and with a decrease level of economic satisfaction.

The importance of considering individual differences regards several realms and has implications for decision makers and policy makers. First, it allows to transform the cold numbers on infected people and casualties into useful information to achieve a better knowledge of the dynamic of the pandemic, considering the distinct reaction of different people. Second, it helps explaining the distinct degree of social compliance to governments’ measures to contain the virus, since they alter perceptions, affect worries and behaviors. Third, it allows governments and other public institutions to understand which actions and policies may be more effective in protecting and supporting people, especially the most vulnerable ones, helping them in several ways, thus reducing their worries, improving their behaviors, with a positive effect on the society as a whole.

An increased attention to individual differences may thus help decision makers and policy makers design actions to support people effectively, avoiding a one-size-fits-all approach.

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