"How much do young Italians know about COVID-19 and what are their attitudes towards the Sars-CoV-2? Results of a cross-sectional study"

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ABSTRACT

Background At the end of 2019, an outbreak of novel coronavirus pneumonia, called Sars-CoV-2, was first identified in Wuhan, Hubei province, China. It subsequently spread throughout China and elsewhere, becoming a global health emergency. In February 2020, WHO designated the disease COVID-19.

Objective To investigate the degree of knowledge of young Italians about COVID-19 and their current attitudes towards the Sars-CoV-2 and to determine if there were prejudices emerging toward Chinese.

Methods An online survey was conducted on 3rd-4th-5th February 2020 with the collaboration of Italian Website “Skuola.net”. Young people had the opportunity to participate by answering an ad hoc questionnaire created to investigate knowledge and attitudes about the new Coronavirus, using a link published on the Homepage.

Results 5234 responses were received of which 3262 were females and 1972 were males. Most of the participants showed generally moderate knowledge about COVID-19. Male students, middle school students and those who do not attend school, should increase awareness of the disease; less than half of responders say that their attitudes towards the Chinese population has worsened in the last period.

Conclusions Global awareness of this emerging infection should be increased, due to its virulence, the significant risk of mortality and the ability of the virus to spread very quickly within the community.

Keywords: Knowledge; Attitudes; COVID-19; Young Italians; Sars-CoV-2
1. Introduction

Coronaviruses (CoV), important human and animal pathogens, are a family of RNA viruses that typically cause mild respiratory, enteric, hepatic, and neurologic disease in humans.² Six coronavirus species are known to cause human disease: among these, four species including hCoV-229E, OC43, NL63, and HKU1 are prevalent and typically cause mild respiratory diseases, while two novel fatal coronaviruses emerge periodically in different areas, severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV).

At the end of 2019, an outbreak of novel coronavirus pneumonia, called Sars-CoV-2, was first identified in Wuhan, Hubei province, China.⁴-⁵ It is supposed that the new virus originated from an animal-to-human spillover event linked to seafood and live-animal markets. It subsequently spread throughout China and elsewhere, becoming a global health emergency. In February 2020, the World Health Organization (WHO) designated the disease COVID-19, which stands for coronavirus disease 2019.⁶

Coronavirus infection in humans causes mild to moderate respiratory diseases, such as colds, that last for a short period of time. Symptoms may include: runny nose, cough, inflamed throat, fever, headache, gastrointestinal disorders and general malaise. Human coronaviruses can cause diseases of the lower respiratory tract, such as pneumonia or bronchitis. This occurs mainly in people suffering from pre-existing chronic diseases of the cardio-vascular and/or respiratory system, and individuals with a weakened immune system, in infants and the elderly.

The transmission of the virus takes place from one infected person to another through: saliva, coughing and sneezing, with direct personal contact and touching with contaminated hands (not yet washed) mouth, nose or eyes. The contagion can occur through faecal contamination.⁷

There are many gaps in the knowledge of the epidemiology, prevalence and clinical manifestation of infection. As the WHO has pointed out, the transmission of adequate information to the public about the virus, how contagion happens and appropriate prevention measures are essential to ensure adequate disease control.⁸

The new COVID-19 virus is still little known and this characteristic leads on the one hand to look for as much information as possible on the subject, on the other hand to rely on sources that often report incorrect or unfounded news.

However, the need to know and inform is associated with a loss of confidence in institutions, science and medicine, the interests of pharmaceutical companies are feared. In the age of social...
networks people are subject to an informational deluge and new forms of media epidemics are developing that quickly transmit habits and behaviors even wrong and unfounded news.  

The aim of this study was to investigate the degree of information on new coronavirus among young Italians and to understand if young people in Italy had developed prejudices against the Chinese because of the coronavirus.

2. Materials and Methods

Study design and participants
This study was a cross-sectional study. An online survey was conducted on February 2020 with the collaboration of “Skuola.net”, an Italian Website for information and insights for secondary school, high school and university students.

The students and also people who do not attend any school or university but simply viewed the website, had the opportunity, during three days, to participate in the survey by answering the questionnaire through a link published on the homepage (www.skuola.net). No limits of age were applied to the participants. This study was carried out according to the STROBE statement.  

Data collection
The questionnaire was created to investigate the knowledge and attitudes of Italian students about the new Coronavirus (Sars-CoV-2), on the basis of previous published studies. It was developed in Italian language and composed by 16 multiple choice questions: seven concerning knowledge, five concerning attitudes and four about socio-demographic data, such as gender, age, school and geographic area. The participants were assured about the anonymity of their responses.

The data from survey responses were collected in an excel file for statistical analysis. A pilot study involving 93 students revealed a Spearman correlation coefficient for test-retest reliability of 0.908 (p<0.001) and Chronbach alpha of 0.701.

Statistical Analysis
All analyses were performed using SPSS for Windows (Statistical Package for the Social Sciences, Version 25; SPSS, Inc., Chicago, IL).
A descriptive analysis of the categorical variables was conducted using absolute frequencies and percentages.

The associations between sex, school, geographic area and attitudes and knowledge were evaluated.

The differences between groups with respect to the categorical variables were analyzed using the Chi-square test.

A score was created using the correct answers to the seven knowledge questions evaluated with one-point, with a range of value from 0 (no knowledge) to 7 (maximum knowledge): we considered for good knowledge a cut-off of correct answers of 75% (5/7).

A multivariate linear regression analysis was performed using a forward stepwise selection, considering the score of knowledge as dependent variables and socio-demographic factors as independent variables. The goodness of fit for the model was assessed with R2.

Moreover, five logistic regression models were computed, estimating OR with 95% confidence intervals (95% CIs): the dependent variable in the models was each question about attitudes, and the independent variables were age, sex, school, geographic area and knowledge score.

Significance threshold was set at p<0.05 for all analyses.

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3. Results

3.1 Descriptive Analysis of the sample

A total of 5374 people took part in the questionnaire and 5234 complete answers were received, of which 3262 (60.7%) were females and 1972 (36.7%) were males. The frequencies of the socio-demographic characteristics (Age, attended school, regional macroarea) of the sample are shown in Table 1.

3.2 Univariate Analysis – Knowledge Questions

Questions 1 to 7 concerned knowledge about new coronavirus. To question "Can Coronavirus infection pass from man to man through cough-borne droplets?" especially females answered correctly (82.2%), students attending high school (83.4%) and people from North of Italy (82%).

Similar results came from question 2 "(Are fever and cough among the signs and symptoms of Coronavirus infection?)", from question 4 ("How long can infection develop after exposure to Coronavirus?") from question 5 ("Can patients with Coronavirus infection be cured?") and from question seven ("Is there currently a vaccine against Coronavirus?")
in which most of the females correctly answered, most of the university students and most of the people of northern Italy.

The Table 2 and the additional file Table 2a show the results in detail.

3.3 Univariate Analysis – Attitudes Questions

Questions 8 to 12 concerned attitudes towards the virus and the Chinese population. The Table 2 and the additional file Table 2b show the results in detail.

About question number eight ("If there was a vaccine available, would you get vaccinated?") 1501 males (71.1%), 2389 females (73.2%), 659 who attending university (68.9%), 2267 who attending high school (83.7%), 511 who attending middle school (78.4%), 453 who not attending any school (42.9%), 1804 from north (74.8%), 903 from center (68.2%), 1183 from south (72.3%) would agree with the idea of getting vaccinated.

About question number nine ("How has your attitude towards Chinese restaurants changed in this period?") 560 males (26.5%), 847 females (26.0%), 201 who attending university (21.0%), 769 who attending high school (28.4%), 228 who attending middle school (35.0%) 209 who not attending any school (19.8%), 627 from north (26.0%), 358 from center (27.0%), and 422 from south (25.8%) say that their opinion on Chinese restaurants has worsened in the last period.

About question number ten ("How has your attitude towards Chinese-run shops changed in this period?") 532 males (25.2%), 746 females (22.9%), 208 who attending university (21.7%), 672 who attending high school (24.8%), 213 who attending middle school (32.7%), 185 who not attending any school (17.5%), 546 from north (22.6%), 307 from center (23.2%), 425 from south (26.0%) say that their opinion on Chinese-run shop has worsened in the last period.

About question number eleven ("How has your attitude towards Chinese tourists changed in this period?") 828 males (39.2%), 1108 females (34.0%), 297 who attending university (31.0%), 1079 who attending high school (39.8%), 298 who attending middle school (45.7%), 262 who not attending any school (24.8%), 887 from north (36.8%), 499 from center (37.7%), 550 from south (33.6%) say that their attitude on Chinese tourists has worsened in the last period.

About question number twelve ("If in the class you attend there was a student of Chinese origin, how would you behave?") 94 males (4.5%), 116 females (3.6%), 28 who attending university (2.9%), 95 who attending high school (3.5%), 49 who attending middle school (7.5%), 38 who not attending any school (3.6%), 97 from north (4.0%), 34 from center (2.6%), 79 from south (4.8%)
answer this question that would put the mask in the classroom in the presence of a student of Chinese origin.

### 3.4 Multivariate Analysis

Linear regression analysis (Table 3) was performed to evaluate the association between the score of knowledge and socio-demographic variables (age, sex, geographic area, school). All variables were directly associated with the score except for the variables “Macroarea-Center” and “Middle school” which had no significant relationships ($B=-0.008\ p=0.619;\ B=0.024\ p=0.357$).

Logistic regression models are reported in Table 4. Regarding Question 8, the variable “Centre” had no significant association (OR 0.879, CI: 0.756 - 1.022), while "Age" had an indirect association (OR 0.666, CI: 0.637 - 0.697). Center was not significantly different from South Italy while age had an inverse association with the intention of being vaccinated. The same happened in Questions 9 and 11 with the geographic variable “Center” which was associated with a negative attitudes (OR 0.796, CI: 0.695 - 0.913; OR 0.787, CI: 0.693 - 0.895). Age was also inversely associated with the attitude investigated in Question 12 (OR 12 0.943, CI: 0.903-0.986), so the older participants tended to have wrong behavior towards a Chinese-born schoolmate.

### 4. Discussion

The aim of this study is to investigate the degree of knowledge of Italian students of middle, high school and university about the new coronavirus and their current attitudes towards the coronavirus and the Chinese population, especially if they have changed in the last period. The survey was conducted in early February before the outbreak of the coronavirus epidemic in Italy.

The study highlights how, in particular, female students, university students, high school students and those of Northern Italy, compared to their respective counterparts, have a greater knowledge about the infection of the new Coronavirus and underlines, in particular, how the attitudes and behaviors of male students, middle school students and those of Central-Southern Italy, towards the Chinese population, have worsened in the last period.

Therefore, greater attention should be paid to male students, middle school students and those who do not attend school, to increase awareness of the disease and to implement the most suitable preventive measures, designed to stem the spread of the infection.
A similar study of Coronavirus, causing the Middle East Respiratory Syndrome, showed good knowledge of the clinical manifestations of MERS-COV and less knowledge of the epidemiological characteristics of the disease; in addition, the Internet was the main source of information about the infection for respondents to the survey.8

A cross-sectional study, carried out on health personnel from the southern region of Saudi Arabia, demonstrated limited knowledge of health personnel regarding the microbiological characteristics of the Cov causing the Respiratory Syndrome of the Middle East.13

A cross-sectional study, conducted on 384 participants recruited in various parts of the government of Al-Jouf, Saudi Arabia, included in the questionnaire, unlike our study, more socio-demographic data, such as the origin of the participants from urban or rural areas and a greater number of very useful questions, in order to prevent and stem the spread of the infection: questions regarding the knowledge of the main preventive measures, the treatment of the disease and the epidemiological characteristics of the infection. In addition, they included a question about the main source of information, which appears to be the Ministry of Health, followed, in order of frequency, by the social networks.14

Another study that involved medical students highlighted how these students had a good knowledge of the clinical manifestations of the Middle East Respiratory Syndrome but a poor knowledge of the rate of mortality of the infection.15

Our study is the first that evaluates the knowledge of Italian students regarding COVID-19 infection, highlighting a good global knowledge; in addition, only students who visited the "Skuola.net" site were able to participate in the survey by filling in a questionnaire on a link published on the website homepage. Compared to other studies, there is no age limit for completing the questionnaire and participating in the survey.

However, not all students access the "Skuola.net" site to acquire information regarding a given topic; in this study, therefore, even the most deserving students, who prefer to study a given topic on a more reliable source, such as a textbook, could be excluded. Another limitation of the study is not to include, among the questions in the questionnaire, one relating to the main source of information regarding the infection caused by Sars-CoV-2: in this way one could know those sources least used by students, in order to be able to encourage them to use these sources, in order to increase awareness of the infection. Finally, if the survey was conducted in the period of maximum contagiousness in Italy, such as the end of March, April, the answers of the students
could vary, resulting in a greater knowledge of COVID-19, for the several details provided above all by the media, and, probably a more inclined attitude towards the Chinese population.

He J. and colleagues in their online survey observed social exclusion and discrimination in the outbreak of COVID-19 across the world and inside of China, reporting many feared contact with people from Wuhan or Hubei Province and the stigmatization of people from Hubei was associated with the social exclusion process.\textsuperscript{16}

In February 2020, before the first case of COVID-19 was confirmed in Poland, Rzymiski and Nowicki conducted an anonymous online survey of Asian medical students in Poland to assess whether they experience any form of prejudice related to the ongoing pandemic. The authors demonstrated the COVID-19 outbreak had triggered xenophobic reactions towards students of Asian-origin before the first SARS-CoV-2 case was confirmed in Poland.\textsuperscript{17}

Epidemics spread fear that is the feeling behind the phenomena of racism and xenophobia. The COVID-19 pandemic has uncovered social and political fractures within communities, with racialized and discriminatory responses to fear, disproportionally affecting marginalized groups.\textsuperscript{18}

Following the spread of COVID-19 from Wuhan, China, discrimination towards Chinese people has increased. This includes individual acts of microaggression or violence, to collective forms, for example Chinese people being barred from establishments.\textsuperscript{19}

5. Conclusions

Most young people are aware of the main symptoms of the disease and generally show a good level of knowledge about new coronavirus. This despite the primary source of information are the social networks, natural docking place of fake news and alarm uncontrolled. Basic notions that, however, do not make them immune to irrational behaviors, from true and proper psychosis.

Efforts should be concentrated to increase global awareness of this emerging infection also to prevent and contrast any prejudicial or discriminatory behaviors, especially among the youngest.
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Table 1. Selected demographics characteristics of the respondents.

| Variables                 | N (5234) | (%)    |
|---------------------------|----------|--------|
| **Gender**                |          |        |
| Female                    | 3262     | (60.7) |
| Male                      | 1972     | (36.7) |
| **Age, years**            |          |        |
| 11-13                     | 503      | (9.4)  |
| 14-16                     | 1510     | (28.1) |
| 17-19                     | 1440     | (26.8) |
| 20-22                     | 507      | (9.4)  |
| 23-25                     | 274      | (5.1)  |
| 25-30                     | 1140     | (21.2) |
| **Attended school**       |          |        |
| Middle school             | 652      | (12.1) |
| High school (first two years) | 1048   | (19.5) |
| High school (last three years) | 1662  | (30.9) |
| University                | 957      | (17.8) |
| Not attending School/University | 946   | (17.6) |
| **Macroarea of Italy**    |          |        |
| North                     | 2413     | (44.9) |
| Center                    | 1205     | (22.4) |
| South                     | 1637     | (30.5) |
## Table 2. Frequency of answers

| Questions                                                                 | N (5234) | (%)  |
|---------------------------------------------------------------------------|----------|------|
| **Q#1: Can Coronavirus infection pass from man to man through cough-borne droplets?** |          |      |
| Yes                                                                       | 4291     | (79.8) |
| No                                                                        | 427      | (7.9)  |
| I do not know                                                             | 656      | (12.2) |
| **Q#2 Are fever and cough among the signs and symptoms of Coronavirus infection?** |          |      |
| Yes                                                                       | 4565     | (84.9) |
| No                                                                        | 271      | (5.0)  |
| I do not know                                                             | 538      | (10.0) |
| **Q#3: Is diarrhea among the signs and symptoms of Coronavirus infection?** |          |      |
| Yes                                                                       | 576      | (10.7) |
| No                                                                        | 3279     | (61.0) |
| I do not know                                                             | 1519     | (28.3) |
| **Q#4: How long can infection develop after exposure to Coronavirus?**     |          |      |
| 1 day                                                                     | 467      | (8.7)  |
| 2 days                                                                    | 529      | (9.8)  |
| 5days                                                                     | 875      | (16.3) |
| 10-15 days                                                                | 3371     | (63.7) |
| I do not know                                                             | 132      | (2.5)  |
| **Q#5: Can patients with Coronavirus infection be cured?**                 |          |      |
| Yes                                                                       | 3206     | (59.7) |
| No                                                                        | 1044     | (19.4) |
| I do not know                                                             | 1124     | (20.9) |
| **Q#6: Is there currently evidence that pet animals can transmit Coronavirus infection?** |          |      |
| Yes                                                                       | 572      | (10.6) |
| No                                                                        | 3235     | (60.2) |
| I do not know                                                             | 1567     | (29.2) |
| **Q#7: Is there currently a vaccine against Coronavirus?**                |          |      |
| Yes                                                                       | 346      | (6.4)  |
| No                                                                        | 4303     | (80.1) |
| I do not know                                                             | 725      | (13.5) |
| **Q#8: If there was a vaccine available, would you get vaccinated?**      |          |      |
| Yes                                                                       | 3890     | (72.4) |
| No                                                                        | 554      | (10.3) |
| I do not know                                                             | 930      | (17.3) |
| **Q#9: How has your attitude towards Chinese restaurants changed in this period?** |          |      |
| It is the same                                                            | 3616     | (67.3) |
| It has improved                                                           | 190      | (3.5)  |
| It is gotten worse                                                        | 1407     | (26.2) |
| I do not know                                                             | 161      | (3.0)  |
| **Q#10: How has your attitude towards Chinese-run shops changed in this period?** |          |      |
| It is the same                                                            | 3754     | (69.9) |
| It has improved                                                           | 184      | (3.4)  |
| It is gotten worse                                                        | 1278     | (23.8) |
| I do not know                                                             | 158      | (2.9)  |
| **Q#11: How has your attitude towards Chinese tourists changed in this period?** |          |      |
| It is the same                                                            | 3106     | (57.8) |
| It has improved                                                           | 177      | (3.3)  |
| It is gotten worse                                                        | 1936     | (36.0) |
| I do not know                                                             | 155      | (2.9)  |
| **Q#12: If in the class you attend there was a student of Chinese origin, how would you behave?** |          |      |
| It is the same                                                            | 4167     | (77.5) |
| I would avoid contacts                                                    | 564      | (10.5) |
| I would urge them not to come                                             | 276      | (5.1)  |
| I would put on the mask                                                   | 210      | (3.9)  |
| I do not know                                                             | 157      | (2.9)  |
Table 3. Linear regression model of Score of knowledge.

| Independent variables | Score of knowledge |       |       |       |       |
|-----------------------|--------------------|-------|-------|-------|-------|
|                       | B                  | Stand. error | Beta stand. | t     | P (Sign.) |
| Age                   | 0.046              | 0.023  | 0.052 | 2.031 | 0.042  |
| Sex*                  |                    |        |       |       |       |
| Female                | 0.201              | 0.041  | 0.066 | 4.940 | <0.001 |
| Macroarea**           |                    |        |       |       |       |
| North                 | 0.237              | 0.047  | 0.079 | 5.068 | <0.001 |
| Center                | -0.027             | 0.054  | -0.008| -0.497| 0.619  |
| Attended school***    |                    |        |       |       |       |
| University            | 0.716              | 0.071  | 0.185 | 10.056| <0.001 |
| High School           | 0.498              | 0.088  | 0.168 | 5.627 | <0.001 |
| Middle School         | 0.110              | 0.120  | 0.024 | 0.921 | 0.357  |

*Reference Sex: Male
**Reference Macroarea: South
***Reference Attended School: Not attending
### Table 4. Logistic regression models of Attitudes questions

| Variables                  | Q#8: If there was a vaccine available, would you get vaccinated? | Q#9: How has your attitude towards Chinese restaurants changed in this period? | Q#10: How has your attitude towards Chinese-run shops changed in this period? | Q#11: How has your attitude towards Chinese tourists changed in this period? | Q#12: If in the class you attend there was a student of Chinese origins how would you behave? |
|---------------------------|----------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| **Gender**                | OR (95% C.I.)                                                                                              | OR (95% C.I.)                                                                 | OR (95% C.I.)                                                                 | OR (95% C.I.)                                                                 | OR (95% C.I.)                                                                 |
| Male                      | ref 1.183 (1.047 - 1.337)                                                                                  | ref 1.335 (1.179 - 1.512)                                                                 | ref 1.455 (1.299 - 1.630)                                                                 | ref 1.506 (1.310-1.731)                                                                 |
| Female                    | 1.166 (0.637 - 0.697)                                                                                    | 1.098 (1.054 - 1.144)                                                                 | 1.131 (1.085 - 1.179)                                                                 | 1.156 (1.117 - 1.197)                                                                 | 0.943 (0.903-0.986)                                                                 |
| **Age**                   | 0.666 (0.637 - 0.697)                                                                                    | 1.098 (1.054 - 1.144)                                                                 | 1.131 (1.085 - 1.179)                                                                 | 1.156 (1.117 - 1.197)                                                                 | 0.943 (0.903-0.986)                                                                 |
| **Macroarea**             | -                                                                                                           | -                                                                                   | -                                                                                   | -                                                                                   | 1.218 (1.057-1.403)                                                                 |
| North                     | 0.879 (0.756 - 1.022)                                                                                    | 0.796 (0.695 - 0.913)                                                                 | 1.208 (1.066 - 1.370)                                                                 | 0.787 (0.693 - 0.895)                                                                 | -                                                                                   |
| Center                    | ref                                                                                                          | ref                                                                                   | ref                                                                                   | ref                                                                                   | ref                                                                                   |
| South                     | 1.241 (1.081 - 1.424)                                                                                    | -                                                                                   | ref                                                                                   | ref                                                                                   | ref                                                                                   |
| **Attended school**       | 1.886 (1.592 - 2.234)                                                                                    | 1.172 (1.013 - 1.356)                                                                 | 1.241 (1.081 - 1.424)                                                                 | 1.986 (1.684-2.341)                                                                 | 1.899 (1.541-2.339)                                                                 |
| High school               | ref                                                                                                          | ref                                                                                   | ref                                                                                   | ref                                                                                   | ref                                                                                   |
| University                | 1.532 (1.280 - 1.832)                                                                                    | 1.370 (1.135 - 1.655)                                                                 | -                                                                                   | -                                                                                   | ref                                                                                   |
| Not attending             | 1.383 (1.323 - 1.447)                                                                                    | 1.240 (1.191 - 1.291)                                                                 | 1.234 (1.185 - 1.285)                                                                 | 1.120 (1.079 - 1.163)                                                                 | 1.597 (1.525-1.672)                                                                 |
| **Corona Score**          | -                                                                                                           | -                                                                                   | -                                                                                   | -                                                                                   | -                                                                                   |