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The psychological impact of the lockdown on Italian university students during the first wave of COVID-19 pandemic: psychological experiences, health risk perceptions, distance learning, and future perspectives

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Abstract

Background: This study aimed to explore the lockdown experience on a sample of university students during the first wave of the COVID-19 pandemic in Italy, focusing on the degree of confidence in the information received about the pandemic, the perceived health risk related to COVID-19, the psychological experiences related to quarantine, and the opinions regarding distance learning and the measures to adopt after the total lockdown. More specifically, we hypothesized that living in an area with more restrictions significantly contributes to accentuating the negative psychological impact of the quarantine experience. Furthermore, we assumed that a high perception of risk and a high fear of contracting the virus are significantly associated with more negative feelings during the lockdown. Conversely, adherence to pandemic containment measures and confidence in the information received on COVID-19 are predictors of positive emotions.

Methods: 655 university students completed a battery of standardized questionnaires between April 22 and May 1, 2020. The data was analyzed through univariate, bivariate, and multivariate analysis.

Results: The students showed to be highly informed about the pandemic and confident regarding the information received about the virus. Furthermore, they had a good perception of their risk of contracting COVID-19. Overall, the results highlighted a significant psychological impact of the lockdown. Students reported greater feelings of sadness (51.3%), nervousness (64.6%), and irritability (57%) than usual, with increased ruminations (70.9%). Furthermore, difficulty concentrating (55.9%), sleeping (54.5%), eating disorders (73.6%), tachycardia (65%), and a tendency to cry (65%) were also reported. Multiple regression suggests that female and younger students who lived in areas with a higher rate of contagion ("red zones") experienced more negative feelings related to quarantine. Moreover, high levels of perceived susceptibility and less compliance with government measures were associated with negative psychological experiences.

Conclusions: These results show that university students represent a vulnerable population, and specific interventions are needed to protect their psychological wellbeing during the pandemic. It would be interesting to evaluate the psychological impact of the subsequent waves of contagion due to the persistence of the pandemic's stressful event.

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1. Introduction

The COVID-19 pandemic that emerged at the end of 2019, first in China and then worldwide, has threatened millions of people's health (Centers for Disease Control and Prevention, 2020; Singhal, 2020). The individuals' lives have been significantly changed, and a global, multilevel, and in-depth process of adaptation to the management of this disease has become necessary (Brooks et al., 2020). Most productive and economic activities have been disrupted, public transportation has been reduced, and shops, restaurants, bars, gyms, and other recreational places have been closed (European Commission Directorate General Economic and Financial Affairs, 2020).

Italy was the first European country heavily hit by the COVID-19 pandemic. Since February 2020, several waves of contagion have affected all Italian regions with an almost uniform spread throughout the country. Numerous periods of both national and local lockdowns have occurred over the last year, with several limitations to people's personal and social life (Stefana et al., 2020). The main indication given by governments to citizens was to stay at home and to avoid meeting people who do not belong to their own family.

University students have been significantly affected by this emergency. Universities have been closed worldwide, and students have had to face a radical change in their university life (UNESCO, 2020). In particular, Italian university students were the first in Europe to face the lockdown with the closure of universities and the transition to distance learning, while students from other countries were potentially already informed about the lockdown experience. In Italy, universities were first closed on March 6, 2020, and all academic activities, such as lessons, exams, degrees, and administrative management, have adapted to online modalities. These activities including holding classic face-to-face lessons via the web, using learning platforms, and sharing files using slides and study notes (D'Addio & Endrizzi, 2020). Therefore, students have had to modify and adapt their study methods to distance learning (Araujo et al., 2020; Sandhu & de Wolf, 2020). Besides, many of them who attended the university outside their residence were forced to return to their homes suddenly or to spend the lockdown in the university cities.

In recent years, lockdown measures have been taken to contain the spread of pandemics such as severe acute respiratory syndrome (SARS) or H1N1 flu. Many studies reported adverse psychological effects of these measures, including post-traumatic stress symptoms, confusion, and anger (Brooks et al., 2020; Hawryluck et al., 2004; Liu et al., 2012). More specifically, a lengthy quarantine duration, fear of being infected, frustration, boredom, inadequate information, financial loss, and stigma are relevant stressors that can exacerbate the negative psychological impact of confinement measures (Brooks et al., 2020). However, quarantine to contain SARS or H1N1 flu did not affect such a large number of people and in such a radical

way as that adopted for the containment of COVID-19. Consequently, it is essential to analyze the specific psychological experiences related to these preventive measures.

During a pandemic, beliefs and knowledge exert a critical impact on the spread of contagion. Indeed, being adequately informed about disease prevention measures and having an accurate perception of the risk of contracting the infection can improve compliance with measures to combat the pandemic's spread and reduce the psychological impact of this experience (Akan et al., 2010; Tooher et al., 2013).

Risk perception is one of the critical drivers of health-related behavior (Commodari et al., 2020; Ibuka et al., 2010) and exerts a significant influence on adopting precautionary measures. Health-related perceived risk consists of two dimensions: perceived "seriousness" and perceived "susceptibility". Perceived seriousness refers to one's perceived risk of developing a disease, while perceived susceptibility concerns the perceived probability of becoming infected with a disease. Perceived susceptibility can be categorized into perceived personal susceptibility, which is the perceived probability that one will be harmed by a hazard (Rogers, 1983), and perceived comparative susceptibility, which is the perceived probability that a hazard will hurt oneself as opposed to other people of the same age and gender.

In this regard, a high perception of health-related risk and the perception of a growing sense of threat has a significant impact on mental health (Ferrer & Klein, 2015; Koffman et al., 2020a). In particular, the COVID-19 pandemic is associated with a high perception of risk related to fear of contracting the virus and uncertainty about the management and prognosis of the disease (Koffman et al., 2020b; Lalot et al., 2020). With regard to this specific point, numerous studies showed that intolerance to uncertainty related to COVID-19 is an important factor of psychological vulnerability in both young people and adults (Gori et al., 2021; Merlo et al., 2021a; Zhu et al., 2020) and can have a significant effect on anxiety and depressive symptoms (del Valle et al., 2020; Moroianu et al., 2021). In addition, the sense of uncertainty and loss of control associated with the COVID-19 lockdown tend to be associated with ineffective coping strategies that result in higher levels of perceived stress and an increased risk of psychopathology (Gori et al., 2021; Merlo et al., 2021b; Rettie & Daniels, 2021; Urban & Urban, 2020).

Literature underlined that the transition to university is a potentially stressful experience and can frequently be associated with difficulties in regulating emotions (Dalbudak et al., 2013; Hamaideh, 2018), anxiety, and depressive symptoms (Lun et al., 2018; Matar Boumosleh & Jaalouk, 2017), risk of addiction and self-harming behaviors (Ewing et al., 2019; Hamza & Willoughby, 2018). Taking into account these data, a series of studies have investigated these specific variables among the university population during the COVID-19 pandemic in different countries of the world, highlighting a significant negative impact of the COVID-19 pandemic on the mental health of college students with high levels of anxiety and depression (Browning

et al., 2021; Islam et al., 2020; Kaparounaki et al., 2020; Odriozola-Gonzalez et al., 2020). In the Italian context, the available studies have focused mainly on university students' mental health (Marelli et al., 2021; Somma et al., 2020). No research evaluates different aspects of the lockdown experience, such as perceived risk or opinions on distance learning and contagion containment measures. Therefore, it is worth evaluating the impact of an experience such as quarantine and home confinement on university students' psychological wellbeing and how these feelings can be influenced by health risk perception and sociodemographic variables.

1.1 Study Aim and Hypotheses

Based on these considerations, this study aimed to analyze a large sample of university students' psychological experiences during the lockdown in the first wave of the COVID-19 pandemic in Italy. More specifically, our objectives are a) to measure the two dimensions of risk perception related to COVID-19; b) to analyze psychological experiences related to the lockdown; c) to explore the confidence in the information received on the pandemic and in the contagion containment measures, and the degree of satisfaction with the distance learning experience. More specifically, the study intended to verify the following hypotheses:

Hypothesis 1 (H1): Living in an area with more restrictions significantly contributes to accentuating the negative psychological impact of the quarantine experience.

Hypothesis 2 (H2): A high perception of risk and a high fear of contracting the virus are significantly associated with more negative feelings during the lockdown. Conversely, adherence to pandemic containment measures and confidence in the information received on COVID-19 are predictors of positive emotions.

2. Material and Methods

2.1 Participants

Participants included 655 university students (male: 180; female: 475); 327 (50%) were between 21 and 23 years of age, 151 (23.1%) were between 18 and 20, 123 (18.8%) were between 24 and 26, and the remaining 8.1% were over 27 years old.

The Italian University System is organized into three cycles. Students with a high school diploma can obtain an undergraduate degree typically obtained after a three-year study program. After two years of postgraduate studies, students can obtain a postgraduate degree that provides rigorous and advanced training in specific sectors. Furthermore, some specific study programs in Italy are five or six-year programs to comply with EU regulations and obtain official recognition (e.g., Medicine or Law). Finally, the Ph.D. degree is the highest university education level and is obtained after a study and research program lasting at least three years (Italian Ministry of Foreign Affairs and International Cooperation, 2020).

Of the study participants, 66.4% were attending an undergraduate degree course, 20.4% were attending a postgraduate degree program, 13.0% were out-of-course students. Only 0.2% were Ph.D. students, but this data can be explained by the fact that Ph.D. students represent a small percentage of the total university students. Furthermore, 44.4% were attending a course in art and humanities, 13.5% in health sciences, 12.8% in science, 13.2% in social sciences and law, and 16.1% in engineering and architecture. This distribution considers that in Italian universities, the students of the humanities area are statistically more numerous than those of the scientific area.

2.2 Measures

Participants completed a standardized battery that measured risk perception for COVID-19 and psychological wellbeing.

The scale consisted of four sections. The first section of the questionnaire contained sociodemographic questions about gender, sociodemographic characteristics, year and type of university course, number of persons in the household, and sources of information about the pandemic outbreak.

The second section explored the two dimensions of risk perception related to COVID-19 by using an Italian version adjustment (Commodari, 2017) of the Risk Perception of Infectious Disease Questionnaire (Brug et al., 2004). Participants responded to questions using a five-point Likert-type scale and one open-ended question that asked why students suppose they belong to a category at risk of contracting COVID-19. More specifically, the students were invited to report how likely they think they are to contract the disease and whether they would have a smaller or larger probability of becoming infected with the disease before summer than their peers of the same age and gender. The psychometric characteristics of the original version of the Risk Perception of Infectious Diseases are good (Cronbach's alpha = .79), and many international studies have used this scale in various contexts (Commodari, 2017; de Zwart et al., 2009, 2010).

In the third section, students were asked to indicate whether they agree with statements reporting information related to COVID-19 and quarantine (e.g., "Are students a category of people at higher risk for COVID-19 than the general population;" "In stage two of the quarantine it is necessary to avoid the use of public transport to reduce the risk of contagion and to avoid a new increase in the epidemic"). Furthermore, they were asked to express their degree of satisfaction with distance learning and the government's restrictive measures to contain the pandemic.

The last section evaluated the psychological impact of the lockdown through a scale obtained by selecting a series of items from the following standardized questionnaires: the *Interpersonal*

Adaptation Questionnaire (QAI), to evaluate the level of interpersonal adaptation (Di Nuovo, 1998); the Italian version of the *Mesure du Stress Psychologique (MSP),* to assess the global index of psychological stress (Lemyre et al., 1990); the *Metacognitive Skills Scale* (MSS), to evaluate metacognitive skills (Altindağ & Senemoglu, 2013). More specifically, this scale measures two psychological dimensions with good psychometric characteristics: "negative feelings" (alpha Cronbach = .81) and "positive feelings" (Cronbach's alpha= .78). A high score corresponded to a heightened experience of negative or positive feelings, respectively. A CFA was performed to assess the validity of these scores. Regarding the model for the "negative feelings", the Chi-square statistic was not statistically significant [$\chi^2(9) = 16.5$; $p = .057$] and the other values were indicative of a good model fit (RMSEA = .035; SRMR = .023; CFI = .986; TLI = .976). Similar results were obtained for the model of the "positive feelings" [$\chi^2(9) = 29.6$; $p < .001$; RMSEA = .059; SRMR = .026; CFI = .981; TLI = .968]. The scores were converted into z scores. The scale was adapted for university students from the version already validated for high school students and published in a previous article (Cronbach's alpha = .80) (Commodari & La Rosa, 2020).

2.3 Procedures

University students completed the questionnaire between April 22 and May 1, 2020, during the first wave of COVID-19 in Italy. The questionnaire was developed using an online-based platform (Google Forms) and consisted of 63 multiple-choice and open-ended questions. The questionnaire was disseminated among the students by invitation on university student groups in the main social networks and on the website of the Department of Educational Sciences of the University of Catania where the study was conducted. Invitations to participate in the study explained that participation was strictly voluntary, with no remuneration, and that participants' identities could not be revealed. All participants completed an online informed consent form. The study adhered to the ethical standards of the Declaration of Helsinki and the Ethical Code for Italian psychologists (L. 18.02.1989, n. 56), Italian law for data privacy (DLGS 196/2003), and the Ethical Code for Psychological Research (March 27, 2015) approved by the Italian Psychologists Association.

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0 (IBM Corporation, Armonk, NY). Frequencies and percentages were used to express categorical and ordinal variables, while mean and standard deviation were used for continuous variables. Chi-squared, *t-test*, and ANOVA were calculated to evaluate differences between groups for the relevant variables. Multiple regression analyses were performed to investigate the impact of sociodemographic variables and risk perception on specific psychological experiences. The main sociodemographic variables and risk perception values were the independent variables, and the "positive feelings" and "negative feelings" scores were the dependent variables.

3. Results

3.1 Sociodemographic characteristics of the participants

Table 1 indicates the sociodemographic characteristics of the participants. One hundred forty-one students (21.5%) reported having lived in a "red zone," which is an area of Italy characterized by stricter containment measures due to the exponential and uncontrolled growth of contagion compared to other areas of the country. Nearly all of the sample (90.5%) spent the lockdown period in their home city, and only 9.5% reported that they spent this period in the city where they studied; 38.9% of the interviewed students spent quarantine living in a four-person household; 27.2% reported three persons; 18% more than four people; 11.1%, two persons; and 4.7% reported living alone during the quarantine.

		n	*%*
Gender	Female	475	72.5
	Male	180	27.5
Age (years old)	18-20	151	23.1
	21-23	327	50.0
	24-26	123	18.8
	27-29	22	3.4
	30+	31	4.7
Type of university course	Undergraduate	435	66.4
	Postgraduate	134	20.4
	Out-of-course	85	13.0
	PhD	1	0.2
Area of study	Art and Humanities	291	44.4
	Health Sciences	88	13.5
	Sciences	84	12.8
	Social Sciences and Law	86	13.2
	Engineering and Architecture	106	16.1
Off-site student	Yes	305	46.6
	No	350	53.4
"Red zone"	Yes	141	21.5
	No	514	78.5
Size of the household	1	31	4.7
	2	73	11.1
	3	178	27.2
	4	255	38.9
	>4	118	18.0
Affected by COVID-19	Yes	0	0.0
	No	567	86.6
	Uncertain	87	13.3

Table 1. Sociodemographic characteristics of the sample

3.2 Opinions and beliefs regarding COVID-19 prevention measures

The vast majority of the sample received most of the information concerning COVID-19 via television (53.9%) and the Internet (36.3%). Only a tiny percentage preferred to receive information about the pandemic through newspapers (6.4%) or by contacting their doctor (3.2%).

In general, the students surveyed indicated that they trusted the information they received regarding COVID-19 (62.7% trusted it enough; 10.8% trusted it a lot; 1.4% trusted it very much). Moreover, most participants reported that they would like to be informed about how they treat the disease (37.1%) and how to prevent transmission (20.2%). Furthermore, 13% wanted to know how to recognize the symptoms of the disease, 11.6% wanted information regarding the likelihood of contracting the virus in their area of residence, 5.2% wanted to be more informed about how the virus is transmitted, and only 3.4% wanted to know the geographical areas where the virus is most present.

Students' opinions concerning the behavioral measures to be adopted in the later stages of pandemic management to limit the risk of new infections were also investigated. An exceptionally high percentage of respondents (88.5%) expressed that it was appropriate to avoid public transport, such as trains or buses, as well as places such as bars, restaurants, cinemas, theaters, and school classrooms (91.8%). Furthermore, 94% believed that it could be helpful to avoid visiting shops if not necessary or only with personal protective equipment, such as a face mask. 73.9% considered it useful to avoid medical consultations if possible. However, most respondents disagreed that it is useful to avoid meeting persons with whom one is not cohabiting (58.6%), and 87.9% expressed that it is not necessary to avoid being in open places such as parks.

Regarding the specific measures to be taken at the university to limit infections after the lockdown, only 6.1% of participants indicated that they would like to resume activities regularly, as in the pre-COVID period. In comparison, 76.9% expressed that they would be available to continue online teaching as in the lockdown period. However, 48.5% stated that they would like to take the exams in attendance, and 50.5% for the degree exams. All of these data are reported in Tables 2 and 3.

Regarding the opinions of university students concerning the lockdown measures adopted by the Italian government during the first phase of the COVID-19 pandemic in Italy, the large majority reported having no difficulty complying with the government's restrictive provisions (87%), and they overwhelmingly agreed with the restrictions imposed on citizens due to the pandemic (95.6%).

Table 2. University students' opinions on the behavioral and academic measures to adopt after the lockdown.

	Agree		Disagree	
	n	%	*n*	%
Avoid using public transport (trains, buses, planes)	580	88.5	75	11.5
Avoid going to closed places such as bars, restaurants, cinemas and theaters, classrooms	601	91.8	54	8.2
Avoid going to shops if not necessary and with the necessary protections (facial mask)	616	94.0	39	6.0
Avoid meeting non-cohabiting people	271	41.4	384	58.6
Avoid unnecessary medical visits	484	73.9	171	26.1
Avoid walking in open places	79	12.1	576	87.9
Resume all teaching activities regularly as in the pre-COVID period	40	6.1	615	93.9
Continue with all distance learning activities, as is being done in this period of quarantine	504	76.9	151	23.1
Continue with distance learning activities except for exams	318	48.5	337	51.5
Continue with distance learning activities except for the collegial organs' meetings (e.g., class councils, assemblies, etc.)	331	50.5	324	49.5

Table 3. Frequencies and percentages of the perceived seriousness, personal and comparative susceptibility to COVID-19.

	Perceived personal susceptibility		Comparative susceptibility		Fear of getting COVID-19	
	n	%	*n*	%	*n*	%
Very low	51	7.8	27	4.1	141	21.5
Low	145	22.1	60	9.2	333	50.8
Neither low nor high	371	56.6	531	8.1	135	20.6
High	83	12.7	35	5.3	38	5.8
Very high	5	0.8	2	0.3	8	1.2

3.3 COVID-19 and perceived health risk among Italian university students

Table 4 reports data related to the perceived health risk in the sample. Most of the students surveyed (86.6%) indicated that they had not been infected with COVID-19, while 13.3% stated that they were unsure whether they had contracted the disease. Therefore, it is possible that in

this sample, there were students who had contracted the virus but who were not sure of it due to a failure to diagnose by swab or blood test.

81.6% of the respondents did not regard university students as at risk for COVID-19. 18.4% believed that they are a category at risk mainly because the university is a place where it is more challenging to maintain adequate social distancing and comply with rules for preventing disease transmission.

In general, university students in the sample exhibited a moderate perception of the risk of contracting the infection. More specifically, 56.6% responded that this event is neither probable nor unlikely; 22.1% considered it an unlikely event; 12.7% perceived it as probable; 7.8% believed it was improbable, and only 0.8% thought it was highly probable. Regarding the likelihood of contracting the disease compared to university students of the same age and gender, most subjects believed that their probability is neither higher nor lower than that of peers (81.1%). Only 5.3% of the sample thought that this probability is high, and 0.3% very high. On the contrary, 9.2% believed that the probability is low, and 4.1% very low.

No significant differences were found in health risk perceptions based on the region of residence, type of university course attended, or age of the participants. However, females expressed a higher perceived susceptibility than males (females: $M = 2.82$, $SD = .79$; males: $M = 2.62$, $SD = .78$; $t = 2.88$; $p = .004$), while no differences were detected in comparative susceptibility between male and females (females: $M = 2.89$, $SD = .54$; males: $M = 2.86$, $SD = .59$; $t = .72$; $p = .47$).

The university students' degree of fear of contracting COVID-19 was also evaluated. The majority of the sample expressed little or no fear of getting sick (72.3%). Only 7% reported being very afraid of getting the infection. There were no significant differences in the responses of the students based on region. Indeed, the students living in the regions with a greater diffusion of the disease did not seem to exhibit a greater fear of the disease than their peers from other Italian regions where the virus's spread has been more limited during the first wave of the COVID-19 pandemic. There were also no significant differences in the students' age or the type and year of the course they attended.

However, females were more afraid of being infected with COVID-19 than males (females: $M = 2.19$, $SD = .86$; males: $M = 2.02$, $SD = .84$; $t = 2.17$; $p = .03$)

Table 4. Differences in the psychological impact of the quarantine according to gender and residence in a "red zone"

	Male (n=180)		Female (n=475)			Not living in a "red zone" (n=514)		Living in a "red zone" (n=141)		
	M	*SD*	*M*	*SD*	*t-test*	*M*	*SD*	*M*	*SD*	*t-test*
Physical health	2.92	.89	2.82	.87	1.19	2.87	.87	2.76	.91	1.36
Self-confidence	2.87	.92	2.46	.96	4.94**	2.60	.94	2.45	1.04	1.71
Tension or nervousness	2.70	1.06	3.03	1.11	-3.40**	2.90	1.14	3.09	1.08	-1.73
Tachycardia	1.54	.74	2.00	1.06	-5.91**	1.82	.95	2.06	1.18	-2.15*
Difficulty sleeping	2.40	1.29	2.94	1.39	-4.52**	2.75	1.37	2.95	1.44	-1.50
Tendency to ruminate	2.99	1.12	3.21	1.13	-2.16*	3.10	1.13	3.33	1.13	-2.06*
Irritability	2.56	1.13	2.95	1.16	-3.84**	2.79	1.14	3.04	1.23	-2.23*
Depression and discouragement	2.39	1.02	2.74	1.13	-3.66**	2.57	1.08	2.93	1.18	-3.41**
Tendency to cry	1.57	.88	2.47	1.21	-10.46**	2.18	1.17	2.40	1.29	-1.98*

*p<.05; **p<.01; *Note.* M=Mean; SD=Standard Deviation

3.4 The psychological impact of the quarantine experience

As a final step in the analysis, the quarantine experience's psychological impact on university students' sample was investigated.

The majority of the sample remained physically well (68.7%). However, a significant percentage of students reported feelings of insecurity and low self-confidence. In particular, females were less self-confident than males (females: M = 2.50, SD = 1.23; males: M = 3.18, SD = 1.14; t = 8.58, p < .001), while there were no significant differences by age, geographical area of residence, or other socio-demographic variables.

The quarantine experience appeared to exert a significant psychological impact on the students interviewed. Indeed, about 40% of students reported greater feelings of sadness (51.3%), nervousness (64.6%), and irritability (57%) than usual, with increased ruminations (70.9%). Furthermore, difficulty concentrating (55.9%) and sleeping (54.5%) were also reported. However, a large percentage did not report other symptoms such as eating disorders (73.6%),

tachycardia (65%), or a tendency to cry (65%). According to the t-test results, females and students living in a red zone tended to report more significant difficulties in this regard, as shown in Table 4.

The survey also explored how students organized their academic activities and how concerned they were about their university career in this lockdown period. In this regard, 57.8% of the students studied less than usual during the lockdown, and 47.5% were concerned that this emergency may negatively affect their university careers. However, most of the sample had no significant difficulties organizing their time (55.9%) and study environment (64.4%). In this case, the sociodemographic variables that appeared to have the most significant impact on these experiences were gender and whether or not they lived a "red zone" (Table 5).

Interestingly, a significant percentage of the university students in the sample (57.2%) took advantage of the quarantine period to devote their time to recreational activities and hobbies, such as playing a musical instrument, dancing, gymnastics, acting, or drawing. Furthermore, most of the students found adequate support in both families (77.3%) and friends (80.1%).

Finally, multiple regression analyses were performed to evaluate the impact of sociodemographic factors and perceived health risk variables on the psychological outcomes (positive and negative feelings z scores). Sociodemographic variables, perceived health risk, and adherence to restrictive government measures were used as independent variables, while positive and negative feelings z scores were the dependent variables.

Regarding negative feelings (F = 10.05, p = < .001; R *square* = .08), the *Std* β and t values contributed significantly to the model of the following predictors: gender (t = 3.17, p = .002, *Std* β = - .12), age (t = -3.59, p < .001, *Std* β = - .13), living in a “red zone” (t = 2.20, p = .02, *Std* β = .08), perceived susceptibility (t = 3.61, p < .001, *Std* β = .13), ease in respecting government measures (t = - 2.97, p = .003, *Std* β = - .11), and confidence in the information received regarding COVID-19 (t = - 2.01, p = .04, *Std* β = - .07). Table 5 presents the significant results from the regression analyses as well as the relationship of each predictor to the dependent variable.

In addition, positive feelings scores (F = 10.15, p < .001, R *square* = .04) are predicted by the following variables: living in a red zone (t = - 2.05, p = .04, *Std* β = - .07), compliance with government measures (t = 3.93, p < .001, *Std* β = .15), and confidence in the information received regarding COVID-19 (t = 2.64, p = .008, *Std* β = .10). Table 5 presents the significant results from the regression analyses as well as the relationship of each predictor to the dependent variable.

Table 5. Multiple regression analyses of possible predictors for positive and negative psychological outcomes.

Negative feelings	*F*= 10.05	*p* = <.001	*R square*=.08
	Std *β*	*t*	*b*
Gender	.12	3.17	.002
Age	-.13	-3.59	<.001
Living in a "red zone"	.08	2.20	.02
Perceived susceptibility	.13	3.61	<.001
Confidence in information on Covid 19	-.07	-2.01	.04
Compliance with Government measures	-.11	-2.97	.003

Positive feelings	*F*= 10.05	*p* = <.001	*R square*=.08
	Std *β*	*t*	*b*
Compliance with Government measures	-.15	3.93	<.001
Confidence in information on COVID-19	.10	2.64	.008
Living in a "red zone"	-.07	-2.05	.04

4. Discussion

This study aimed to evaluate the health risk perceptions and psychological impact of the quarantine experience during the first wave of the COVID-19 pandemic in a large sample of Italian university students. Furthermore, the study also investigated these students' opinions and beliefs regarding COVID-19 prevention measures, their confidence in the information received concerning the pandemic, and their attitudes toward the methods of performing university teaching after the lockdown. To the best of the knowledge, this is the first study investigating these variables in Italy and with such a large number of subjects.

Firstly, Italian university students were highly informed about the pandemic, with a high degree of confidence regarding the novel virus's information. In line with the data reported by similar studies on the topic (Akan et al., 2010; Carducci et al., 2019), in this sample of university students, the primary sources of information used in this quarantine period included mass media such as television and the Internet. According to these data, the participants in this study exhibited a high degree of awareness of the restrictive measures necessary to contain the virus's spread and agreed with the limitations imposed by the Italian government.

Furthermore, Italian university students have a good perception of their risk of contracting COVID-19. Indeed, both perceived and comparative susceptibility are neither too high nor too low. Besides, they are not particularly afraid of contracting coronavirus. More specifically, females express a higher perceived susceptibility and tend to be more afraid of becoming sick than males. These results also agree with the literature data on the perception of university students' risks in the event of pandemics (Dolinski et al., 2020; Tooher et al., 2013). In this

regard, a study by Akan et al. on university students' knowledge of and attitudes toward the pandemic influenza A/H1N1 demonstrated that 40.5% of the participants perceived their risk of influenza as "moderate" and that the risk perception of males was significantly lower than that of females, as in this study (Akan et al., 2010).

The findings also indicated significant psychological effects of the quarantine period in university students. In particular, about 40% of students reported greater feelings of sadness (51.3%), nervousness (64.6%), and irritability (57%) than usual, with increased ruminations (70.9%). Furthermore, difficulty concentrating (55.9%), sleeping (54.5%), eating disorders (73.6%), tachycardia (65%), and tendency to cry (65%) were also reported. This data confirms that of other studies examining the mental health of university students in this pandemic period. A recent study conducted at the University of Valladolid (Spain) showed high levels of anxiety, stress, and depression among students and administrative staff (Odriozola-Gonzalez et al., 2020).

Similarly, another recent study conducted in Greece reported the quarantine's detrimental psychological effects on university students' mental health (Kaparounaki et al., 2020). A cross-sectional web-based survey conducted on 476 university students living in Bangladesh during the COVID-19 pandemic confirmed that university students experienced heightened depression and anxiety. However, this study differs from others reported in the literature on the same topic as our sample students did not report other symptoms indicative of a psychopathological state of stress. This data can be explained by the fact that the students interviewed in this study continued their academic activities and found time to devote to their hobbies and interests. Moreover, most of them reported having received adequate support from family and friends and therefore relied on a good social support network.

Finally, the study evaluated the role of sociodemographic factors and health risk perception variables related to the COVID-19 experience concerning perceptions of negative and positive feelings. More specifically, according to the hypotheses of this study, living in a region with more limited virus spread, reporting high compliance with government measures, and being confident in the information received regarding COVID-19 are all variables associated with a higher degree of positive feelings. On the contrary, as hypothesized, being female and younger, living in a red zone, reporting high levels of perceived susceptibility, and being less compliant with government measures and less confident in the information received regarding the pandemics are associated with more negative feelings. These findings are consistent with literature data, according to which greater awareness and knowledge are associated with a more minimal psychological impact of the pandemic events (Brug et al., 2004; Carducci et al., 2019; Commodari, 2017; de Zwart et al., 2009). According to our data, the study by Browning et al. (2021) also confirmed that university students who were women and with ages between 18 and

24 years experienced higher levels of psychological stress. Furthermore, the results of this study are similar to those reported in a previous study conducted on Italian adolescents during the first wave of COVID-19, according to which females and adolescents living in a "red zone" showed more significant psychological negative feelings about the quarantine experience (Commodari & La Rosa, 2020).

5. Strengths and limitations

This study has both strengths and limitations. Firstly, this is one of the first studies conducted in Italy concerning health risk perceptions related to COVID-19 and the effects of the quarantine experience on the psychological wellbeing of university students. Furthermore, data were collected from a large sample consisting of almost 700 Italian students interviewed from north, central, and south Italy. However, the study used an internet-based questionnaire, so it was not possible to ascertain the accuracy of the answers to the questions. Furthermore, due to the way in which the participants were recruited, the sample was not adequately balanced with regard to the socio-demographic variables taken into account in the study. For this reason, the results of our study should be interpreted in the light of this limitation. Similarly, most of the students interviewed fell within the area of humanities or psychology, with a consequent underestimation of students studying other subjects, which may have affected the results.

6. Conclusions

In conclusion, despite some limitations, this study gives empirical evidence that a large percentage of Italian university students have suffered from the lockdown's psychological impact during the first wave of the COVID-19 pandemic. In light of these results, the psychological wellbeing of university students should be carefully considered. Therefore, it is necessary to provide adequate crisis-oriented psychological services to support this specific population in addressing the uncertainty associated with the pandemic and the quarantine period, as well as to reduce the psychological impact of university closures as much as possible, according to the recommendations of the literature on the subject (Di Giacomo, 2020; Koffman et al., 2020a, 2020b). Future studies will have to focus on the impact of restrictive measures to contain the COVID-19 pandemic on the quality of life and psychological wellbeing of university students even in subsequent waves of contagion, in order to adapt the organization of teaching and academic life according to the needs and experiences of students and taking into account the persistence of the stressful event of the pandemic.

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any potential conflict of interest.

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