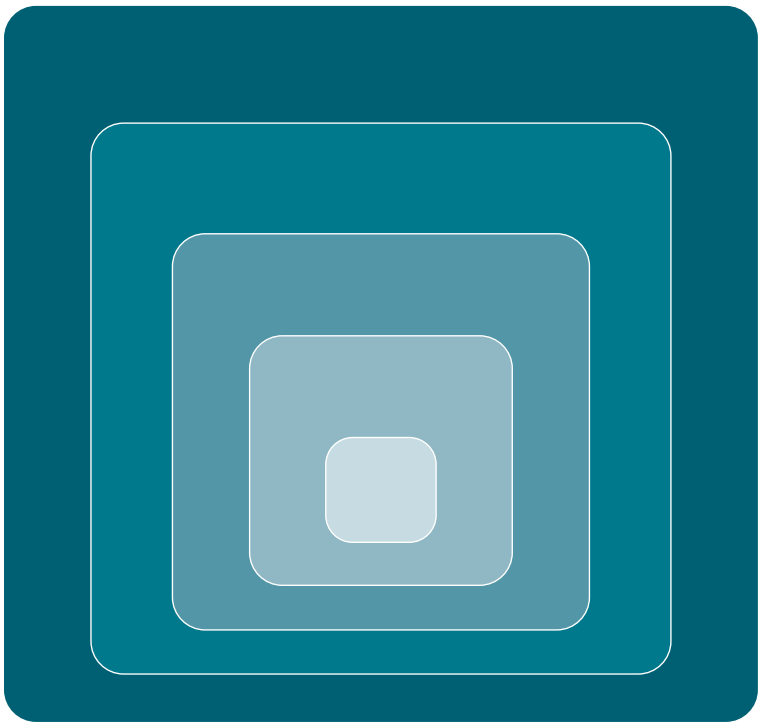
established in 1984

PSYCHOLOGY HUB

n. 1, Vol. XXXIX, 2022



University Press

SAPIENZA
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PSYCHOLOGY HUB

n. 1, Vol. XXXIX, 2022

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Psychology Hub

Four-monthly journal of the Department of Dynamic and Clinical Psychology and the Department of Social and Developmental Psychology, Sapienza University of Rome.

As a peer-reviewed journal for original research articles as well as review articles in all areas of Psychology, Rassegna di Psicologia, has been well-known since 1984. To further increase its international representation the editorial board has decided to change the journal title to Psychology Hub, starting with the first issue in 2020.

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Editorial procedure
Double-blind peer review
This journal follows a double-blind reviewing procedure. Authors are therefore requested to submit:
A blinded manuscript without any author names and affiliations in the text or on the title page.
A separate title page, containing title, all author names, affiliations, and the contact information of the corresponding author.
Any acknowledgements, disclosures, or funding information should also be included on this page.

Journal owned by Sapienza Università di Roma, published with the contribution of the University
Authorisations of the Court of Rome n. 268/85 of 17 May 1985 and n. 105/2014 of 16 May 2014
ISSN PRINT: 2723-973X – ISSN ONLINE: 2724-2943

Sapienza Università Editrice
Piazzale Aldo Moro 5 – 00185 Roma - www.editricesapienza.it - editrice.sapienza@uniroma1.it
Registry of Communication Workers registration n. 11420

Published in march 2022
https://rosa.uniroma1.it/
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© Author(s)
E-ISSN 2724-2943
ISSN 2723-973X

Psychology Hub (2022)
XXXIX, 1, 5-6

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Special Issue
Effect of Covid-19 pandemic: vulnerability and resources. Part 2

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The first seven contributions to this issue of Psychology hub derive from the call for papers of the Italian Psychology Association (AIP) centered around the "Effect of Covid-19 pandemic: vulnerability and resources". Together with the first five papers of the previous issue and with the first contributions of the next one, these papers will cover all the articles received from the AIP members in response to the previously mentioned call for papers.

The first contribution of this issue, titled "The five-day challenge: how to turn a change into a chance. An action-research to promote resilience and self-empowerment during lockdown", written by Teresa Galanti, Stefania Fantinelli, Michela Cortini e Teresa Di Fiore", is aimed to investigate the level of well-being of Italians during the lockdown and to promote the acquisition of proactive behaviours and self-empowerment. The results of the research study suggest that dispositional optimism is positively associated with wellbeing, with this association mediated, in a negative way, by state anxiety. Moreover, it shows a significant effect of an intervention proposed on anxiety level reduction of participants.

The second contribution, written by Michela Marchetti, Daniele Gatti, Lucio Inguscio and Giuliana Mazzoni and titled "Psychological well-being and lockdown: a study on an Italian sample during the first COVID-19 wave" points out how during the first wave of COVID-19 in Italy, only the perceived usefulness of lockdown, among several other variables, positively affected people's emotions, showing the importance of political communication in time of crisis such as that one.

The third contribution, whose title is "The psychological impact of the pandemic: the effects of COVID-19 pictures on emotional processing", written by Raffaella Maria Ribatti, Antonietta Curci and Tiziana Lanciano, investigates the long term consequences of the exposition to COVID-19 related pictures and shows how they stir up negative affective states that increase over time and favor a relevant persistence of long-term rumination and a significant persistence of intrusive thoughts.

The fourth contribution, written by Calogero Lo Destro and titled "Psychological factors predicting social distance during the COVID-19 pandemic: an empirical investigation" investigates several psychosocial factors which may contribute to the compliance with the government rules about social distancing. This research study shows how participants' social distance, in response to both coughing and smiling targets, was predicted by fear of infection and by the perception COVID-19 could become a pandemic. Social distance in response to coughing target was also significantly and positively predicted by age and state anxiety.

The fifth contribution, "Remote working during the COVID-19 pandemic: A study on the emotional and relational experience and on the well-being of Italian university scholars and clerks", written by Ciro Esposito, Barbara Agueli, Caterina Arcidiacono and Immacolata Di Napoli, shows that scholars consider remote working mainly as a critical issue, while clerks see it more as a resource. Moreover, clerks more frequently report negative feelings of anxiety, fear, and anger, while scholars more

frequently report loneliness. Moreover, clerks reported lower economic and overall well-being compared to scholars.

The sixth contribution, written by Claudio Russo, Giuseppe Giordano and Giuseppina Marsico, and whose title is "The social pandemic from SARS-CoV-2 among Italian university students: a pilot study" analyze qualitative data on the lived experience against the occurrence of health-related behaviors and shows that the extent to which the participants have reported a lower degree of satisfaction on living arrangements, intimate and family relationships appears to be meaningfully related with a more negative lived experience.

The last paper connected to COVID-19 topic, "Effects of Anti-COVID Face Masks on Contagion Risk Evaluation: Wearing a Mask Intensifies Moral Judgments Towards Risky Behaviors", written by Matteo Perini and Simona Sciara, investigates the effects of complying with measures aimed at offsetting the risks of spreading COVID-19 on the evaluation of risks themselves, and shows an effect of mask-wearing on the moral judgments towards behaviors at risk of COVID-19 contagion, with no significant results for other morality-unrelated attitudes towards risks.

We want to stress the richness of the perspectives and of the methodologies utilized in the papers published in this issue, and how they can help us better understand the psychological consequences of the pandemic, the psychological and social mediators of these influences, and the possibilities of developing and implementing interventions aimed at reducing the negative impact and side effects of the measures adopted to defend the population from the infection.

We think also that this richness is a sign of the good health of our community of academic psychologists in its different specificities and sensitivities, and we hope in future collaborations of our journal and this community.

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© Author(s)
E-ISSN 2724-2943
ISSN 2723-973X

Psychology Hub (2022)
XXXIX, 1, 7-16

Article info

Submitted: 15 October 2021
Accepted: 04 December 2021
DOI: XXXX

The five-day challenge: how to turn a change into a chance. An action-research to promote resilience and self-empowerment during lockdown

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Abstract

Introduction. The social and sanitary emergency due to the spread of Coronavirus has certainly represented one of the most difficult challenges of contemporary world that has put at risk the psycho-physical health of people. Some studies in the field of psychological sciences have turned their attention to the impact of restrictive confinement within own homes, on the well-being and quality of life. Isolation, the lack of opportunity to socialization, the sense of job insecurity and economic precariousness, as well as the difficulty in managing a daily life without routine and predictability, have put a strain on people's resilience, exposing them to numerous psycho-social risks. Aim of the study. Moving within Positive Psychology, the present action-research is aimed to investigate the level of well-being of Italians during the lockdown and promote the acquisition of proactive behaviours and self-empowerment. Method. We developed a self-report questionnaire and designed an intervention, called "the five-days challenge: how to turn a change into a chance". A triangulated methodology has been implemented in order to enrich the data from a double point of view, qualitative and quantitative. Results. Firstly, it was observed that dispositional optimism was positive associated with wellbeing, but that this positive association will be significantly mediated, in a negative way, by state anxiety. Secondly, the results have shown a statically significant effect of the intervention proposed on anxiety level reduction of participants. Implication. To sum up, the five-days challenge seemed to be a practical and operative intervention to promote self-empowerment in various situations dominated by uncertainty, which requires a great effort in terms of resilience and reappropriation of meaning.

Keywords: Covid-19; psychological risks; resources; Positive Psychology; Self-empowerment; Proactive behaviours; five-days challenge.

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Introduction

The socio-sanitary emergency resulting from the spread of coronavirus certainly represents one of the most difficult challenges in the contemporary world, which has put the psycho-physical health of people at risk. Faced with the spread of the virus, several studies have been conducted with the aim of not only collecting health and epidemiological data but also investigating the effect of Covid-19 on individuals and communities, as well as the consequences of the actions adopted by institutions to counteract its spread (Converso et al., 2021; Ergin, 2021). The main impacts have concerned not only friendships and family relationships but also the ability to relate to a new way of organizing and managing work, as well as the sense of precariousness and uncertainty about the future, involving people on multiple levels, from the physical to the psychological, environmental, and relational levels. These studies have facilitated a better understanding of the psychosocial impact of exposure to a pandemic, as well as the determination of its effects to mitigate them and cope with future pandemics (Ergin, 2021).

Regarding the restrictive measures adopted, primarily home confinement during the first phase of the pandemic, some studies have tried to emphasize their consequences on well-being and quality of life. In fact, isolation, lack of socialization opportunities, sense of job insecurity, and economic precariousness, as well as the difficulty of managing daily life without routine and predictability, have severely tested the resilience of people, exposing them to numerous psycho-social risks. These include the risk of stopping in believing that we have multiple possibilities in front of us and that we have power over reality. When we stop believing in our possibilities, we stop growing, and development dies.

In such a scenario, the ability to withstand setbacks, adapt positively, and cope with adversity becomes a priority, which is described as resilience (Killgore et al., 2020b). Resilience during the COVID-19 pandemic was significantly lower than normative data, suggesting that the crisis triggered by the pandemic negatively affected population resilience, perhaps due to acute changes in emotional outlook and perceived support (Killgore et al., 2020a). Masten (2018) defines resilience as "the capacity of a dynamic system to successfully adapt to disturbances that threaten the function, survival, or development of the system" (p. 187), whereas the American Psychological Association (APA, 2014) defines resilience as a process of bouncing back from difficult experiences and adapting well in the face of adversity, trauma, tragedy, threats, or significant stress sources. Individual resilience contributes significantly negatively to the prediction of depression, anxiety, stress, and obsessive-compulsive symptoms (Bonanno et al., 2004; Hjemdal et al., 2011; McEwen et al., 2015).

Thus, the protective role that individual resilience might play against COVID-19-related psycho-social risk seems evident, as does the study and implementation of an intervention to promote it. Studies and interventions of this nature find fertile ground in the panorama of positive psychology, whose key assumptions, though not exhaustive, are presented below.

Positive psychology (Seligman & Csikszentmihalyi, 2000) is a psychology science of positive subjective experience, positive individual traits, and positive institutions that promises to improve the quality of life and prevent the illness and disease that arise when life is sterile and meaningless.

Thus, in contrast to the dominant approach in psychology characterized by an exclusive focus on human pathology or disfunction, positive psychology proposes a new approach aimed to "catalyze a change from preoccupation only with repairing the worst things in a life to also building positive qualities" (Seligman, 2020, p. 5).

In other words, positive psychology studies the conditions and processes that contribute to the flourishing or optimal functioning of people, groups, and institutions (Gable & Haidt, 2005). Its goal is not to deny negative aspects of life or the existence of human suffering, but to study the other side of the coin. In fact, understanding human strengths can usually help prevent or decrease stress and disorders.

According to this vision, prevention researchers have found that there are human strengths that can act as buffers against mental illness, including both personality traits, which are generally stable, and more flexible dimensions, such as empowerment and proactivity.

The construct of empowerment differs from some psychological constructs with which it is sometimes confused, such as self-efficacy, self-esteem, locus of control, or competence (Perkins & Zimmerman, 1995). According to Zimmerman (2000), three basic dimensions of empowerment—control, referring to the ability to make decisions; awareness, which relates to how decisions are made and how power structures operate; and participation, which refers to acting to make things happen and achieve one's goals—can be identified. Furthermore, we can analyze empowerment on three different levels: individual (or psychological), organizational, and community (Zimmerman, 2000). The first individual level is characterized not only by the learned hope component, which facilitates change, but also by the ability to set new goals. In particular, the learned hope component is characterized by the fact that it can be learned or unlearned depending on the influences of the external environment, so it is not a dimension that relates only to personality traits (Zimmerman, 1990), which tend to be stable. Rappaport (1987) also defines empowerment as a process through which individuals can exercise control over issues that affect them. Thus, empowerment seems to be a key resource for individuals, especially in times of fear and insecurity, because of its ability to educate hope while fostering a perception of control over reality.

Closely related to empowerment is proactivity, a self-directed, future-focused behavior in which an individual aims to bring about change, including situational change and/or change within oneself (Bindl & Parker, 2010; Parker et al., 2010; Parker et al., 2019). In other words, proactivity involves actively taking control of oneself and one's environment to "make things happen" (Wang & Parker, 2015). According to Greenglass and Fiksenbaum (2009), we can also understand proactivity as the ability to reinterpret demands as challenges rather than stressors, enhancing vitality. In fact, challenges can stimulate vitality, which generates more positive outcomes (Greenglass, 2006). This idea of proactivity has also led to a reinterpretation of coping styles, no longer from a reactive but from a preventive perspective. Proactive coping, in fact,

is an active construction of opportunities that can positively influence health and well-being (Schwarzer & Knoll, 2003) through the promotion of positive mood and cognitions, especially regarding future events.

From this perspective, the importance of designing an intervention aimed at promoting these adaptive dimensions to cope with the negative psycho-social impact of the COVID-19 pandemic is therefore evident.

Aim of the study

Moving within the framework of positive psychology (Seligman, 2000), we wanted to look at the emergency context, particularly the period of lockdown imposed by the Italian government from March 9 to May 18, 2020, not focusing only on the obvious costs of the psycho-social nature related to it but trying to promote the aspects of opportunity offered by this situation. Considering only the negative aspects, there is the risk of not seeing some characteristics of the human being capable of playing a key role in crisis situations, such as hope, proactivity, resilience, and a sense of power.

Starting from these considerations, this research intervention aimed to investigate whether a self-empowerment intervention can reduce state anxiety and, in turn, reduce its negative effects on well-being. In particular, the self-empowerment intervention was designed as a five-day challenge based on the five letters of the word COVID, each dedicated to a key competence to be developed or enhanced (Communication, Organization, Self-Vision, Information, and Desire).

Methodology

Research design

This study is participatory action research (PAR), a research process to which all participants contribute their unique skills and knowledge and through which all participants learn and are transformed (Borda, O. F., Reason, P., & Bradbury, H. 2006). The choice of this research design can be briefly explained by the dual interests of the research: first, to investigate the level of well-being of Italians in confinement and the associated psycho-social risks; second, to test the effectiveness level of an intervention to promote resilience and empowerment. According to Yeich and Levine (1992), participatory research and the conceptualization of empowerment are related.

For the reasons mentioned above, we developed a self-report questionnaire and designed an intervention called "the five-day challenge: how to turn a change into a chance."

In particular, the intervention focused on five important dimensions of identity emphasized by the emergency context and restrictive confinement measures: communication, organization, introspection and self-analysis skills, information, and desire.

We decided to implement a triangulated methodology to enrich the data from a dual viewpoint—qualitative and quantitative data together can represent a more comprehensive context (Cortini, 2014).

The qualitative part was implemented by processing the daily diaries completed by the participants. A discourse and an interpretative analysis were performed in line with the grounded theory approach (Glaser & Strauss, 1967) and the traditional exploration of metaphors and key themes in the text.

The quantitative part was implemented through an online questionnaire administrated before and after the intervention, using which we intended to measure the level of well-being and anxiety of participants and verify the relationships among some variables of interest, such as dispositional optimism and proactive coping. In particular, the main hypothesis was that state anxiety (due to the emergency context) can negatively mediate the positive relationship between dispositional optimism and well-being and that an empowerment intervention can mitigate this negative pathway. This hypothesis is in line with the recent literature affirming the greater psychological impact of Covid-19 in terms of reported anxiety and stress (Cao et al., 2020; Solomou & Constantinidou, 2020; Wang et al., 2020).

Qualitative methodology

Regarding the qualitative analysis of the diary content, a theoretical premise was necessary. According to Murray (2000), narrative construction, such as the diary, is a way of making sense of the world. The process of diary writing allows a person to make sense of the constant changes in their lives and to bring order to the disorder. In this sense, the description of some diaries as "documents of life" (Wallin and Adawi, 2018) indicates a "self-revealing record that intentionally or unintentionally yields information regarding the structure, dynamics and functioning of the author's mental life" (Allport, 1942, p. 22). Starting from these premises, we conducted a classic discourse analysis of the diary content (Minnini & Anolli, 2002).

Discourse analysis is a qualitative, interpretative, and constructionist methodology that allows researchers to explore how participants actively construct categories or clusters with respect to the themes being investigated. It considers metaphors and linguistic agency: metaphors are viewed as a tool for thinking, for conceptualization that can expand the view of the research object by creating connections to other themes; linguistic agency refers to the use of lexical and morphological aspects of the linguistic system to result or not result in oneself as a responsible agent. From this perspective, the content of diaries was analyzed, and all linguistic metaphors used to talk about the theme were identified, interpretated, and explained. The idea was to generalize from them the conceptual metaphors they exemplified and to use the results to suggest understandings or patterns of thought that construct or constrain people's beliefs and actions (Galanti, 2021).

Participants and procedure

The sample comprised 309 home-confined Italians, 56 males and 252 females, with Mage (mean age) = 34.11 and SD

(standard deviation) = 12.56. They completed an initial self-report questionnaire created on the Qualtrics platform and distributed through social media (i.e., LinkedIn, Facebook, and Instagram).

The research conformed to the Declaration of Helsinki of 1995 (and following revisions), and all ethical guidelines were followed as required for conducting human research, including adherence to the legal requirements of the study country. The participants gave their informed consent prior to participating in the research session and agreed to complete the questionnaire anonymously. No treatment, including medical, invasive diagnostics, or procedures causing psychological or social discomfort, was administered to the participants. Moreover, participation was voluntary without any reward.

For five days, the participants received an email containing a challenge to complete during the day. The first challenge focused on the need for relationships, partly denied by the lockdown experience. The participants were asked to call a person they had not heard from the beginning of the pandemic. Furthermore, every day, the participants received an invitation to write an experience diary, which comprised a short survey on a Google module platform created to not only explore their experiences with respect to the day's challenge but also to their state of well-being.

Finally, each day the diary provided the participants with insights into the day's challenge. Our idea was to "walk" with them and support their reactivation. After five days, the participants re-completed the stress and well-being section of the questionnaire to see the expected positive effect of the challenge.

Measures

In addition to the socio-demographic items (gender, age, education, current occupation, and presence of children under 14 years of age), the questionnaire also included the measures described below. Well-being was assessed using *Goldberg's short general health questionnaire* (GHQ 12) (e.g., "I have enough physical energy to face the day") (Goldberg & Illier, 1979). The locus of control was measured with a brief version of *Levenson's Locus of Control Scale* (Sapp & Harrod, 1993), comprising nine items evaluated using a 5-point Likert scale (from 1 = "Strongly disagree" to 5 = "Strongly agree") (e.g., "the possibility of success in life is mainly due to the help of others").

Dispositional optimism was measured with Scheier et al.'s (1994) *Revised Life Orientation Test* (LOT-R), a Likert scale comprising six items (from 1 = "Strongly disagree" to 6 = "Strongly agree") (e.g., "In times of uncertainty, I usually expect the best"). Finally, the Italian version of Spielberger et al.'s (1983) *STAI-Y* was assessed to measure state anxiety (form 1) and trait anxiety (form 2) (Pedrabissi & Santinello, 1989).

Statistical analysis

Before analyzing the data, the validity and reliability of the scales were assessed. Once established that all measures in this study had reliability and validity values in accordance with the cut-offs usually followed in research (Hair et al., 2018), the descriptive statistics and correlations among the major study variables were calculated.

To perform the mediation analysis, a Statistical Package for Social Science (SPSS) macro called PROCESS, described by Preacher and Hayes (2004), was used, which incorporated the traditional approach (e.g., the Sobel test) and the approach developed by Baron and Kenny (1986) to quantify the indirect effects of the predictor on the dependent variable with the bootstrap approach.

Results

Quantitative results

Descriptive statistics, Cronbach's alphas, and correlation analysis among variables are listed in Table 1. All variables were correlated in the expected direction. Dispositional optimism was found to be positively related to well-being and internal locus of control and negatively related to anxiety. In contrast, state anxiety was negatively related to dispositional optimism, well-being, and internal locus of control.

Tab. 1. Descriptive statistics, Cronbach's alphas, and correlations among the study variables

	1	2	3	4
1. STAI_Y (2)	(.79)	-.39**	-.46**	-.193**
2. WELL-BEING		(.78)	.35**	.30**
3. DISP. OPTIMISM			(.87)	.30**
4. INT_LOC				(.79)
M	43.92	4.51	4.20	4.20
SD	12.42	0.83	.91	.58
SKEWNESS	.201	-.413	.151	-.277
KURTOSIS	-.746	-.231	-.161	.134

Note *= $p < 0.05$; ** = $p < 0.01$.

Path analysis performed using the SPSS macro PROCESS (Preacher & Hayes, 2004) was used to test the hypotheses. The first mediation was tested using Model 4 of Preacher and Hayes (2004); the graphical representation of the model is shown in Figure 1.

First, dispositional optimism was found to be positively associated with well-being (Direct effect .19, SE .05). However, this positive association was significantly partially mediated in a negative way by state anxiety (Indirect Effect 0.13, SE .03, LLCI .069, and ULCI .191).

This result confirmed the first hypothesis and supported the second hypothesis, which is related to the efficacy of an intervention to reduce the level of anxiety generated by the emergency context, primarily by confinement measures adopted during the first pandemic wave.

To test the longitudinal effects after the intervention phase, a repeated measures ANOVA (within subjects) was performed. As shown in Figure 2, a statistically significant effect of intervention was proposed on anxiety level reduction ($F(1,64) = 557.23$, $p = .000$).

Fig. 1. Graphical representation of the model

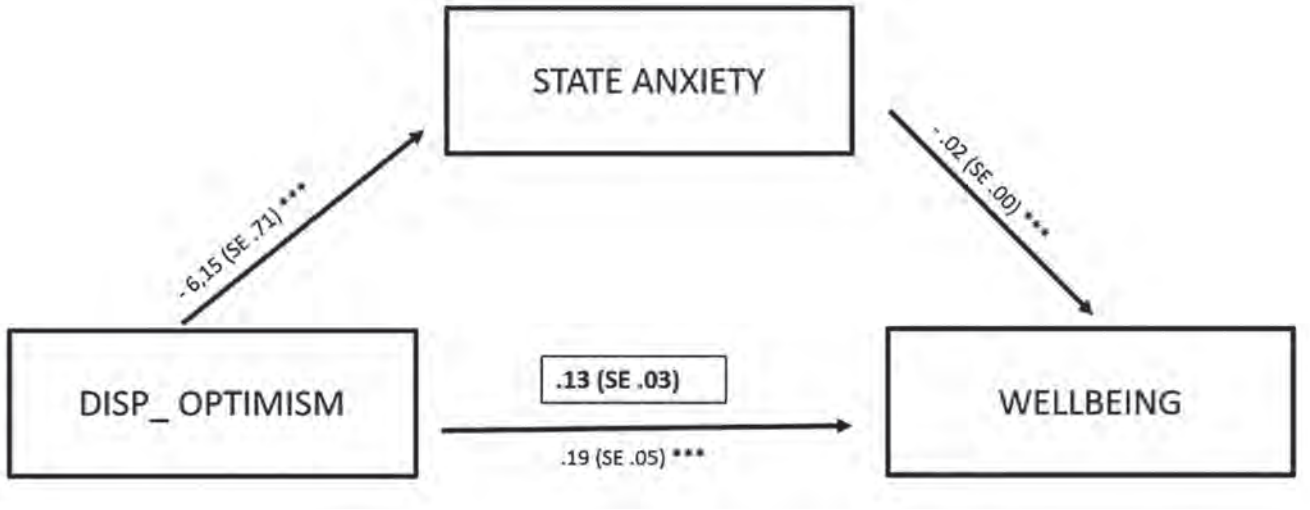
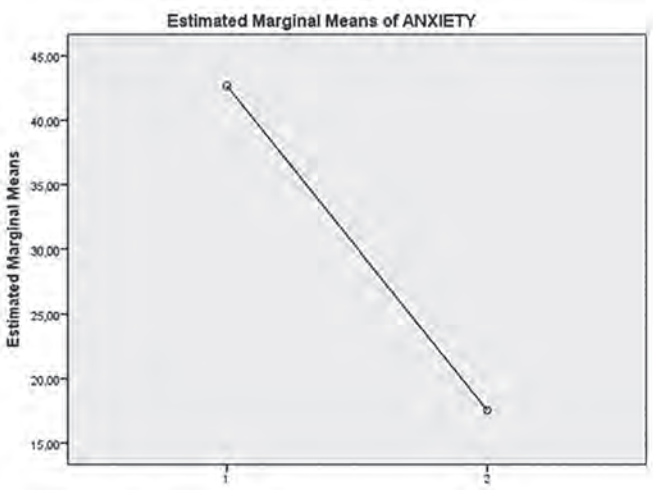


Fig. 2. ANOVA within subjects T1-T2



At time 1, there were higher levels of anxiety among the participants (means = 42, 67, SD = 11.52) compared to time 2 (mean = 17.53, SD = 6.37). The extraordinary significance of this second result is, at least partly, attributable to the timeliness of the intervention. Thus, *the five-day challenge* could be seen by the participants as an operational guide to restart in small but daily steps to contrast the feeling of learned helplessness (Seligman, 1972) with the real possibility of self-empowerment (Zimmerman, 2000).

However, regarding the impact of our intervention on well-being, no statistically significant changes were found. This result is, at least partly, explained by the short duration of the proposed intervention (only five days), which could positively affect state anxiety but not as much the overall sense of well-being.

Qualitative results

For the qualitative analysis of the participants' diaries, a classic discourse analysis (Minnini & Anolli, 2002) was conducted, which is a qualitative, interpretative, and constructionist methodology that allows the exploration of how participants actively construct categories, or clusters, regarding the investigated themes.

In this study, four thematic clusters were identified: self-knowledge, planning, well-being, and gratitude. "Communicating is not dialoguing with someone, but it is first of all admitting to oneself that one is not alone in the world" (diary no. 89) and "It was extremely liberating to speak to oneself, to suddenly take a new perspective on oneself" (diary no. 56) are a few examples of the self-knowledge cluster.

The planning cluster is compared with a *sharp weapon* (diary no. 20), capable of breaking down mountains (diary no. 9), or to a faithful companion who can help you in times of difficulty (diary no. 39). Emblematic, in a positive key, is the frequent recourse to words and expressions such as "gift for oneself," "liberating," "resize," and "like a caress" in referring to the lived experience and the possibility of reflection and introspection on the day spent by writing a simple diary page. Finally, the last theme is related to the ability to recognize the gifts received, the good of each experience, and the possibility of feeling gratitude. "This time is trying to teach me to live unpretentious every day and to be grateful for everything that, incredibly, happens." (diary no. 154).

Furthermore, the contents of the diaries were analyzed with a quantitative methodology using the statistical software T-Lab, which is capable of returning a mapping of the characterizing contents.

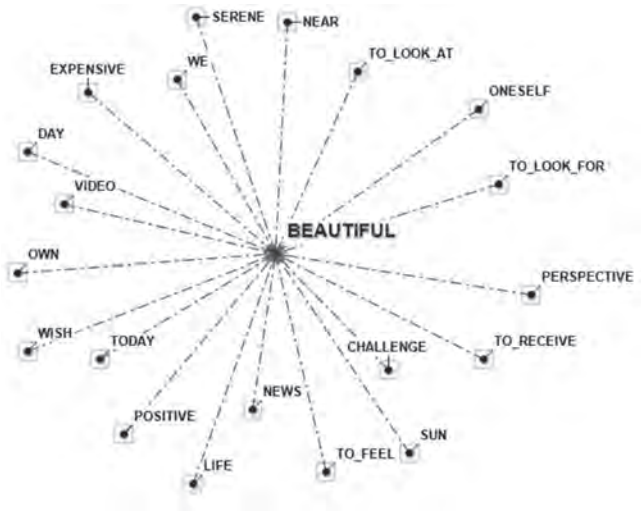
An automatic analysis of the content was performed, which starts from the idea that the more we refer to specific language families in speaking, the more these concepts are active in our minds.

The first thing T-Lab allows us to achieve with textual material is to analyze word occurrences and cooccurrences. The software output shows in the middle the most cited word and all around the words that co-occur the most with it, according to an association index: the Cosine coefficient; in graphical terms, the more two words co-occur, the closer they are in the dimensional space (Cortini & Tria, 2014). It is always possible to "dialog" with the software and ask to put in the middle a specific word of interest for the user to have a graphical representation of its associations; in this sense, T-Lab can assist the user in following both an automatic analysis path and a customized path.

Moreover, T-Lab allows us to obtain the phrase in which the two words co-occur, and this cue is particularly useful in terms of the mixed method, because just with a click, you get the original textual material, which can be analyzed by discourse analysis. We checked occurrences and co-occurrences, setting a frequency threshold of four. As Figure 3 shows, the value association of the thematic elements is graphically represented in terms of the distance from the keyword in the center.

The most common lemmas in the diaries were "beautiful" (Figure 3), associated with other keywords such as "wish" (Cosine, 0.26), "perspective" (Cosine, 0.23), "to share" (Cosine, 0.22), and "positive" (Cosine, 0.20), in line with what emerged from the discourse analysis. Table 3 reports the coefficient of Cosine and Chi² of co-occurrence with the lemma "beautiful."

Fig. 3. Co-occurrence with the lemma BEAUTIFUL



Tab. 2. Coefficient of Cosine and Chi² of co-occurrence with lemma BEAUTIFUL

LEMMA	COEFF	C.E.(A)	C.E(AB)	CHI²
wish	0.261	13	6	5.107
perspective	0.234	4	3	7
To share	0.222	8	4	1.697
Positive	0.201	15	5	1.39
Time	0.224	31	8	0.436
To search	0.221	18	6	1.697

Note. C.E.(A)= occurrence; C.E.(AB) co-occurrence

Other important lemmas that occurred frequently were "work" (Figure 4), associated with the word "satisfaction" (Cosine, 0.20); "experience" (Cosine, 0.25), "understand," "home" (Cosine, 0.20), and finally, the word "I" (Cosine, 0.14). This last association (Work-I) are powerful in showing how work represents an essential dimension of people's identities. The need for experience and knowledge, the urge to understand, and finally, the desire for personal work satisfaction appeared evident from the analysis of the diaries, as the need to safeguard work-life balance also seemed evident. Table 4 reports the coefficient of Cosine and Chi² of co-occurrence with the lemma "work."

Fig. 4. Co-occurrence with the lemma WORK



Tab. 3. Coefficient of Cosine and Chi² of co-occurrence with lemma WORK

LEMMA	COEFF	C.E.(A)	C.E(AB)	CHI²
Satisfaction	0.2	10	2	4.675
Experience	0.25	6	2	9.92
To understand	0.18	4	1	3.241
Home	0.2	10	2	4.675
I	0.141	5	1	2.275

Note. C.E.(A) = occurrence; C.E.(AB) co-occurrence

Finally, a personalized analysis was conducted, asking the software to map the co-occurrences with the word "future" (Figure 4). This choice can be explained by the research interest in investigating how the created intervention helped people to assume an attitude of openness and trust toward the future.

First, the lemma "future" was associated with the lemmas "hope" (Cosine, 0.45), "thanks" (Cosine, 0.31), and "positivity" (Cosine, 0.22). These are keywords in the field of positive psychology for their relation to the possibility of reversing the situation and grasping the positive side of each day.

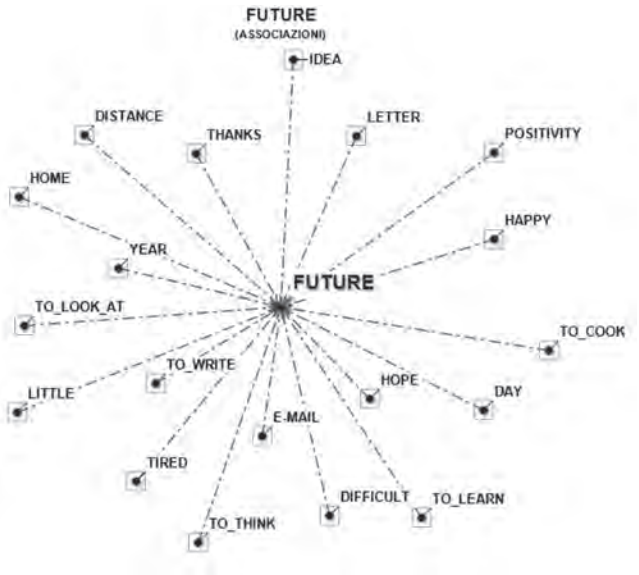
Second, the association with the words "to learn" (Cosine, 0.22) and "to look at" (Cosine, 0.2) refer to two opportunities to be grasped despite the limitations imposed by the lockdown. In addition, these associations seemed to confirm what emerged from the discourse analysis: most participants affirmed that they had learned considerably from everyday challenges, especially in terms of self-awareness. Table 5 reports the coefficient of Cosine and Chi² of co-occurrence with the lemma "future."

Tab. 4. Coefficient of Cosine and Chi² of co-occurrence with lemma FUTURE

LEMMA	COEFF	C.E.(A)	C.E(AB)	CHI²
Hope	0.452	12	7	31.494
Thanks	0.31	13	5	11.753
To learn	0.224	4	2	6.859
Positivity	0.224	4	2	6.859
To look at	0.2	21	4	1.882

Note. C.E.(A) = occurrence; C.E.(AB) co-occurrence

Fig. 5. Co-occurrence with the lemma FUTURE



Discussion

The present study intended to investigate the level of well-being of Italians during the first lockdown (March–May 2020), considering not only the negative impact of the pandemic but also the personal resources that can mitigate these effects, such as empowerment. The COVID-19 pandemic has impacted our society at different levels and with different intensities, affecting human and social capital, which is impossible to address through a simple adaptation of the situation.

Isolation, the absence of routine and predictability, has weakened people's resilience, convincing them that they have little or no power over reality. This condition seems to recall the well-known learned helplessness theory (Seligman, 1972), according to which individuals show more stress when faced with traumatic situations they cannot control as compared to the case of equivalent controllable trauma. Thus, the COVID-19 pandemic can be reasonably considered an unpredictable and uncontrolled trauma against which the participants of this action research—and, more generally, the Italians—found themselves unprepared and shocked.

In contrast, it should be seen as an opportunity to progress and "bounce forward" through adaptation and transformation. Thus, individual and collective resilience can play a strategic role in strengthening people and mobilizing their creativity to deal with the crisis (Killgore et al., 2020a)

Moving within the framework of positive psychology, this participatory action research aimed to promote a different way of looking at the COVID pandemic and the restrictive measures adopted to contain the spread of the virus: an opportunity to look at this crisis as a chance to learn and develop individual and collective resources, above all empowerment and proactivity.

Several recent studies have highlighted the role played by personality traits in predicting the impact of COVID-19 on people's behaviors and well-being (Carvalho et al., 2020; Prentice et al., 2020; Rettew et al., 2021). In this study, we aimed to investigate how a positive trait such as dispositional optimism can improve the well-being of Italians in the lockdown. This is because extroversion, the macro factor that also includes dispositional optimism, is generally associated with lower levels of perceived stress (Jackson & Schneider, 2014; Schneider et al., 2012). Yet, our first result suggests something else. If the positive relationship between dispositional optimism and well-being is confirmed, it also determines how the state of anxiety experienced by Italians during the lockdown is configured as a threat to the aforementioned relationship.

A possible explanation for this result (i.e., the fact that a state of situational anxiety can negatively mediate the impact of a stable trait on well-being) can be found in social isolation, which characterizes the home-confinement period. According to Liu et al. (2021), individuals with high dispositional optimism, particularly those with high levels of activity and sociability qualities, might not be as effective in controlling their environment once the social aspect is removed. Starting from the consideration that the pandemic is a "golden age for introverts", *the five-day challenge* invites Italians to metaphorically open the doors to react to a progressive closure that began as an imposition and risked becoming, albeit unconsciously, a choice. The importance of being open to communication emerged from the participants' experiences, parallel to the awareness that listening to each other is "the most human need we have" (diary no. 89). At the same time, the communication challenge forced the participants to step out of their "own little garden" (diary no. 92), taking on a different perspective and feeling "connected and less alone" (diary no. 45). Finally, the most hoped-for result is achieved: awakening the planning and desire to take charge of one's daily life. We believe that the satisfaction of the need for a relationship might have opened up the possibility of wishing for a different routine in which an individual does not passively undergo the passage of time but himself becomes a promoter of change. In other words, the five-day challenge was designed to accompany the participants day after day in the progressive rediscovery of personal resources to be put in place against the sense of helplessness favored by this situation. It was then configured as a trip of progressive reappropriation of the ability to manage their own time and achieve the desired objectives through the promotion of empowerment and proactivity, specifically proactive coping.

If dispositional optimism is a personality trait that is stable and not upgradeable, the abovementioned resources can be learned and, more importantly, re-learned. *The five day challenge* question participants on different dimension of life (communication, organization, self-reflection, information, and desire) to promote self-empowerment, that is, the ability of gaining or assuming power on your life and reality, and proactive coping. According to Greenglass and Fiksenbaum (2009), proactive coping plays a determinant role in the vision of life, which involves positive feelings and aspirations about future events. Thus, the urgency of promoting a proactive coping style appears even more evident in crisis contexts, where uncertainty and unpredictability threaten the ability to imagine a better future. The last two proposed challenges move in this direction: the participants were asked to write a letter to their future selves (challenge no. 4) and to choose a destination (challenge no. 5), with respect to which they become aware of the resources and obstacles along the way. Thus, we wanted to promote a process of reflection in the participants, according to

previous learning theories, which have shown that individuals learn through reflection on their experiences (Kolb, 1984; Korthagen, 2005, Mezirow, 1990; Schon, 1983). We believe that promoting self-reflection on the situation, as the personal response to it, can positively influence first the intention and then the implementation of proactive behaviors.

Limits and future perspective

This study has some limitations. First, the survey items were selected based on the literature review and qualitative investigations conducted by our team; thus, some relevant aspects of daily living might not have been included. Regarding the socio-demographic variables, future research should examine the different impacts of anxiety on the relation between dispositional optimism and well-being, underlining whether there are some categories to which individuals are more susceptible. Among the main limitations of the study, we indicate the convenience sample is susceptible to biases, including, for instance, the fact that the data collection and participant recruitment took place online. Another limitation is the use of self-report scales for data collection, with few variables measured, which limits construct validity.

Furthermore, in this study, we adopted a longitudinal research design to test the positive effect of our intervention on anxiety level reduction, but the time lapse of five days can be too short a temporal interval. However, the obtained positive results can be seen as confirmation of the genuineness of this choice, which can be characterized as a timely and easy-to-use choice.

Finally, regarding the future perspective of this study, it can be interesting to investigate the possibility of extending the five-day challenge to other contexts and populations, for example, to long-term patients, who live under a transitory condition of powerlessness, or even to workers and organizations struggling with outplacement transitions. Regarding this last point, we think of the models of protean and boundaryless career based on the assumption that the diversification of experiences and the multiplication of opportunities for learning and strengthening one's skills contribute to increasing the ability of individuals to become employable (Arthur et al., 1999).

Conclusion

This study aimed to highlight, in the field of positive psychology, the strategic role played by proactivity and self-reflection in the process of reacquiring the ability to desire that makes real individual development first conceivable and then possible. The analyses of both quantitative and qualitative data reveal the effectiveness of the research methodology used. Furthermore, the primary purpose of this PAT was undoubtedly to intervene in favor of a recovery of individual planning and a progressive reappropriation of the feeling of power undermined by the emergency period. The five-day challenge seemed to be a practical and operative intervention to promote self-empowerment in various situations dominated by uncertainty, which require considerable efforts in terms of resilience and reappropriation of meaning. The study aimed to offer the participants a chance: to be able to see, behind the undoubted limits of the crisis, the different opportunities, such as in terms of growth and self-knowledge. From the perspective of stress management, health promotion can be realized by empowering people to take control of their lives. In fact, "healthy" choices seem to reflect an empowered individual capable of controlling stress and making decisions that have long-term benefits.

Author Contributions
The authors contributed equally to this manuscript.

Compliance with Ethical Standards

Conflict of interest
The authors declare that they have no competing interests.

Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethical approval
All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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© Author(s)
E-ISSN 2724-2943
ISSN 2723-973X

Psychology Hub (2022)
XXXIX, 1, 17-24

Psychological well-being and lockdown: a study on an Italian sample during the first COVID-19 wave

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Article info

Submitted: 14 September 2021
Accepted: 30 December 2021
DOI: XXXX

Abstract

In February and March 2020, the Italian government decided to provide guidelines in order to counter the spreading of Coronavirus disease (COVID-19). Several studies have shown that the first Lockdown deeply affected the psychological well-being of the individuals, but the role of possible protective variables is currently not known. In the present study we aimed to investigate the impact of several psychological variables on individuals' mental states and emotions experienced during the first Lockdown in Italy. Participants were 172 Italian adults and they were asked to answer several questions regarding the intensity of mental states and emotions experienced, the perceived usefulness of lockdown, the feeling of living a normal life, and the coping strategies implemented to face the pandemic. Results showed that, during the first wave of COVID-19 in Italy, only the perceived usefulness of lockdown positively affected people's emotions. This result suggests that a better communication of the experimental findings supporting the political decisions made, and behavioral measures shaped to increase people's commitment to the proposed rules are crucial in order to enhance people's wellbeing. While this result is limited to the first wave and the first lockdown, future research should assess the role of rule acceptance and coping strategies in subsequent waves of COVID-19, and consequent partial or total lockdowns.

Keywords: COVID-19; emotions; perceived usefulness; psychological well-being.

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Introduction

On February 17th, 2020, the first Italian citizen infected by the Coronavirus disease (SARS-CoV-2 or COVID-19) was discovered in Codogno, Lombardy. After the emergence of several cases in the following days across the whole Italian territory, the government decided on March 9th to forbid unnecessary and unmotivated travels, to close schools and universities and to suspend all the in-person events in order to limit social contact. This period, generally labeled as the first Lockdown or the first wave of COVID-19, lasted approximately three months, until the end of May 2020. Similar decisions have been made across a large number of Western countries to prevent the spread of the infection. This period of time deeply affected the psychological well-being of the population, as it interfered with their daily functioning (Groarke et al., 2020) for months, in addition to impacting the physical health for those who contracted the virus.

A very large number of studies have been conducted around the world on the impact of lockdown, because of its potential major impact on many everyday life aspects and activities, from the effects on the economy to the potential negative influence on social and psychological well-being. Starting from the first lockdown measures, the literature recorded a general increase in stress, depression, anxiety and obsessive behaviors, and a worsening of sleep quality in individuals who felt the burden of worry about infecting and being infected by COVID-19 (Abba-Aji et al., 2020; Asmundson & Taylor, 2020).

Fear and anxiety about COVID-19 became a major problem, to the point of being considered a form of Post Traumatic Stress Disorder (PTSD) (Torales et al., 2020; Tagliabue et al., 2020). Interestingly, Tambelli et al (2021) looked at the role of psychological variables that can mediate the severity of pandemic-related PTSD symptomatology, confirming how fear of infection directly affects the symptoms.

Emotional dysregulation has been observed in the population, with both externalizing (e.g., irritability, inability to relax) and internalizing (e.g., sense of loneliness, boredom, poor concentration) behavior disorders and symptoms in children, as well as an increase in anxiety disorders in teenagers (Orgilés et al., 2020). In addition, Shigemura and colleagues (2020) found that in adults the fear of the unknown lead to the development of mental disorders such as stress, anxiety, depression and increased alcohol and tobacco addiction. Finally, other studies highlighted the elements that can lead to specific distress, such as: prolonged separation from those we love, loss of freedom, uncertainty about the progress of the pandemic, and feeling of worthlessness (Cao et al., 2020; Li et al., 2020).

The need to reduce social contacts to prevent the spread of COVID-19 and to preserve physical health, has deeply affected basic social needs. Besides the high level of stress and increase of mental disorders related to the pandemic, a more general poorer psychological well-being has been associated with social isolation and the poor quality of the relationships, in addition to the need to adapt to daily changes. A poor network of social contacts was found to exacerbate the effect of COVID-19 on psychological well-being (Birditt et al., 2021). Indeed, Brooks and colleagues (2020) described the current pandemic as a new, complex and multifaceted form of psychosocial stressor and found that this extended period of social distancing interfered with experiencing empathy towards others, increasing the depersonalization of relationships or forced virtual empathy (Saladino et al., 2020).

However, recent evidence has highlighted that several protective factors have allowed the development of coping strategies to face psychological stress, such as social support, humor, sport, and sharing thoughts and feelings about COVID-19 with others, (Armour et al., 2020; Golemis et al., 2021). Moreover, it is interesting to note that the use of social media was also fundamental in helping to deal with the problems created by lockdown, as shown by the increase in favorable attitudes and opinions (Cecalupo et al., 2020) following the press conferences in which new guidelines or restrictions were decreed to decrease the development of COVID-19.

Coping strategies aiming to reduce the level of stress are widely studied in literature, but their application in a pandemic scenario is still poorly understood (Ornell et al., 2020) even if their role might be crucial.

Here, we aimed to investigate the impact of several psychological variables, such as the perceived usefulness of lockdown, the feeling of living a normal life, and various coping strategies implemented to face the pandemic, on individuals' mental states and emotions experienced during the first Lockdown in Italy. The main goal of this study was thus to extend the research on the effect of COVID-19 pandemic on elements that might protect people's psychological health (i.e., mental states and emotions experienced during this period).

Methods

Participants

The present research was conducted on a group of 172 Italian adults (55M). 72 were under 25 years of age, 30 were between 26 and 35 years, 41 were between 36 and 50 years and 29 were over 51, Table 1 shows the distribution of the individuals by gender and age groups. Table 2 represents the distribution of level of education. Forty five percent of the sample were students, six percent were unemployed, five percent were retired, and forty-two percent were actively employed. The participants' distribution across different parts of the country was as follows: 16,3% were from Northern Italy, 62,8% from Central Italy, and 20,9% from Southern Italy.

Tab. 1. Distribution of participants by age group and gender

		Age				Total
		<25	26-35	36-50	>51	
Gender	**Women**	52	22	26	17	117
	Men	20	8	15	12	55
Total		72	30	41	29	172

Tab. 2. Distribution of participants by education (N =172)

Education	n (%)
Until Middle School	11 (6,4)
High School	49 (27,3)
Bachelor degree	51 (29,7)
Master degree	54 (31,4)
PhD	7 (4,1)

Procedure

Participants were contacted and tested during the first Italian lockdown between March and May 2020. The survey was developed on Google Forms and the recruitment was conducted through social media. After providing informed consent and demographic information, participants were asked to answer several questions regarding: i) the intensity of the mental states and the emotions experienced, ii) the perceived usefulness of lockdown, iii) the feeling of living a normal life, and iv) the coping strategies implemented to face the pandemic.

Instruments

The questionnaire measuring the intensity of the mental states and the emotions experienced was based on two existing scales, the Brief Mood Introspection Scale (BMIS; Mayer & Gaschke, 1988) and the Brunel Mood Scale (BRUMS; Terry et al., 2003).

The *BMIS* is a mood scale consisting of 16 mood-adjectives to which a person responds (e.g., Are you happy?). The scale can provide measures of overall pleasant-unpleasant mood (Cronbach's α = .83), arousal-calm mood (Cronbach's α = .58), and it can also be scored according to positive-tired (Cronbach's α = .77) and negative-calm mood (Cronbach's α = .76). The 16 items are: Happy, Lively, Drowsy, Grouchy, Sad, Peppy, Tired, Nervous, Caring, Calm, Content, Loving, Gloomy, Fed up, Jittery, Active.

The *BRUMS* is composed by 24 items presenting 24 mood adjectives. The items are arranged into six subscales: a) Anger: annoyed, bitter, angry, bad-tempered (Cronbach's α = .72); b) Confusion: confused, muddled, mixed-up, uncertain (Cronbach's α = .77); c) Depression: depressed, downhearted, unhappy, miserable (Cronbach's α = .74); d) Fatigue: worn out, exhausted, sleepy, tired (Cronbach's α = .70); e) Tension: panicky, anxious, worried, nervous (Cronbach's α = .71); f) Vigor: lively, energetic, active, alert (Cronbach's α = .70). Each adjective represents the answer to a question such as "How do you feel now?", "How have you been feeling in the past week, including today?", or "How have you been feeling?". The participant has to select the intensity of mood (through items/adjectives) selecting an option from a rating scale from 0 to 4 (0 = Not at all, 4 = Extremely). The BRUMS has demonstrated satisfactory predictive, concurrent, criterion, and factorial validity as well as appropriate test-retest reliability (Terry et al., 1999; 2003). The results of the Italian validation indicated very good internal consistency of the factors and excellent factorial validity (Quartiroli et al., 2017).

In the questionnaire, the intensity of the mental states and the emotions experienced was investigated asking participants their mood by rating the intensity of twenty-seven emotions taken from the BMIS and the BRUMS scales (see below Data analysis and results for the complete list of emotions). The answers were provided on a 4-level Likert scale, ranging from 0 to 3 (0 = Never, 3 = Always).

The perceived usefulness of lockdown was measured by asking participants the following questions: "Is staying at home useful for you?", "Are you experiencing something new?". The answers were on a 5-level Likert scale, they ranged from 0 to 4 (0 = Not at all, 4 = Extremely).

The feeling of living a normal life was investigated asking participants the following questions: "Can you stay focused?", "Do you study/work easily?" "Is it easy to keep old social relationships?", "Is it easy to develop new social relationships?", "Do you feel deprived of your freedom?". The answers were on a 5-level Likert scale, ranging from 0 to 4 (0 = Not at all, 4 = Extremely).

Finally, the coping strategies implemented were investigated by asking participants to indicate which of the following coping strategies they put into practice to face the pandemic: "talking with friends", "playing on electronics", "singing/playing instruments", "doing physical activities/sports", "reading", "watching television/movies", "cooking/baking". The answers were on a 5-level Likert scale, they ranged from 0 to 4 (0 = Never, 4 = Always).

Data analysis and results

All the analyses were performed using *R*-Studio (RStudio Team, 2015). Data were analyzed through a mixed-effects approach, which incorporates both fixed-effects and random-effects (associated to participants and task stimuli) and allows for the specification of predictors at both participants and/or item level. Cumulative link mixed models (CLMMs) were run using the *ordinal* package (Christensen, 2019).

Our main dependent variable was the intensity of the mental states and the emotions experienced by the participants. The three continuous predictors in our statistical model were i) perceived usefulness of lockdown, ii) feeling of living a normal life iii) coping strategies implemented to face the pandemic.

Firstly, we performed an exploratory factor analysis to investigate how the twenty-seven selected emotions aggregated. Extraction method was set as minimum residuals and rotation was set as oblimin, the number of factors was based on parallel analysis and the threshold for factor loadings was set as .40 (Stevens, 1992). Using these parameters we identified four factors, specifically:

- A negative-external one, comprising: Lack of affection, Feeling withdrawn, Disgust, Detachment, Contempt, Disregard, Oppression, Hostility, Anger, Vengeance.
- A negative-internal one, comprising: Isolation, Vulnerability, Fear, Anxiety, Loneliness.

- A positive-internal one, comprising: Optimism, Hope, Resilience, Determination.
- A positive-external one, comprising: Compassion, Curiosity, Empathy, Sense of justice.

While the following emotions were found not to belong to a specified factor: Acceptance, Pride, Solidarity, Surprise.

For each of the four factors we estimated a CLMM including all possible interactions between fixed effects. Participants and type of emotion were set as random intercepts.

For each of the four models, we then performed a model selection using the *MuMIn R* package, with the *dredge* function (Bartoń, 2020). This procedure selects the best fitting model (i.e., the one with lowest Akaike information criterion, which returns an estimation of the quality of the model, AIC, Akaike, 1973) fitting all possible combinations of the fixed effects included.

For the factors: negative-external, negative-internal and positive-external, the model selection dropped all the fixed effects predictors, as the random-effect models were the ones with the lowest AIC.

Conversely, for the positive-internal factor, the best model identified by the model selection included the effect of the perceived usefulness of lockdown and the effect of the coping strategies implemented to face the pandemic. The best model outperformed the random-effect model of 6 AIC points, p = .005, *McFadden's Pseudo-*R^2 = .06.

Specifically, the effects of both predictors were significant, z = 2.14, p = .03, b = .48, and, z = 2.42, p = .01, b = .62, respectively, meaning that for both predictors the higher their value, the higher participants' positive-internal emotions intensity (Figure 1).

For emotions belonging to the positive-internal factor (i.e., Optimism, Hope, Resilience, Determination), the higher participants' perceived usefulness of lockdown and coping strategies, the higher their intensity. Please note that for graphical reasons, in the plot we reported only the slopes of high intensity responses, the full plot is reported as Supplementary Material.

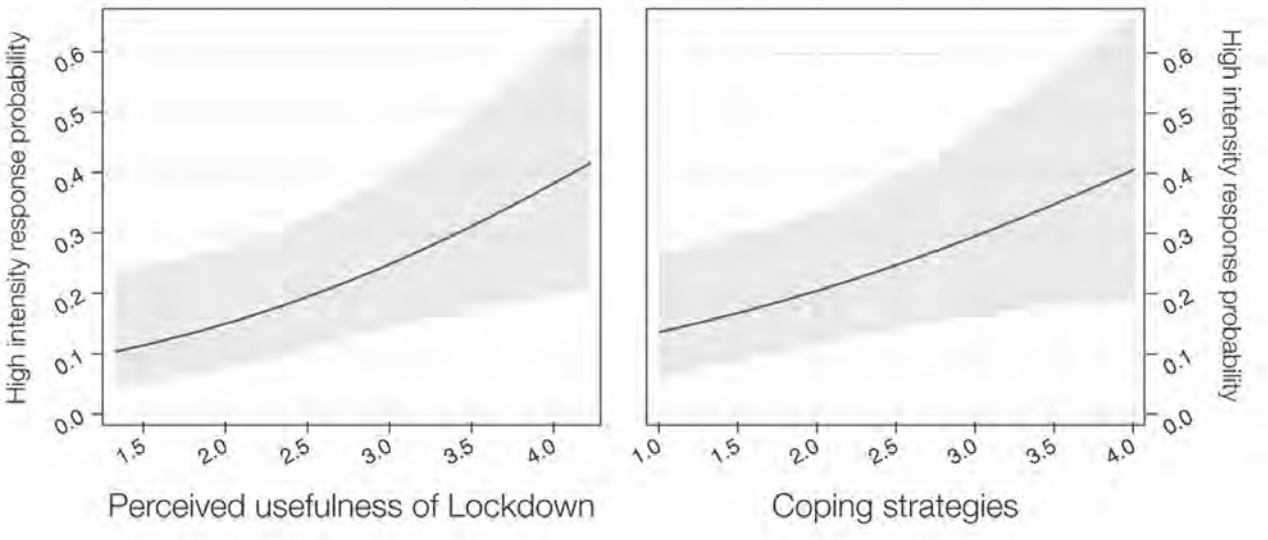
Discussion

In the present study we investigated in an Italian sample how several psychological variables affected the intensity of the mental states and the emotions experienced by participants during the first Lockdown. Using a model selection procedure, we identified the best model explaining the data collected; the best model included the perceived usefulness of lockdown (e.g., "Is staying at home useful for you?", "Are you experiencing something new?"), as well as the presence of coping strategies, while all other potential predictors were excluded. More specifically, it was found that the higher the participants' perceived usefulness of lockdown, the higher the perceived intensity of emotions with positive valence. Similarly, a greater the engagement in activities that helped maintain social contact (speaking with friends), physical exercise, or play (both socially and individually) predicted more intense positive internal emotions.

The first finding suggests that perceiving the lockdown as a necessary and correct measure to counter the spread of the infection can serve as a protective psychological factor during stressful times. Consistent with this, previous findings showed that the belief that taking health precautions is effective for avoiding COVID-19 positively predicted voluntary health compliance behavior (Clark et al., 2020).

These findings extend the results of recent studies reported in literature, which focused on the adherence to quarantine restrictions and recommendations. Carlucci, D'Ambrosio and Balsamo (2020), for example, found that a large sample of Italian quarantined adults showed very high rates of adherence to the measures proposed by the government, and that their trust in such measures was a crucial factor for adhering to the rules. Conversely, Bicchieri, Dimant and Gächter (2020), showed that a strong predictor of compliance was the degree of trust in science shown by participants, while the trust in decisions taken by the government was not relevant. In this regard, on the political and medical sides, the result of Bicchieri and colleagues (2020) can be explained considering that many contrasting views about the effectiveness of the use of face masks, gloves, and social distance were provided by the media and by the government, possibly affecting people's

Fig. 1. Results of the model selection



perception of the effectiveness of the interventions and the rules established. None of these studies, however, examined the impact of government regulations on participants' emotions.

A recent study by Pezzuti, Figus and Lauriola (2021) showed that the most effective coping strategies to face the pandemic were Avoidance Strategies and Orientation to the Problem. Our results integrate these data, showing that people can cope with a stressful situation also without avoidance-focused coping strategies, and highlight mechanisms which are rather focused on acceptance and positive responses. Lockdown measures and the inability to leave the house has led also to the attribution of new values and meanings to the space people live in, since the house is configured as a multifunctional space in which people can experience new "ways to move" (Primi & Marchioro, 2021). Digital technologies also offered many opportunities to remain involved in economic, cultural and social interactions and relations, creating a growing compensation and integration between real and virtual spaces (Primi & Marchioro, 2021). The help of technology has been essential to maintain the perception of ordinary life, and the possibility to enjoy a long period spent at home in a functional way. Complementary with this, our study shows that the perceived usefulness of lockdown can positively affect people's emotions.

Our findings not only integrate previous results, but they also point to the possibility that trusting the decisions made by the government represents a protective factor against stress, anxiety, and other types of negative emotions, even if this does not remove the need for a clearer and more transparent scientific information supporting political decisions (Gross, 2020; Mahase, 2020; Skegg et al., 2021). It has been argued that to cope with COVID-19 governments cannot just *follow the science*, but they must take responsibility for their decisions, "rather than relying on science as if it were an apolitical and indisputable tablet of stone" (Stevens, 2020, p.560). Indeed, science end-users are typically not familiar with the probabilistic approach in science, or the scientific process of understanding and reaching conclusions by disconfirming hypotheses (e.g., Popper, 1962). Consistent with this, recently it has been argued that the relationship between scientists and science end-users should be improved in order to reach a broader popular acceptance of scientific evidence (Toe, 2021). Greater understanding and acceptance of scientific evidence might enhance the respect of the health rules proposed by the government, a topic which is increasingly important during the current vaccination campaign (Moscadelli et al., 2020).

Italy faced two other COVID-19 waves between October 2020 and April 2021, both characterized by different approaches on the political and medical sides, and possibly by different psychological reactions in the population (e.g., Kohút et al., 2021). Here we examined the role of rule acceptance and effectiveness of positive coping strategies on emotional states in the first wave of the pandemic in Italy. Other waves of the pandemic might have different characteristics and elicit different emotions and different coping strategies. Trust in governmental decisions might also differ from one wave to the next, suggesting that the variables affecting participants emotions might depend on the characteristic of each single wave of the pandemic. This topic can be very promising for future research, especially in the case of the occurrence of other COVID-19 waves.

Conclusion

The present study shows that during the first wave of COVID-19 in Italy, between March and May 2020, the perceived usefulness of lockdown and the active engagement in positive activities positively affected peoples' emotions. These findings highlight two major aspects. One is the need to have clear guidelines from the governments, possibly supported by a better communication of the scientific findings on which political decisions are taken and behavioral measures shaped to increase people's commitment to the proposed rules. The second is the availability of activities that help maintain a normal level of physical and enjoyable mental activity.

Author Contributions
The authors contributed equally to this manuscript.

Compliance with Ethical Standards

Conflict of interest
The authors declare that they have no competing interests.

Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethical approval
All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study was approved by the Department Ethics Committee of La Sapienza University of Rome.

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UNIVERSITÀ EDITRICE

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© Author(s)
E-ISSN 2724-2943
ISSN 2723-973X

Psychology Hub (2022)
XXXIX, 1, 25-38

Article info

Submitted: 15 September 2021
Accepted: 07 January 2022
DOI: XXXX

The psychological impact of the pandemic: the effects of COVID-19 pictures on emotional processing

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Abstract

The impact of the COVID-19 pandemic continues to affect the lives of billions of people in recurrent waves. The present study aims to investigate the effects of exposure to COVID-related pictures on affective states, working memory performance, rumination, and intrusion. Negative emotions -- such as those aroused by the pandemic -- trigger a post-emotional elaboration depleting working memory resources required to perform other tasks. We expected a greater negative affect state, a greater impairment in working memory performance (as assessed by a visuospatial task), and a greater persistence of rumination and intrusion in participants exposed to COVID-19-related pictures as compared with emotional and neutral pictures. Results on a sample of 96 subjects show that when participants were requested to process COVID-19 pictures, their negative affective states increased over time (p<0.05), but the same does not hold for the emotional and neutral conditions. Furthermore, when participants were requested to process COVID-19 pictures, they exhibited a relevant persistence of long-term rumination (p<0.05), in particular in its deliberate form (p<0.05), and a significant persistence of intrusive thoughts (p<0.005). These considerations lead to serious concerns about post-event processing as a long-term consequence of the ongoing pandemic.

Keywords: COVID-19; negative affects; working memory; rumination; intrusion.

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Introduction

COVID-19 is a disease caused by severe acute respiratory Syndrome Coronavirus 2 (SARS-CoV-2) which has spread worldwide since its emergence in late 2019 in Wuhan, China. In a short time, this pathogen has caused a pandemic, which was declared by the World Health Organization (WHO) on March 11, 2020. Due to quarantine, almost all non-vital movement of people has been banned. As social distancing and "staying at home" became the main public policies during the COVID-19 health crisis, the imposed restrictions drastically changed people's social habits (WHO, 2020).

In their review paper, Brooks and colleagues (2020) described various causes of stress during long-term quarantine periods, including duration of isolation, fear of infection, anxiety, irritation and boredom, financial losses, and social stigma. All these factors contributed to extreme situational emotional distress (Geirdal et al., 2021), and increased prevalence of depression and anxiety due to reduced social contacts (Qiu et al., 2020; Rodriguez-Rey et al., 2020; Wang et al., 2020). According to a recent study by Lanciano and colleagues (2020), Italians experienced peak levels of long-term and persistent anxiety and worry. The most important risk perceptions were related to the future of the institutional economy and labor, followed by psychological risk perception.

It is still unknown how the pandemic – especially its second wave taking place in Italy in autumn-winter 2020-21 – has affected people's life. The chronic stress and overload of negative emotions caused by the exposure to the emergency period and the related consequences could lead to adverse physical and mental health outcomes in the long run (Schneiderman et al., 2005; Thoits, 2010). Indeed, negative events and resulting emotions have been demonstrated to conflict with task performance requiring cognitive and attentional resources such as working memory (Baddeley, 2003; 2012; Barrett et al., 2004; Okon-Singer et al., 2015).

Working memory (WM) is a cognitive system with a limited capacity. One of the main WM roles is to maintain goal-relevant information in mind, ready to be manipulated or employed, while keeping irrelevant information away (Goldman-Rakic, 1996; Baddeley, 2012). Baddeley describes four main components of WM: the central executive, the episodic buffer, and two storage systems, the phonological loop, which holds and manipulates speech-based information, and the visuospatial sketchpad, which performs a similar function for visual and spatial information (Baddeley, 2003; Baddeley et al., 2011).

Processing stressful experiences have effects comparable to secondary task sharing WM resources normally devoted to daily life tasks (Klein & Boals, 2001; Curci et al. 2013; 2015). Emotional stimuli are stressors that can require greater visual attention in comparison with neutral or positive material, evoking or increasing negative affective states, and post-emotional processes (Gross, 2013). This post-emotional processing commonly includes rumination and intrusions. Martin and Tesser (1996) defined rumination as a class of conscious thoughts that focus on a common instrumental theme and recur in the absence of immediate environmental needs. In contrast, intrusions are described as short-lived sensory impressions that are the direct result of the persisting impact of an emotional event (Ehlers et al., 2004).

Curci and colleagues (2013; 2015) investigated emotion and post-emotion processing – in the form of ruminative thoughts and intrusions – as resource-consuming processes affecting concurrent activities and entailing long-term consequences. In their studies, non-clinical participants were given a WM task before and after the presentation of negative vs. neutral information (a novel excerpt or a video clip). Rumination was evaluated immediately following the experimental induction.

Additionally, after a 24-hour delay, measures of rumination and intrusions were collected. Results demonstrated that the exposure to negative emotions significantly and durably affected participants' cognitive activity. Rumination moderated the link between the negative emotional state and the concomitant WM performance. Based on these findings, the authors claimed that ruminative activities exhaust WM resources, making them less available for concurrent tasks. Additionally, rumination tends to persist over time. At odds with rumination, individuals develop intrusions as a consequence of the emotional impact of these experiences, with no significant effects on WM load. These findings contribute to the investigation of the relationship between the cognitive and emotional systems, in terms of theoretical modeling of long-term emotional consequences in both everyday life and clinical settings.

Negative events such as the COVID-19 pandemic lend themselves well to an interpretation consistent with the above-reviewed evidence. COVID-19 pandemic reports and pictures spread like wildfire on social media, overlapping official communications and spawning a true "infodemic" (WHO, 2020). If COVID-19 emotional impact research is slowly making its way into literature (i.e., Montemurro, 2020; Canet-Juric et al., 2020), at the time of writing there are no studies about this overload of emotional material. It should be taken into account that, unlike other past epidemics and pandemics, the COVID-19 is the first pandemic with a huge amount of social media information. The impact in terms of the psychological well-being of the massive sharing of emotional material on social networks is still unknown.

Starting from Curci and colleagues' experiments (2013; 2015), in the present study, we aim to understand if the exposure to COVID-19 related pictures (compared to emotional and neutral material) would impact affective states, WM performance, and post-emotional processing (rumination and intrusion). Taking into account the above reviewed studies and the emotional impact and "proximity" of the COVID-19 pandemic - that is to experience a disastrous situation nearby and not only on the other side of the world (Hanusch, 2012) - COVID-themed photos are assumed to be more emotionally arousing than other generically emotional ones. Given our focus on visual stimuli (i.e., pictures), we used a WM visual analog task, such as that proposed by Curci and colleagues (2015), by applying a similar experimental procedure. When people experience stressful situations, such as the one we are living with the pandemic, related cognitive representations are expected to contend for WM resources with other task demands (Antrobus, 1968; Teasdale et al., 1995). Therefore, in running the present study we

aimed to show that the emotional and cognitive effects of the COVID-19 may represent long-term consequences of health distress associated with the same pandemic (Saltzman et al.,2020). Indeed, rumination can last for a long period after the original event and can be associated with depressive outcomes (Ehlers & Clark, 2000; Evans et al., 2007). Intrusions can have long-run consequences, too, so that they are considered to both cause and contribute to the persistence of psychopathological symptoms (e.g., Rachman, 2007; Brewin et al., 2010; Moritz et al., 2014). Difficulties in regulating intrusive thoughts are typically the starting point for illnesses such as PTSD and obsessive-compulsive disorder (Brewin et al., 2010). It follows that focusing on ruminative and intrusive processes triggered by the exposure to COVID-19 material is of great interest for the individual's psychological well-being at the time of the pandemic.

Hypotheses

The present experimental study was devised to investigate the effects of exposure to COVID-related pictures on affective states, WM performance, rumination, and intrusion after stimuli presentation. Following the above-cited studies on the post-emotional processing of negative experiences (see Curci et al., 2013; 2015), we expected:

H1) a greater negative affective state after the exposure to COVID-19-related pictures, as compared with emotional and neutral pictures;

H2) a greater impairment in WM performance (as assessed by a visuospatial WM task; Curci et al., 2015) after the exposure to COVID-19-related pictures, as compared with emotional and neutral pictures;

H3) a greater persistence of rumination and intrusion in individuals who have been exposed to COVID-19-related pictures as compared with exposure to emotional and neutral pictures.

Method

Participants

The study was given ethical approval by the Ethics Committee of the Department of Education, Psychology, Communication, University of Bari Aldo Moro, Bari, Italy, and executed according to the Declaration of Helsinki (No. ET-20-01). Participants signed informed consent before participating in the experiment. We used G*Power (Faul et al., 2007) to run an a priori power analysis for repeated-measures ANOVA between three groups with a power of 0.95 and effect size f = 0.20 (Correlation among repeated measures = 0.45) indicated a sample of 96 participants was needed. A total of 96 participants (50% women; M_{age} = 25.97, SD = 9.82), aged between 19 and 60 (M_{age} = 25.97, SD = 9.82), with an average level of education of 13.66 years (SD=2.06) were involved in the experiment.

Design

The between-subject factor of the design was Emotional Valence (COVID-19 vs. Emotional vs. Neutral). The dependent variables were: (1) Positive (PA-S) and Negative (NA-S) PANAS-S scores (Watson et al., 1988; Terracciano et al., 2003); (2) WM visual task indices; (3) Event-Related Rumination Inventory (ERRI, Cann et al., 2011); (4) Impact of Events Scale-Revised (IES-R, Weiss & Marmar, 1996). A repeated-measures assessment was adopted for PA-S and NA-S scores, WM measures, and ERRI scores.

Procedure, measures, and materials

The procedure included: (1) a Screening Phase; (2) a Pre-Test Phase; (3) a Test Phase using a visuospatial WM task; (4) an Experimental Manipulation Phase with emotion induction; (5) a Re-Test Phase for WM task; (6) a Post-Test Phase; and (7) a Follow-Up at a 24-hour delay.

Participants were recruited among University of Bari "Aldo Moro" students and experimenters' acquaintances. The whole procedure (40 minutes) was administered online due to COVID-19 restrictions, using Google modules and Teamview software. During the experimental session, the experimenter and the participant were connected via video call, with a shared screen to enable a correct administration of the task.

Three groups of 32 participants were randomly assigned to each of the three conditions (COVID-19 vs. Emotional vs. Neutral). The study involved the following phases:

- *Screening phase*: to rule out the effects of the individual's affectivity disposition, executive capacities, and depressive rumination style, participants were administered the Italian version of Positive and Negative Affect Schedule-Trait (PANAS-T; Watson et al., 1988; Terracciano et al., 2003), the Random Number Generation task (RNG; Ginsburg & Karpiuk, 1994) and the Italian version of the Ruminative Response Scale (RRS; Treynor et al., 2003; Palmieri et al., 2007).
- *Pre-test phase*: to evaluate the affective state at the moment in which participants are filling out the questionnaire, Positive and Negative Affect Schedule-State (PANAS-S; Watson et al., 1988; Terracciano et al., 2003) was administered by participants.
- *Test phase*: in this phase, we adopted a visuospatial task developed by Curci and colleagues (2015), administered through SuperLab Pro v.4.0 software to evaluate visuospatial WM performance.
- *Experimental manipulation phase*: participants were randomly allocated to one of three emotional conditions (COVID-19 vs. Emotional vs. Neutral), and requested to rate 13 pictures about how upset they were by each picture.
- *Retest phase*: immediately after watching the pictures, participants performed a new visuospatial WM task session to evaluate the effects of resource depletion on WM performance.
- *Post-test phase*: participants were re-administered PANAS-S. They also completed an adapted version of the Event-Related Rumination Inventory (ERRI, Cann et al., 2011),

a scale assessing two dimensions corresponding to intrusive and deliberate forms of rumination.

- *Follow-up*: Participants received by email an online questionnaire including ERRI and the Impact of Events Scale-Revised (IES-R, Weiss & Marmar, 1996), to measure the amount of protracted distress associated with a specific event in the form of intrusive processes. They were instructed to fill in the questionnaire exactly 24 h after they participated in the experimental session. All participants returned the questionnaire on time. One week after the lab session participants were debriefed in person or by video call.

Screening Phase

In this phase, we aimed to exclude individual differences in participants' affective states, executive performance, and ruminative tendencies before the experimental phase. To this purpose, participants administered PANAS-T (Watson et al., 1988; Terracciano et al., 2003), RNG (Ginsburg & Karpiuk, 1994), and RRS (Treynor et al., 2003).

PANAS-T is a scale that requires participants to evaluate, on twenty 5-point items (0 = not at all; 4 = completely), their general affective state along two dimensions, corresponding to Positive Mood (PA-T) and Negative Mood (NA-T). PA-T reflects the extent to which a person generally feels enthusiastic, excited, or active (i.e., *"How do you feel in general…determined?"*). NA-T reflects general subjective distress and negative mood (i.e., *"How do you feel in general… nervous?"*). Values range from 10 to 50, with lower scores representing lower levels of Positive/Negative Trait Affect and higher scores representing higher levels of Positive/Negative Trait Affect.

RNG assesses the individual's executive capacities. It requires participants to say aloud 120 random digits from 0 to 9, one per second, while trying to avoid rising, falling, odd, and even skip sequences. We used the RgCalc software, created by Towse and Neil (1998), to score the RNG and we obtained the RNG (Evans' Random Number Generator score) index.

RRS requires participants to rate on twenty-two 4-point scales (1 = never, 4 = always) how often they exhibit ruminative responses following sad or depressed feelings (i.e., "*Think about all your shortcomings, failings, faults, mistakes*"). Items from every scale were averaged into three composite indices for Brooding (Cronbach's a = 0.82), Reflection (Cronbach's a = 0.70), and Depression (Cronbach's a = 0.77).

Pre-Test Phase

To evaluate the affective state at the moment in which participants are filling out the questionnaire, PANAS-S (Watson et al., 1988; Terracciano et al., 2003) was administered.

PANAS-S is composed of two subfactors, PA-S and NA-S, as PANAS-T. These subfactors measure the degree of positive or negative affect (i.e., *"How do you feel in this moment…active/ afraid"*). Values can range from 10 to 50, with lower scores representing lower levels of Positive/Negative Affect and higher scores representing higher levels of Positive/Negative Affect. Cronbach's a for both PANAS-T and PANAS-S ranges from 0.86 to 0.90 for PA items and from 0.84 to 0.87, with the test-retest correlation of 0.47-0.68 for the PA and 0.39-0.71 for the NA (Watson, 1988).

Test Phase

In this phase, we adopted a visuospatial task developed by Curci and colleagues (2015), administered through SuperLab Pro v.4.0 software. As with other dual tasks, this task was designed to capture differences in attention retention and interference resistance (Rosen & Engle, 1998) as measures of healthy people's executive functioning (Miyake et al., 2000). Given the visual nature of the stimuli to be processed (i.e., pictures), we used that visuospatial task to evaluate the effects of resource depletion on WM performance.

The task consists of sixty ideograms presented individually on the screen for 1000 milliseconds. Correct recognition of ideograms and their position on the screen contributes to the individual's score. Each ideogram is presented in one of the four quadrants into which the computer screen is ideally divided. The presentation of each ideogram is followed by a blank screen for 300 ms. Participants had to identify whether another ideogram presented in the middle of the screen was the same as the one presented just before or a different one. Then they had to use a computer mouse to mark the areas of the screen occupied by the ideograms just identified in the same order of presentation. The task involved three blocks of stimuli ranging from two to six ideograms. One point is awarded for correct recognition and identification of the screen position, for a total of 60 points for the whole task.

Curci et al. (2015) run a pilot study to evaluate the validity of this task as a measure of WM capacity applied to visuospatial stimuli (sample N = 17). The Visuospatial performance scores correlated with the index of the Corsi block-tapping test (Orsini et al., 1987; Kessels et al., 2000) as a measure of visual memory span (Spearman's rho = 0.59, $p < 0.05$), and with indices obtained from RNG (Ginsburg & Karpiuk, 1994), such as RNG index (*Spearman's rho* = 0.60, $p < 0.05$).

Experimental Manipulation Phase

Participants were randomly assigned to one of the three conditions corresponding to COVID-19, Emotional, and Neutral themes. Within each condition, 13 pictures were presented on the computer screen using a PowerPoint macro to randomize the order of presentation (see Figure 1).

The whole set of 39 pictures was obtained from a pilot experiment, in which COVID-19 themed pictures were paired with generically emotional ones, chosen from the Open Affective Standardized Image Set database (OASIS; Kurdi et al., 2017). The emotional pictures were paired paying attention to visual similarity with COVID-themed ones. A sample of 60 participants (30 women) was requested to choose the most emotionally upsetting picture between

randomly presented couples of stimuli (COVID-19 and OASIS) and motivate their choice. The pictures evaluated as the most upsetting were selected for our study for a total of 26 pictures, 13 COVID-19-themed pictures ($M \geq 44.00$, $SD = 11.90$), and the associated 13 emotional pictures. A further set of 13 pictures was added for the neutral condition, selected from the OASIS database based on the valence and arousal scores reported by the authors and on visual similarity with COVID and emotional ones.

In the present experiment, after the presentation of each picture (one at a time, in randomized order), we asked participants to rate on a scale ranging from 0 (= not at all) to 10 (= completely) how upset they felt by that picture. This task was introduced to ensure that the emotional processing of the stimuli was effective[1]. Once the application was completed, participants moved on to the next slide.

Fig. 1. Examples of pictures used in the experimental session



Note. In the left column, there are three COVID-19 themed pictures; in the central column, there are three generically emotional pictures; in the right column, there are three neutral pictures.

Retest Phase

Immediately after the emotion induction, the visual WM task was performed again, which was identical to the previously performed one except for the ideograms adopted and their relative positions. This was done to investigate whether there were differences in WM performance after the picture exposure (Turner & Engle, 1989)[2].

Post-Test Phase

We used the PANAS-S to determine if there were differences between the pre-test and post-test phases in participants' affective states following the exposure to the pictures.

ERRI (Cann et al., 2011) questionnaire was adopted to measure rumination after the experimental manipulation phase. The test consists of twenty 4-point scales (1 = never; 4 = often). Total scores aggregate two sub-scales, corresponding to Intrusive and Deliberate rumination. Intrusive rumination refers to unwanted, disturbing thoughts related to an emotional experience (i.e., "*I thought about the pictures when I did not mean to*"); Deliberate rumination consists of the tendency to intentionally process an emotional experience (i.e., "*I forced myself to deal with my feelings about the pictures*").

Follow-Up

After 24-hour from the experimental session, each participant received an email with a follow-up questionnaire. In this session, the ERRI questionnaire was re-administered along with an adapted Italian version of the IES-R (Weiss & Marmar, 1997; Craparo et al., 2013), to assess participants' intrusive thoughts following the emotional induction of the experimental manipulation (i.e., "*Any reminder brought back feelings about it*"). All 96 participants completed the online follow-up questionnaire.

IES-R included twenty-two 5-point scales (0 = not at all, 4 = very much). All items were combined into three sub-dimensions (Intrusion, Avoidance, and Hyperarousal) and a total IES-R score. The measures show high degree of intercorrelation (r = 0.52 to 0.87, Creamer et al., 2003) and high levels of internal consistency (Intrusion: Cronbach's a = 0.87 – 0.94, Avoidance: Cronbach's a = 0.84 – 0.87, Hyperarousal: Cronbach's a = 0.79 – 0.91). Test-retest reliability ranged from 0.89 to 0.94 (Weiss & Marmar, 1997).

Results

Screening Analyses (PANAS-T, RNG, RRS)

A set of one-way ANOVAs was run to assess whether there were significant group differences in participants' executive capacities, tendency to depressive rumination, and affective states, with Emotional Valence (COVID-19 vs. Emotional vs. Neutral) as a between-subjects factor. The dependent variables were PANAS-T (PA-T and NA-T), RNG, and RRS indices (RRS–Brooding; RRS–Reflection; RRS–Depression; RRS–Total), measured at the Screening Phase. As Table 1 shows, no significant differences were found across the three groups on these variables.

[1] These data were not analysed for the purposes of the present study but are available upon request from the first author.

[2] Using the same test at both pre-test and post-test might have induced a possible learning effect, although Curci et al. (2013; 2015) showed that this effect was significantly more pronounced in participants exposed to neutral material as compared with participants exposed to emotional stimuli. In this sense, the repetition of the same task is not a limitation.

Tab. 1. One-way ANOVAs on measures at the Screening Phase[3]

Measures (Range; Cronbach's a)	COVID-19		Emotional		Neutral		*F*2 (partial η^2)	*p*
	Min, Max	Mean (*SD*)	Min, Max	Mean (*SD*)	Min, Max	Mean (*SD*)		
PA-T (0 – 4; 0.84)	0.60, 3.70	2.65 (0.69)	1.70, 3.50	2.53 (0.56)	1.10, 3.80	2.65 (0.58)	0.37 (0.01)	0.69
NA-T (0 – 4; 0.90)	0.00, 3.80	1.09 (0.82)	0.00, 3.40	1.48 (0.86)	0.00, 2.70	1.27 (0.80)	1.81 (0.04)	0.17
RNG index (0 – 1; 0.94)	0.29, 0.68	0.39 (0.10)	0.26, 0.76	0.38 (0.10)	0.23, 0.71	0.40 (0.11)	0.40 (0.01)	0.67
RRS–Brooding (1 – 4; 0.75)	1.00, 3.33	2.09 (0.52)	1.33, 3.50	2.26 (0.54)	1.00, 3.00	2.07 (0.49)	1.36 (0.03)	0.26
RRS–Reflection (1 – 4; 0.72)	1.00, 4.00	1.98 (0.67)	1.00, 3.20	2.06 (0.65)	1.00, 3.20	2.05 (0.70)	0.14 (0.00)	0.87
RRS–Depression (1 – 4; 0.86)	1.18, 3.45	2.03 (0.68)	1.09, 3.64	2.21 (0.58)	1.00, 2.91	2.13 (0.61)	0.50 (0.01)	0.61
RRS–Total (1 – 4; 0.89)	1.23, 3.23	2.05 (0.52)	1.27, 3.41	2.20 (0.47)	1.09, 2.86	2.08 (0.48)	0.89 (0.02)	0.41

Pre-Test, Test, Retest, and Post-Test Analyses

Pre-Test (PANAS-S)

To check the effectiveness of the experimental manipulation of participants' affective states, we ran two mixed-design ANOVAs with Valence (COVID-19 vs. Emotional vs. Neutral) as a between-subject factor, Pre-Post (Pre-test vs. Post-test phases) as a within-subjects factor, and with PANAS-S (PA-S and NA-S) as dependent variables (see Table 2). As regards PA-S, the main effect of Pre-Post was statistically significant ($F_{(2, 93)}$ = 13.36, p<0.01, partial η^2 = 0.13; see Table 3), in that PA-S scores significantly decreased over time ($M_{\text{Pre-test}}$ = 25.57, *SD* = 7.36; $M_{\text{Post-test}}$ = 23.40, *SD* = 8.76). By contrast, the main effect of Valence did not reach the significance level. Similarly, the interaction Valence*Pre-Post was not significant.

As regards NA-S scores, the main effects of both Valence and Pre-Post were not significant, while a significant interaction effect was observed ($F_{(2, 93)}$ = 4.49, p<0.05, partial η^2 = 0.09; see Table 3). Analyzing simple effects, NA-S scores for the COVID-19 condition were highly increasing over time ($F_{(1)}$ = 6.76, p<0.05, partial η^2 = 0.03), while scores for the Emotional and Neutral conditions did not show a significant change (respectively, $F_{\text{Emotional (1)}}$ = 0.98, p = 0.29, partial η^2 = 0.01; $F_{\text{Neutral (1)}}$ = 3.80, p = 0.12; partial η^2 = 0.07).

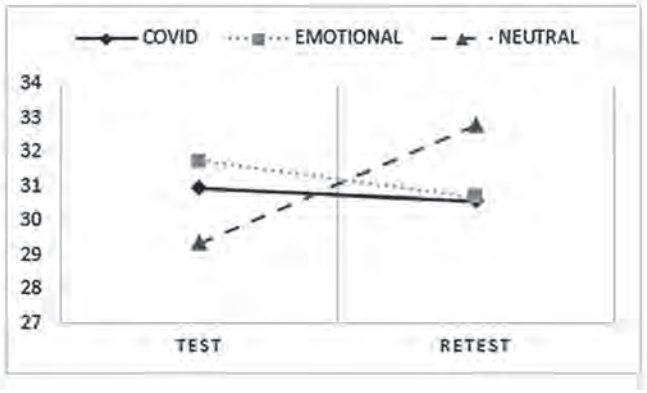
To sum up, the experimental manipulation of participants' affective states was found to be effective: when participants processed COVID-19 pictures, their negative affective states increased over time, while the same did not hold for the other two conditions of the design (see hypothesis 1).

Analyses of WM performance indices

We ran a 3x2 mixed-design ANOVAs with Emotional valence (COVID-19 vs. Emotional vs. Neutral) as a between-subject factor, Test-retest (Test vs. Retest phases) as a within-subject factor, and visuospatial WM task scores as dependent variables. The analyses revealed that there were no main nor interaction effects that reached the significance level ($F_{(2, 93)}$ =2.19 , p = 0.12, partial η^2 = 0.06; $F_{(2)}$ = 0.03, p = 0.97, partial η^2 = 0.001; $F_{(1)}$ = 0.52 , p = 0.47, partial η^2 = 0.01; see Table 3).

Given the non-significant effects, we can conclude that, although the observed mean differences for the WM index go in the expected direction (see Figure 2), hypothesis (2) was not confirmed.

Fig. 2. Mixed-design ANOVA on WM visual performance index



Post-Test and Follow-Up Analyses

Analyses on ERRI

We ran a set of mixed-design ANOVAs with Valence (COVID-19 vs. Emotional vs. Neutral) as a between-subject factor and Post-Follow-up (Post-test vs. Follow-up phases) as a within-subjects factor, on ERRI scores (Total, Deliberate and Intrusive) as dependent variables (see Table 4 and 5). As regards ERRI–Total and ERRI–Deliberate scores, the main effect of Valence was statistically significant (respectively; $F_{\text{Total (2, 93)}}$ = 4.35, p<0.05, partial η^2 = 0.09; $F_{\text{Deliberate (2, 93)}}$ = 3.65, p<0.05, partial η^2 = 0.07). For ERRI–Total scores, individuals in the Emotional condition scored the highest ($M_{\text{Emotional}}$ = 16.69, *SD* = 1.70), followed by individuals in the COVID-19 and Neutral conditions (respectively, $M_{\text{COVID-19}}$ = 14.55, *SD* = 1.70; M_{Neutral} = 9.75, *SD* = 1.70). The same pattern of results was

[3] Kurtosis and Skewness analysis were analysed for all measures collected. All indices ranged between -2 and +2. Analyses are available from the first author upon request.

observed for ERRI – Deliberate scores (respectively, $M_{Emotional}$ = 9.23, *SD* = 0.97; $M_{COVID-19}$ = 7.83, *SD* = 0.97; $M_{Neutral}$ = 5.55, *SD* = 0.97).

The main effect of Post-Follow-up was statistically significant for all ERRI indices (respectively, $F_{Total\ (1)}$ = 39.86, p<0.001, partial η^2 = 0.30; $F_{Deliberate\ (1)}$ = 22.65, p<0.001, partial η^2 = .20; $F_{Intrusive\ (1)}$ = 35.12, p<0.001; partial η^2 = 0.27), with scores decreasing from Post-Test to Follow-up, for Total ($M_{Post\text{-}test}$ = 17.00, *SD* = 11.30; $M_{Follow\text{-}up}$ = 10.32, *SD* = 11.16), Deliberate ($M_{Post\text{-}test}$ = 8.92, *SD* = 6.13; $M_{Follow\text{-}up}$ = 6.16, *SD* = 6.59) and Intrusive indices ($M_{Post\text{-}test}$ = 8.40, *SD* = 7.25; $M_{Follow\text{-}up}$ = 4.17, *SD* = 5.35).

A significant interaction effect was observed only for ERRI-Deliberate scores, with individuals in the Neutral and Emotional conditions showing a significant decline over time (respectively, $F_{Neutral\ (1)}$ = 20.91, p<0.001, partial η^2= 0.18; $F_{Emotional\ (1)}$ = 6.99, p<0.05, partial η^2= 0.07), at odds with individuals in the COVID-19 condition who exhibited a stable pattern of results ($F_{COVID\text{-}19\ (1)}$ = 1.05, p = 0.31, partial η^2= 0.01; see Table 5).

Taken together, these results support hypothesis (3): compared to neutral and emotional pictures, when participants processed COVID-19 pictures, they exhibited a relevant persistence of long-term rumination, in particular in its deliberate form.

Tab. 2. Descriptive analysis for the PA-S and NA-S scores (Pre- Post-test) and on WM indices (Test-Retest)

Measures (Range; Cronbach's a)	COVID-19		Emotional		Neutral	
	Min, Max	Mean (*SD*)	Min, Max	Mean (*SD*)	Min, Max	Mean (*SD*)
PA-S Pre-test (0 – 4; 0.89)	0.20, 3.90	2.73 (0.83)	0.50, 3.70	2.48 (0.76)	0.90, 3.60	2.46 (0.60)
PA-S Post-test (0 – 4; 0.91)	0.40, 4.00	2.34 (0.84)	0.50, 4.00	2.31 (0.88)	0.20, 3.90	2.37 (0.93)
NA-S Pre-test (0 – 4; 0.91)	0.00, 1.90	0.44 (0.48)	0.00, 3.40	0.83 (0.88)	0.10, 0.64	0.51 (0.66)
NA-S Post-test (0 – 4; 0.89)	0.00, 2.50	0.72 (0.75)	0.00, 3.20	0.94 (1.02)	0.00, 2.40	0.37 (0.69)
WM Test (0 – 60; 0.84)	16.00, 46.00	30.94 (9.34)	11.00, 47.00	31.75 (9.19)	13.00, 44.00	29.34 (9.48)
WM Retest (0 – 60; 0.83)	12.00, 46.00	30.59 (8.62)	17.00, 42.00	30.69 (7.24)	14.00, 53.00	32.78 (9.96)

Tab. 3. Mixed-design ANOVAs for the PA-S and NA-S scores at the Pre-test and Post-test and on WM indices and test-retest reliability coefficient

	Valence (a)		Pre-Post-test/ Test-retest (b)		a x b		Test-Retest Reliability
	$F_{2, 93}$ (partial η^2)	*p*	F_1 (partial η^2)	*p*	$F_{2,93}$ (partial η^2)	*p*	*Pearson r (p)*
PA-S Pre-Test / PA-S Post-Test	0.32 (0.01)	0.73	13.36** (0.13)	0.00	2.11 (0.04)	0.13	0.75** (0.01)
NA-S Pre-Test / NA-S Post-Test	3.07 (0.06)	0.05	1.44 (0.02)	0.23	4.49* (0.09)	0.01	0.69** (0.01)
WM Test / WM Retest	0.03 (0.001)	0.97	0.52 (0.01)	0.47	2.19 (0.05)	0.12	0.46** (0.01)

Note. *p<0.05; ** p<0.01

Tab. 4. Descriptive analysis for ERRI scores

Measures (Range; Cronbach's a)	COVID-19		Emotional		Neutral	
	Min, Max	Mean (*SD*)	Min, Max	Mean (*SD*)	Min, Max	Mean (*SD*)
ERRI–Total – Post-test (0 – 3; 0.90)	0.00, 2.15	0.85 (0.65)	0.15, 1.95	1.00 (0.50)	0.00, 1.85	0.75 (0.55)
ERRI–Total – Follow-up (0 – 3; 0.95)	0.00, 2.40	0.61 (0.61)	0.00, 2.20	0.66 (0.61)	0.00, 1.25	0.28 (0.35)
ERRI–Deliberate – Post-test (0 – 3; 0.84)	0.00, 3.00	0.83 (0.69)	0.10, 2.00	1.06 (0.52)	0.00, 2.00	0.78 (0.60)
ERRI–Deliberate – Follow-up (0 – 3; 0.92)	0.00, 2.60	0.73 (0.73)	0.00, 2.40	0.79 (0.72)	0.00, 1.50	0.32 (0.38)
ERRI–Intrusive – Post-test (0 – 3; 0.91)	0.00, 2.40	0.86 (0.79)	0.00, 2.40	0.95 (0.74)	0.00, 1.90	0.71 (0.64)
ERRI–Intrusive – Follow-up (0 – 3; 0.93)	0.00, 2.20	0.48 (0.55)	0.00, 2.30	0.54 (0.61)	0.00, 1.60	0.23 (0.38)

Tab. 5 Mixed-design ANOVAs on ERRI scores

Measures (Cronbach's a)	Valence (a)		Post-Follow-up (b)		a x b		Test-Retest Reliability
	$F_{2,93}$ (partial η^2)	*p*	$F_{1,93}$ (partial η^2)	*p*	$F_{2,93}$ (partial η^2)	*p*	*Pearson r (p)*
ERRI–Total – Post-test ERRI–Total – Follow-up	4.35* (0.09)	0.02	39.86** (0.30)	0.00	1.03* (0.02)	0.36	0.57** (0.01)
ERRI–Deliberate – Post-test ERRI–Deliberate – Follow-up	3.65* (0.07)	0.03	22.65** (0.20)	0.00	3.15* (0.06)	0.04	0.59**(0.01)
ERRI–Intrusive – Post-test ERRI–Intrusive – Follow-up	2.40 (0.05)	0.10	35.12** (0.27)	0.00	0.21 (0.004)	0.82	0.42**(0.01)

Note. *p<0.05; ** p<0.01

Analyses on IES-R

A set of one-way ANOVAs was run on the IES-R scores (Total, Intrusion, Avoidance, and Hyperarousal) with Valence (COVID-19 vs. Emotional vs. Neutral) as a between-subjects factor (see Table 6). Due to high skewness and kurtosis coefficients[4], we run bootstrapped one-way ANOVAs (stratified sampling for Valence and Sex, CI 95%, 5000 samples).

The main effect of Valence was significant for IES-R–Total scores ($F_{(2, 93)}$ = 6.29; p<0.001, partial η^2 = 0.12), IES-R–Avoidance ($F_{(2, 93)}$ = 7.59; p<0.001, partial η^2 = 0.140), and IES-R–Hyperarousal ($F_{(2, 93)}$ = 4.01; p<0.05, partial η^2 = 0.79). No significant effect was found on IES-R–Intrusive scores ($F_{(2, 93)}$ = 2.74; p = 0.07, partial η^2 = 0.06).

We run post hoc Bonferroni comparisons to assess if there were significant differences among subsamples' means. We chose this post-hoc test to avoid an inflate of type I error due to multiple comparisons and for its conservativeness.

For IES-R-Total score, post hoc Bonferroni comparisons demonstrated there was a significant difference for the Emotional (M_{Diff} = -8.72, 95% CI (-15.42, -2.02), p = 0.06) and COVID-19 conditions (M_{Diff} = -8.12, 95% CI (-14.82, -1.43), p = 0.012) as compared with the Neutral one (M_{Diff} = 0.59, p = 1.00), in that individuals in the Emotional condition scored the highest and individuals in the Neutral condition scored the lowest.

A similar pattern of results emerged for IES-R–Avoidance with individuals in the Emotional condition scoring the highest and those in the Neutral condition scoring the lowest. Indeed, Bonferroni post hoc comparisons demonstrated that there was a significant difference in this measure for Emotional (M_{Diff} = -4.53, 95% CI (-7.55, -1.51), p = 0.001) and COVID-19 conditions (M_{Diff} = -3.72, 95% CI (-6.74, -0.70), p = 0.01) as compared with the Neutral one (M_{Diff} = 0.81, p = 1.00).

For IES-R – Hyperarousal indices, individuals in the COVID-19 condition reached the highest levels, while participants in the Neutral condition reached the lowest. Bonferroni post hoc comparisons demonstrated that there was a significant mean difference of IES-R – Hyperarousal measures for COVID-19 (M_{Diff} = -2.22, 95% CI (-15.42, -2-02), p = 0.04) compared with the Neutral condition (M_{Diff} = 0.16, p = 1.00). Other differences were not statistically significant (all p_s>0.05).

These findings support hypothesis (3), by indicating that there was a greater persistence of intrusions in individuals who have been exposed to COVID-19-related material compared with those exposed to neutral ones.

Tab. 6. One-way ANOVAs on IES-R scores

Measures (Range; Cronbach's a)	COVID-19		Emotional		Neutral		$F_{2,93}$ *(partial* η^2*)*	*p*
	Min, Max	Mean (*SD*)	Min, Max	Mean (*SD*)	Min, Max	Mean (*SD*)		
IES-R–Total (0 – 4; 0.91)	0.00, 2.27	0.60 (0.61)	0.05, 1.68	0.62 (0.55)	0.00, 1.00	0.23 (0.28)	6.29** (0.12)	0.003
IES-R–Intrusion (0 – 4; 0.84)	0.00, 2.88	0.64 (0.70)	0.00, 2.38	0.65 (0.65)	0.00, 1.88	0.34 (0.44)	2.74 (0.06)	0.070
IES-R–Avoidance (0 – 4; 0.80)	0.00, 2.25	0.70 (0.66)	0.00, 3.00	0.80 (0.76)	0.00, 1.38	0.23 (0.36)	7.59** (0.14)	0.001
IES-R–Hyperarousal (0 – 4; 0.85)	0.00, 2.50	0.48 (0.69)	0.00, 2.17	0.38 (0.59)	0.00, 0.83	0.09 (0.21)	4.01* (0.08)	0.021

Note. *p<0.05, **p<0.005.

[4] Skewness and kurtosis analysis for the cited measures resulted for IES-R-Total scores, Skewness = 1.34 and Kurtosis = 1.30; for IES-R-Intrusive scores, Skewness = 1.60 and Kurtosis = 2.37; for IES-R-Avoidance scores, Skewness = 1.41 and Kurtosis = 1.63; for IES-R-Hyperarousal scores, Skewness = 1.95 and Kurtosis =2.96.

Discussion

The current study experimentally examined the hypotheses that exposure to COVID-19-related pictures is related to changes in affective states, WM performance, rumination, and intrusion as compared with emotional and neutral pictures. Following our prediction (1), we observed that when participants processed COVID-19 pictures, their negative affective states increased after the manipulation and over 24 hours as compared to individuals who processed emotional and neutral pictures.

Furthermore, we observed that exposure to COVID-19 and emotional material is linked to a decrease in visuospatial WM scores, but the results of our analyses on the WM index were not statistically significant so that our hypothesis (2) was not confirmed. This might probably be due to the visuospatial task adopted as concurrent to emotional processing. Some studies demonstrate that visuospatial tasks temporarily reduce the intensity of emotional material to process (Andrade et al., 1997; Kavanagh et al., 2001; Kemps & Tiggemann, 2007). Andrade and colleagues (1997) challenged nonclinical samples to construct emotive imagery triggered by pictures of conflicts, death, and disasters in an experimental imitation of post-traumatic stress disorder. They also assessed clarity, vividness, and emotional reaction to these photos. During the imaging phase, individuals completed a concurrent task designed to load the visuospatial WM. Visuospatial task completion reduced not only the clarity and the vividness but also the emotional impact of upsetting pictures. However, van den Hout et al. (2001) replicated this study and demonstrated this vividness and emotional reductions persisted only immediately after the visuospatial task. In this sense, our results on rumination could be considered as accounting for post-emotional processing occurring when the effect of the visuospatial WM task wears off.

Our results also showed that post-event rumination, especially in its deliberate form, was higher for individuals who viewed and rated emotional pictures as compared with individuals exposed to COVID-19 and neutral stimuli. However, at odds with rumination for emotional and neutral images, rumination following exposure to COVID-19 pictures appeared to persist over time. As regards intrusion indices, the Hyperarousal scores were higher when participants in the COVID-19 condition are compared to the sample assigned to the neutral condition. Taken together, these findings support hypothesis (3): the greatest persistence of rumination and intrusion was observed for individuals who have been exposed to COVID-19-related and emotional material. Major life events, especially negative ones that challenge the individual's assumptive world beliefs, require cognitive processing (Janoff-Bulman, 1992). Watson and Clark (1984) described individuals high in Negative Affect as also tending to ruminate and dwell on their mistakes. These results are in line with Curci and colleagues' outcomes (2015) and with the theoretical and empirical distinction between rumination and intrusion (Evans et al., 2007). Indeed, the former appeared more like a cognitive process consisting of repetitively thinking about an emotional event and influenced by the individual's WM resources, whereas the latter mainly consisted of sensory impressions of short duration rapidly arising from the original experience as a consequence of its emotional impact (Ehlers & Clark, 2000; Hackmann et al., 2004). The effects on the intrusive component of rumination should be read in conjunction with results on intrusions, as assessed by IES-R. Intrusive rumination is different from the intrusion of sensory-perceptual material related to a traumatic experience. Intrusive rumination might be conceptualized as a recurrent attempt to understand the impact of a stressful experience to justify its meaning (Calhoun et al., 2010). By contrast, intrusions are instances of involuntary or direct retrieval, as opposed to voluntary retrieval, in that they pop up spontaneously rather than as a result of a conscious effort (Berntsen, 2009; Mace, 2007). It follows that IES-R scores are systematically higher for emotional material (also including COVID-19 pictures) in comparison with neutral stimuli. In our study, participants do not seem to develop repetitive and insistent forms of thought concerning what was shown to them (i.e., *"Why am I exposed to these pictures?"*) but the COVID-19/emotional scenes involuntarily re-emerge into awareness in the form of intrusions (IES-R).

The style in which a person engages in cognitive processing in the aftermath of a stressful life event has significant consequences for the psychological impact of the same event. Event-related rumination influences people's health and well-being in life crises and transitions. In dealing with emotional experiences, the two forms of ruminative thoughts, Intrusive and Deliberate, have distinct effects on post-traumatic outcomes (Schaefer & Moos, 1992; Cann et al., 2011). Deliberate rumination demands a conscious review, re-examination, and creation of alternative viewpoints to enable progress and it is associated with generally favorable outcomes such as post-traumatic growth (Ikizer et al., 2021; Tedeschi & Blevins, 2015). Continuous exposure to COVID-19 pandemic-related material can keep the rumination persistent, while the mass media plays a crucial role in spreading information on the pandemic (Garfin et al. 2020). Individuals prone to rumination, in such a contingency, may increase their attempts to manage emotions, resulting in a decreased psychological wellbeing, and become stuck in the deliberate rumination when personal resources are insufficient to reprocess the event (Ehlers & Clark, 2000). Continued deliberate ruminating could reflect a long-term struggle with negative emotions, resulting in distress mediated by current intrusive ruminations (Chan et al., 2011).

As to intrusive thoughts following COVID-19 exposure, our findings also support the general hypothesis that the COVID-19 pandemic is a mass traumatic event that moves people to a hypervigilant rather than avoidant stance (see Sanchez-Gomez et a., 2021). High levels of intrusive thoughts are linked to sustained or increased discomfort, as well as to a failure to deal well with the experience (Ehlers & Clark, 2000; Elwood et al., 2009; Taku et al., 2008). The pandemic scenario led people to be repeatedly reminded of the negative occurrence, making them feel alarmed and experiencing excessive vigilance. Furthermore, because individuals are unable to escape the traumatic occurrence and eliminate the stressor, they experience unpleasant emotions, as fear and anxiety, which have a severe impact on their mental health (Sanchez-Gomez et al., 2021). Recent empirical studies have provided findings

consistent with the idea of a traumatic impact of COVID-19 on the general population (Casagrande et al., 2020; Ikizer et al., 2021; Karatzias et al., 2020; Liu et al., 2020).

Our study has four main limitations. Firstly, we did not systematically consider individual differences in terms of WM capacity, except for the RNG assessment during the Screening Phase. Curci and colleagues (2013) showed that the individual's availability of WM resources was significantly associated with the presence of ruminative thoughts both immediately after an emotional event and 24 hours later. The role of the individual's cognitive and executive resources needs to be taken into account in modeling the role of WM resources in post-emotional processing.

Secondly, in studies conducted by Brewin and Beaton (2002) and Brewin and Smart (2005), the influence of intrusive formations on WM performance was only examined when participants were expressly instructed to suppress intrusive thoughts. This type of instruction was not given in our study, so any lack of significance might also be attributed to the structure of the experiment. We set up our experiments by aiming to investigate post-emotional processing of experiences that resemble daily life occurrences.

Thirdly, we did not ask for information about past experiences related to COVID-19, for example about participants' or relatives' previous infection, vaccination access, or attitude toward COVID-19 quarantine or vaccination campaign. These variables would have played a role in increasing the ruminative processes in participants. The present study was carried out from February until April 2021, i.e., in the middle of a period of restrictions and red zones institution corresponding to the COVID-19 second wave in Italy. The difficulty of carrying out the administration of a remote computerized task limited the experimental procedure, also given the need to concentrate the data collection in a short period characterized by repeated changes.

Finally, COVID-19 pictures taken alone could be less powerful to induce emotion, while in an "infodemic" context, both emotional words and pictures continuatively crash on the screens, destabilizing everyday life. Given the extreme diffusion of COVID pictures, there could be a desensitization effect, where these pictures are not as destabilizing compared with the generically emotional ones, which are "new".

Despite these limitations, our study reports interesting results from both a clinical point of view and for future policies contrasting long-term consequences of the pandemic. We are continuously overwhelmed with pictures in a dynamic crisis setting, which often contains a variety of terrible and disturbing information. Users usually express their negative emotions on social media, according to content analysis of blogs and Twitter posts related to disasters (Macias et al., 2009). Continuously sharing unpleasant content and stressful experiences may eventually improve a vicious circle of negative psychological consequences (Zhao & Zhou, 2020).

One year after the outbreak of the pandemic and the onset of the lockdown, COVID-19 material continues to impact the individual affective states and ensuing ruminative and intrusive formations. Our results contribute thus to increasing knowledge about individual reactions to major disasters, providing information relevant to understanding the current public health crisis. Both during and after the pandemic, strategic measures that take psychological well-being into account must be implemented. Our study is finally intended to support the development of targeted interventions and strategies for the general public by examining the role of COVID-related post-emotional processes on psychological wellbeing.

Author Contributions
The authors contributed equally to this manuscript.

Compliance with Ethical Standards

Conflict of interest
The authors declare that they have no competing interests.

Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethical approval
All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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© Author(s)
E-ISSN 2724-2943
ISSN 2723-973X

Psychology Hub (2022)
XXXIX, 1, 39-46

Psychological factors predicting social distance during the COVID-19 pandemic: an empirical investigation

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Article info

Submitted: 16 October 2021
Accepted: 17 January 2022
DOI: XXXX

Abstract

Numerous nations around the world are facing exceptional challenges in employing measures to stop the spread of COVID-19. Following the recommendations of the World Health Organization, a series of preventive measure have been adopted. However, individuals must comply with these rules and recommendations in order to make such measures effective. While COVID-19 was climaxing, it seemed of crucial importance to analyze which psychosocial factors contribute to the acceptance of preventive behavior, thus favoring the management of COVID-19 worldwide health crisis. In particular, the identification of aspects related to obstacles and facilitations of adherence to social distancing has been considered as crucial in the containment of the virus spread. We hypothesized social distance could be influenced by individual psychological differences and target's characteristics. Specifically, since the virus was firstly detected in China, we assumed Asian people could be considered a relevant outgroup targeted for exclusion.
260 participants participated in this research on a voluntary basis. They filled a survey designed to explore a series of COVID-19 measures (such as exposure to virus and fear of infection). Participants' state and trait anxiety was also assessed. The dependent variable was social distance, based on a measure of seating distance, designed ad hoc for the present study. Our hypothesis that participants could reports greater distance in response to Asian people was not confirmed. On the other hand, significantly lower distance in response to smiling compared to coughing targets was displayed. Finally, adopting a regression analysis model, we found that participants' social distance, in response to both coughing and smiling targets was predicted by fear of infection and by the perception COVID-19 could become a pandemic. Social distance in response to coughing target was also significantly and positively predicted by age and state anxiety. In summary, the present work has sought to identify a set of psychological variables, which may still be relevant in predicting social distancing.

Keywords: COVID-19; social distancing; health; preventive behaviors; risk of infection.

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Introduction

Rates of COVID-19 infections have rapidly risen worldwide reaching pandemic proportions, with more than 219 million people infected. Compared to the seasonal flu, COVID-19 was found to be highly contagious, with the average infected person spreading the virus to up to three other individuals.

During the last 18 months, communities around the globe have faced unusual challenges to effectively reduce the spread of SARS-CoV-2 virus. In fact, numerous governments have applied measures that severely hinder many daily activities (Anderson et al., 2020; Kraus et al., 2020). For instance, most authorities have required citizens to adopt behaviors, such as wearing a face mask, sanitize hands frequently and have forbidden gatherings of two or more individuals from different households (e.g., Ferguson et al., 2020).

In this scenario, social distancing has been immediately identified as one of the primary strategies to contain the COVID-19 transmission. In particular, the World Health Organization (2020) recommends social distancing to slow the spread of virus. Social distancing implies keeping physical distance from others, including family, friends and loved ones. Nonetheless, such paradigm is ineffective in impeding contagious spread if not adhered to (e.g., West et al., 2020).

Cleary, this seems an easy and rational method to contain the virus spread. Yet, such behavior opposes human tendencies when being threatened. As a matter of fact, in such situation, individuals ancestrally show a tendency to seek social contact and closeness to others (Dezecache et al., 2020; Mikulincer & Shaver, 2003).

Considering that social distancing imposes significant lifestyle changes and it may potentially still be required for a long time, it seems crucial to understand which factors facilitates or prevents adherence to such behavior. Besides perceived effectiveness, the role of perceived severity of the disease and perceived susceptibility is well documented in previous studies. For instance, during H1N1, perceived severity of the virus was related to intention to comply with recommended preventive measures (Bults et al., 2011). Similarly, perceived risk susceptibility was associated to H1N1 vaccination intention in a sample of pregnant women (Tucker Edmonds et al., 2011).

Considering COVID-19, numerous studies suggested that fear of infection can be one of the main predictors of social distancing (e.g., Harper et al., 2020). Furthermore, several cross-sectional works (e.g., Clark et al., 2020) have found a correlation between trust in governmental figures and compliance with preventive health behaviors. Accordingly, a reduction in geographical mobility, which can be considered an indicator of adherence with lockdown and social distancing measures, has also been observed in Europe regions with high pre-pandemic levels of trust in government and politicians (Bargain & Aminjonov, 2020).

COVID-19 global spread was also accompanied by a reported rise in the stigmatization of Asian-looking individuals (e.g., Devakumar et al., 2020; Gover et al., 2020; Ng, 2020). In this vein, people perceived to look Chinese have been stigmatized based on their appearance, increasing social exclusion and avoidance behaviors (e.g., O'Brien & Major, 2005).

Accordingly, since the beginning of the pandemic, 58% of Asian Americans have reported that expressions of anti-Asian sentiment have become more common (Ruiz et al., 2020) and 60% have reported witnessed someone blaming Chinese (or Asian) people for the virus (Ellerbeck, 2020). In a similar vein, a research (Ruiz et al., 2020) reported that over 40% of participants stated they would engage in discriminatory behaviors, at least one, toward Asian people (or individuals of Asian descent).

These data are corroborated by concrete facts. Asian American communities have experienced an increased rate of discrimination ranging from intimations to physical assaults. On a similar vein, a recent work (Jeung & Nham, 2020) reported around 1,500 cases of harassment against such community between March and April 2020.

At that time, narratives that place the blame for the virus spread on Chinese, or Asian people more broadly, were pervasive in Europe and in the U.S. (see Noel, 2020, for a review). Numerous studies have demonstrated how peoples' worries about COVID-19 might enhance prejudice toward such outgroup. For instance, an experimental work (Tabri et al., 2020) demonstrated that Americans being primed with thoughts of COVID-19 as an existential threat showed higher anxiety and arousal levels, which in turn increased anti-Asian bias. Similarly, a large survey revealed that Americans more concerned about the virus also manifested stronger anti-Asian sentiment (Reny & Barreto, 2020).

To the best of our knowledge, no empirical studies assessing prejudice towards Asian have been conducted within the Italian context. However, in a related vein, it has previously been found that Italian citizens who reported higher Ebola infection risk perception showed a tendency to express greater prejudice toward African immigrants (Prati & Peitrantoni, 2016). For the sake of clarity, Ebola epidemic took place in West Africa in 2014 and, overall, Italy reported only 2 Ebola cases.

Taking these findings into account, the main goal of the present study was to analyze the relative contribution of individual psychological factors to social distancing behavior during COVID-19 outbreak. Furthermore, this work aimed at analyzing whether social distancing could be greater for outgroups strongly associated with the disease (Chinese or Asian looking people).

Methods

260 participants (203 women) who ranged in age from 18 to 79 years (M = 37.16, SD = 12.62) completed a web-mediated survey on a voluntary basis. They did not receive any compensation in exchange for their participation. Data were collected between March 10 and March 30, 2020. Participants were informed about the research and consented to the use of their anonymized data.

The survey, firstly, consisted of several questions about socio-demographic data.

This was followed by a section concerning COVID-19 emergency measures. In particular, it was assessed exposure to the virus, knowledge of the virus and governmental performance in response to the pandemic. Fear of infection and feeling of insecurity were derived from a scale adopted to measure such feeling in response to the SARS (Ho et. al., 2005). Perceived chance of having a large-scale COVID-19

outbreak was measured to assess participants' perception of the magnitude of the virus spread. State and Trait Anxiety were assessed using the State-Trait Anxiety Inventory (STAI; Spielberger, 1983). The dependent variable was a measure of social distance designed ad hoc for the present work.

Measures

Exposure to the virus (e.g., "Have you had contacts with patients who exhibited symptoms related to COVID-19?") was measured via a 7-items scale, designed ad hoc to assess participants contact with the virus. The items required a "yes" or "no" answer.

Knowledge of the virus (e.g., "COVID-19 is caused by a kind of bacteria called streptococcus") was assessed with a 10-items instrument. These items were developed to investigate respondents' knowledge about COVID-19 and the answers option were: "Yes", "No" or "I don't know". A total score was calculated by summing all correct answers.

Governmental performance in response to the pandemic was assessed by 5 items, measuring respectively: timeliness of measures, effectiveness of implemented measures, clarity of explanations furnished to citizens, adequacy of hygienic measures and adequacy of isolation and quarantine procedures. Participants had to evaluate government performance on a scale ranging from 0 (*terrible*) to 5 (*excellent*). An average score was calculated for the 5 items. In this sample, Cronbach's α was .87.

Fear of infection (e.g., COVID-19 makes me... fear that I will be infected") and *feeling of insecurity* (e.g., "COVID-19 makes me... feel very unsafe about myself") were assessed via two three-items scales. Items were answered on a 5-point Likert scale ranging from 1 (*definitely false*) to 5 (*definitely true*). Cronbach's α were respectively .80 and .83.

Perceived chance of having a large-scale COVID-19 outbreak was measured via a three items scale designed to measure participants' perception of the likelihood there was going to be an increase of the virus spread (1) in their region, (2) in Italy and (3) around the world. Items were answered on a scale ranging from 1 (*not at all*) to 5 (*extremely*). In this sample, Cronbach's α was .80.

State and trait anxiety were assessed using the well-known instrument (STAI) developed by Spielberger (1983). The STAI is based upon a theoretical conception of anxiety as having two different facets. Specifically, the trait scale was developed to measure a more enduring characteristic presence of anxiety, whereas the state scale was intended to assess a temporary state of arousal subjectively experienced as anxiety.

This instrument consists of two 20-item self-report measures specifically designed to assess both aspects and it has shown excellent psychometric properties. The Trait form consists of 20 statements (e.g., "Some unimportant thoughts run through my mind and bother me"), for each of them participants are asked to rate how they generally feel on a 4-point Likert scale ranging from 1 ("almost never") to 4 ("almost always"). The State form contains 20-items aimed at measuring how much tension, worry or apprehension the respondent experiences in the present circumstances. Items (e.g., "I feel nervous") emphasize the intensity of particular symptoms (ranging from 1 = "not at all" to 4 = "very much so"). Reliability for the two scales in this study was respectively .95 and .87.

Social distance was conceptually derived from the seating distance measure (previously used by Halim et al., 2017). Specifically, it involved participants' choice of seating next to a Caucasian *vs*. Asian, man *vs*. woman, smiling *vs.* coughing person. Using such procedure, we obtained participants answers in response to 8 different targets (represented using 8 distinct photos). The response format was a 4-point scale (1 = *seat next to the person*, 2 = *two seats from the person*, 3 = *three seats from the person*, 4 = *four seats from the person*).

Results

Correlations between variables are presented in Table 1.

To verify our hypotheses about the targets proposed, we run 2 T-tests. These analyses revealed no difference in response to the

Tab. 1. Inter-correlations among study variables and Cronbach alphas

	1	2	3	4	5	6	7	8	9	10	11	12
1. Timelapse	(-)											
2. Age	.133*	(-)										
3. Gender	-.052	-.033	(-)									
4. Education	.173**	.181**	-.066	(-)								
5. State anx.	.051	-.112	.123*	.026	(.87)							
6. Trait anx.	.010	-.279**	.103	-.119	.499**	(.95)						
7. Infection	-.033	-.215**	.080	.023	.361	.246**	(.80)					
8. Insecurity	.111	-.049	.062	.119	.569**	.392**	.409**	(.83)				
9. Outbreak	.079	-.049	-.026	.144*	.291**	.133*	.261**	.337**	(.80)			
10. Expo.	.107	.129*	.056	.013	.072	.030	-.015	.001	.080	(-)		
11. Know.	.050	-.020	-.185**	.115	-.006	.062	-.027	-.062	.060	.099	(-)	
12. Gov.	.097	.079	-.223**	.069	-.154*	-.172**	-.001	-.083	.008	.049	.093	(.80)

Note. N = 260; In bracket (Cronbach's Alpha). *p< .05; **p< .01. State anx. = State anxiety; Trait anx. = Trait anxiety; Expo. = Exposure; Know. = Knowledge; Gov. = Government performance.

ethnicity of the targets (Caucasian *vs*. Asian; see Figure 1), whereas a significant difference emerged, as it can be easily hypothesized, when the targets considered were people smiling *vs*. coughing. In such case, in fact, participants reported significantly greater distance in response to coughing targets (see Figure 2).

Fig. 1. Social distance as a function of participants answers in response to the ethnicity of the targets

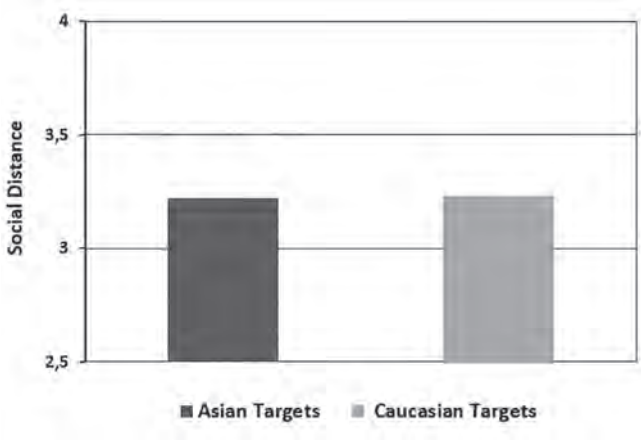
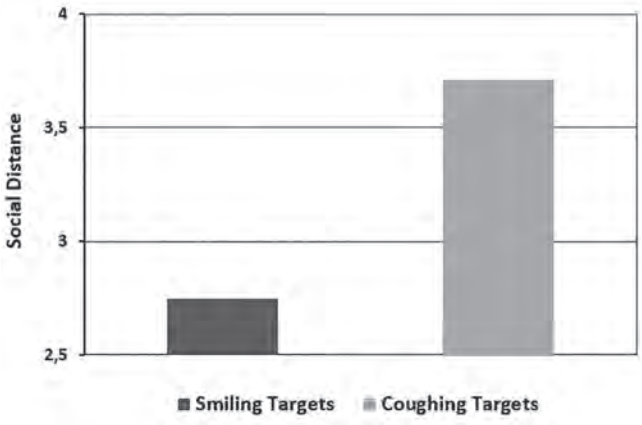


Fig. 2. Social distance as a function of participants answers in response to health condition of the targets



More importantly, adopting two regression analysis models (see Table 2), we tested the hypothesis that social distance in response to smiling or coughing targets could be predicted by individual psychological variables.

In the first regression model, we found that participants' reported social distance, in response to coughing targets, was significantly and positively predicted by age, with older people reporting greater distance (b = .18, p = .004), state anxiety (b = .16, p = .041), fear of infection (b = .34, p < .001) and by the perception COVID-19 could become a pandemic (b = .13, p = .033).

Surprisingly, however, exposure to COVID-19, insecurity caused by virus, knowledge of the virus and evaluation of the measures adopted by the government were not found to be predictive of participants' distance with regards to coughing people. None of the others controls variable (i.e., gender, education and timelapse between the submission) was significant.

In a second regression model (See Table 2), considering the same predictors, but smiling targets as dependent variable, social distance was positively and significantly predicted only by fear of infection (b = .15, p = .029) and by the perception COVID-19 could become a pandemic (b = .19, p = .004). None of the other variables was significant.

Tab. 2. Summary of final regression model with coughing or smiling targets as outcome

	Coughing targets		Smiling targets	
	Beta	p	Beta	p
Gender	.10	.094	.04	.532
Age	.18	**.004**	.13	.057
Education	-.10	.080	-.01	.931
Timelapse	.07	.256	-.06	.318
State anxiety	.16	**.041**	-.02	.794
Trait anxiety	-.11	.124	-.07	.358
Infection	.34	**.000**	.15	**.029**
Insecurity	-.09	.241	.05	.574
Outbreak	.13	**.033**	.19	**.004**
Exposure	-.08	.178	.05	.469
Knowledge	.07	.219	.03	.624
Government performance	.07	.269	-.01	.845
R^2	.202		.094	

Note. N = 260.

Discussion

Since the beginning of the pandemic, social distancing has been an effective preventative policy that has been enforced by governments worldwide. However, substantial differences have been observed in adherence to such measure across individuals and countries. Many citizens have adhered to the limitations from early on, but there was a significant variance in acceptance.

In line with these notions, recognizing the main psychological factors implicated in people adherence to social distancing throughout the pandemic health crisis was highly crucial.

The results of our study suggest that individuals, during the first phase of the pandemic, were more incline, as it might be expected, to seat next to a smiling person compared to a coughing one. In this sense, people were clearly more prone to keep social distance in response to individual showing symptoms related to the COVID-19 (i.e., coughing). Nonetheless, we should consider that, even when approaching individuals who seem healthy, one should respect social distancing to reduce the risk of transmission (Koo et al., 2020). That is because individuals can also spread the virus unknowingly. For this reason, keeping social distance is deemed one of the most effective measures to decrease infection rate during COVID-19 pandemic.

On the other hand, since the virus was firstly detected in Wuhan, China, we tested the hypothesis that participants could report greater distance in response to Asian people. However, our results did not support such idea. As mentioned, this hypothesis was related to the fact that, during the first phase of the virus spread, Asian were considered by the media as the main vehicle. However, at least in the Italian scenario, it seems that social distancing, already during the first COVID-19 wave, was not influenced by the ethnicity of target individuals.

These results are consistent with the ones (Koller et al., 2021) obtained in another European nation (i.e., Germany). In fact, this work reported no evidence for an increase in the stigmatization of Chinese and Asian-looking people. In particular, worry about shaking hands with a Chinese looking individual did not increase rising threat levels and was significantly lower than worry about shaking hands with a person who has recently travelled to China. Additionally, another study (Sorokowski et al., 2020) showed that greater exposure to COVID-19-related news was linked to more negative attitudes towards Italians, but not towards Chinese or other nationalities.

According to these results, it has been found (Xu et al., 2021) how stigmatization of different geographic target groups seems to be function of COVID-19 prevalence. Thus, it seems plausible to affirm that the specificity of such results may be due to the concurrent epidemiological situation. In this vein, it is important to specify that, at the time of the study, Italy was already severely affected by the virus.

The present research also had the goal to shed light on the relative contribution of individual factors (e.g., fear of infection) to social distancing during the pandemic. In this vein, it has been found that individuals, at least in the first phase of the virus spread, were more willing to respect social distance if they were afraid of being infected and if they believed the virus could spread worldwide. Coherently, the first studies on such topic have demonstrated risk of infection may be positively and significantly associated with the respect of preventive behaviors. For instance, it has been found (Lunn et al., 2020) that messages highlighting the risk of infecting large numbers of people as the risk of infecting vulnerable people may lead to higher intentions to engage in social distancing, increasing acceptability of such behaviors.

Looking at sociodemographic variables, such as, age, gender and education, we found that older individual reported a higher tendency to seat further from other individuals. This effect was stronger for coughing target, whereas for smiling target it was only trending toward significance. These results are coherent with the fact that mortality from and severity of COVID-19 is higher among older individuals (Iaccarino et al., 2020).

Surprisingly, knowledge of the virus did not significantly predict social distancing. In contrast, it should be noted that previous works (e.g., Al-Hasan et al., 2020) have found that a greater COVID-19 knowledge positively predicted social distancing adherence.

Finally, it is important to underline that state anxiety, which has generally a negative connotation due to its association with depression, somatic problems, and general psychopathology (e.g., Gotlib, 1984), may in such case represent an important protective factor.

Limitation

Of course, there are several factors limiting the generalizability of these results. Specifically, first criticisms are related to the use of a convenience sample (i.e., recruited on social media) and to the imbalance of the sample (i.e., 78% female). The present work relies on self-report answers and social desirability must be taken into account when examining sensitive issues.

Then, it should be recognized that these data are limited to responses from white, Italian citizens during a specific moment of the COVID-19 pandemic.

On the other hand, the cross-sectional nature of the study allowed for testing of relations between predictor and outcomes at one point in time, but longitudinal assumption cannot be made. It should be acknowledged that many aspects of life in Italy have changed since the early days of the virus outbreak. In this vein, we could not be sure to observe a similar pattern of results nowadays. At the time of data collection, in fact, approximately 10.000 Italians were reported to have died of COVID-19. At the time of writing (September 2021), more than 130.000 people in Italy have died of COVID-19 (Ministry of Health, 2021).

Moreover, social distancing measure has been adapted from previous works having different goals and its psychometric properties are currently unknown. Lastly, the choice of the targets could not cover a complete range of people that participants might encounter in their real life.

Conclusion

In conclusion, despite the massive diffusion of the COVID-19 vaccines, social distancing is still one of the main effective instruments for containing the pandemic. In this vein, the present work has identified a set of psychological variables, which may still be predictive of behaviors (such as keeping social distance) oriented to the prevention of the COVID-19 diffusion.

Nonetheless, future studies should investigate whether associations between intensity perception of disease outbreak and adherence to preventive behaviors shift or remain stable across the lifespan of a pandemic, particularly in light of people's proximity and exposure to disease changes.

Compliance with Ethical Standards

Conflict of interest

The author declares that he has no competing interests.

Funding

The author received no financial support for the research, authorship, and/or publication of this article.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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SAPIENZA
UNIVERSITÀ EDITRICE

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© Author(s)
E-ISSN 2724-2943
ISSN 2723-973X

Psychology Hub (2022)
XXXIX, 1, 47-54

Remote working during the COVID-19 pandemic: A study on the emotional and relational experience and on the well-being of Italian university scholars and clerks

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Article info

Submitted: 12 October 2021
Accepted: 04 February 2022
DOI: XXXX

Abstract

The COVID-19 pandemic has had significant effects on people's well-being and also on their ordinary work activities. This study aims to investigate the emotions, relational experience and well-being of academic personnel who continued their activities in remote working, during the Italian lockdown period in the months of March and April 2020.
For this purpose, 87 workers (55 % scholars and 45 % university clerks) filled out an online quali-quantitative questionnaire about their experiences of being in lockdown and doing their work remotely.
Qualitative data were analyzed through Grounded Theory Methodology using the ATLAS.ti 8.4 software. From the coding process, the following macro-categories emerged: remote working, affects and interpersonal relationships in lockdown. Then cross-tabs intertwined the code groups emerged with work role and gender of participants. In the end, the frequencies in the cross-tabs were analyzed by Chi square test. Quantitative data were analyzed through Univariate Analysis of Variance (ANOVA) using SPSS 22 software.
The results showed that scholars consider remote working mainly as a critical issue, while clerks see it more as a resource. Moreover, clerks more frequently report negative feelings of anxiety, fear and anger, while scholars more frequently report loneliness. Regarding interpersonal relationships, no significant differences between scholars and clerks were observed. Neither affects nor interpersonal relationships were associated with gender differences. Moreover, clerks reported lower economic and overall well-being compared to scholars. Finally, results highlighted the importance of the mattering role of human relations in work activities; this core category gives some practical implications that will be discussed extensively.

Keywords: remote working; COVID-19 pandemic; well-being; affects; Grounded Theory Methodology.

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Introduction

The COVID-19 pandemic affected the whole world, bringing changes that have modified people's daily lives with respect to work, school, free time, and interpersonal relationships, negatively impacting their emotional, interpersonal, and psychological well-being (Dawson & Golijani-Moghaddam, 2020; Macdonald & Hülür, 2020; Zacher & Rudolph, 2020). The state of emergency increased the precariousness and instability of work activities and also changed times and methods related to these activities, affecting the workers' well-being (Evanoff et al., 2020; Pacheco et al., 2020).

Remote working was the flexible form of work which allowed workers to carry out their activities without having fixed hours to respect and without having to go to the workplace (Biasi, 2020; Cancello et al., 2020; Langè & Gastaldi, 2020). In this mode, the workload was usually not quantified on the basis of hours of presence in the workplace, but on the basis of tasks completed within a set deadline (Angelici & Profeta, 2020).

De Masi (2020) underlined that remote working implies a saving of time, effort and stress involving a greater level of autonomy in the performance of activities and in the distribution of times; more remote working means also less commuting for workers and, therefore, less traffic and less environmental pollution.

But remote working also implies various criticalities. For example, a problem of remote working concerns the maintenance of social relationships leading to a decrease in human and social contact, a kind of social isolation. The lack of daily attendance at the workplace actually leads to a loosening of interpersonal relationships with colleagues and to the limiting of social interactions only to family and friends (Grant et al., 2013).

Therefore, literature has considered remote working as a positive evolution of the way of working, but also as an involution that increasingly isolates workers.

Italian universities switched to this new way of working and have experienced an exponential increase in remote working compared to the previous year. The data on the staff of the University of Naples Federico II (2020), who carried out remote working in the early months of 2020, clearly show this high increase: while in January and February 0% of the entire staff worked remotely, in March there was an increase of 83% in the first half of the month and of 90% in the second half, and finally in April the percentage reached 92%.

However, despite this increase, still little research has investigated the psychological and affective aspects of remote working, particularly in the academic context.

On this basis, this study aims to investigate the effects that remote working have on emotional life, interpersonal relationships and well-being of academic workers (namely scholars and clerks).

Method

Procedure and Participants

The research was carried out from March to May 2020, i.e., during the first lockdown established in Italy as a containment measure against the COVID-19 pandemic. It was started on behalf of the Comitato Unico di Garanzia (CUG) of the University of Naples Federico II, which is the committee responsible for enforcing equality among public workers and protecting their rights. Through the CUG, an email containing a link to the online questionnaire was sent to all academic workers to find participants in the research.

Following this procedure, the research involved 87 (65 females and 22 males) workers of the University Federico II of Naples. The mean age of the participants was 51.67 (SD = 10.70), and they belonged to two distinct categories: 48 were scholars, while 39 were clerks.

All the characteristics of the participants can be viewed in Table 1.

Tab. 1. Characteristics of the participants

Age	M = 51.67	SD = 10.70
Sex	%	**N**
Male	25.3	22
Female	74.7	65
Role in the university institution	%	**N**
Scholar	55.2	48
Clerk	44.8	39
Marital Status	%	**N**
Single	14.9	13
With a partner	13.8	12
Married	56.3	49
Separated or divorced	12.6	11
Widowed	2.3	2
Total	100	87

Measures

The qualitative-quantitative questionnaire administered, consisting of a preliminary demographic section and of two further sections:

1) six open-ended questions related to the workers' emotional and relational experiences during the lockdown period. Specifically, the participants were asked to write about: the emotions they felt; their most recurring thoughts; events perceived as significant in this lockdown period; individual or collective actions, carried out by them and/or by others, to be mentioned; what the pandemic and the lockdown have taught them about the future.; and finally comments on how they perceive the new mode of working remotely.
2) the *I COPPE scale* (Prilleltensky et al., 2015; Di Martino et al., 2018) in its 14 items short form (Esposito et al., 2021), for assessing perceived well-being in seven domains, such as interpersonal, community, occupational, physical, psychological, economic and overall well-being. For each

item, respondents had to indicate their level of well-being using a 11-points Cantril scale ranging from 0 (the minimum) to 10 (the maximum).

Finally, all participants were asked to communicate their consent to the use of responses and sensitive data exclusively for research purposes, in accordance with the Law Decree n. 101 - 2018, established by the Italian Government.

Data analysis

The textual material from the six open-ended questions was analyzed by the Grounded Theory Methodology (GTM; Charmaz & Belgrave, 2018), supported by the software ATLAS.ti.

Indeed, the data analysis, carried out through a bottom-up approach, involved three coding phases: open coding, axial coding and selective coding. This coding phase was implemented using the software ATLAS.it, starting with the open coding, that is the attribution of codes to significant words and sentences; later these codes were collected into larger code groups; finally, macro-categories were identified.

During several meetings, organized according to the CASP Qualitative Research Guideline (2018), the team interacted to construct the best categories to understand and explain the gathered textual materials; the researchers discussed also data in continuous comparison with the theoretical construction of the literature arriving at its substantive interpretation that is the core category.

Furthermore, the team verified the relation between the remote working experience of the workers and the affects and interpersonal relationships during lockdown. To test these further hypotheses, cross-tables were created, intertwining frequencies of the code groups that emerged with the role and sex of respondents, namely scholars or clerks and female or male. Finally, chi-squared tests were performed.

To evaluate the well-being of workers during lockdown, a univariate analysis of variance (ANOVA) was conducted, using the software SPSS. Specifically, to assess the differences between scholars and clerks, the variable *Role* as predictor, and all seven I COPPE domains of well-being as outcomes were used.

Results

Remote workers' affects and relational experience during lockdown

The analysis of the textual material resulted in 193 codes. These codes were collected into 32 code groups categorized in three macro-categories: a) *remote working*, which includes code groups referring to the perception of remote working, its usefulness or difficulties in daily work; b) *affects*, which includes code groups referring to the emotions and moods aroused in workers during the lockdown period; and c) *interpersonal relationships*, which includes code groups referring to the critical aspects and resources of relationships with family, friends, colleagues and the wider community and how they changed during the lockdown.

a) Remote working

The Remote working macro-category includes two code groups: Remote working criticality and Remote working resources.

Remote working criticality contains codes that refer to the negative aspects, problems and deficiencies experienced during remote working: scholars and clerks reported not going to university places as a "loss of contact with an environment of great cultural and human stimuli" (M, 38, scholar).

It is clear that with remote working there are no more time limits, as they claim to work all day and very often even during the weekend: "The first month of remote working and distance learning I had to work almost 10 hours a day including Saturdays and Sundays" (F, 33, scholar).

So, all this affects family life because, the time to dedicate to the family becomes less and less: "too many online appointments in the same day wear out the body and mind." (F, 42, scholar).

Among the critical issues the interviewees highlighted the technical problems, related to the world of technology and the web: "We talk about agile work, but we were and are nor ready with the equipment to be made available to the staff" (F, 39, clerk).

Therefore, some participants do not consider remote working as real work, stating that: "working from home, we do not have any illusions, it is not working. Let's return as soon as possible, safely to our workplaces" (F, 61, scholar).

Remote working resources includes codes related to the opportunities and positive aspects of this experience.

In fact, remote working was considered effective, as it avoids commuting from home to work, and therefore the very often long journeys to reach the workplace.

Consequently, this aspect has considerably reduced anxiety and related stress, in many cases also making the most of the time available: "I do not detect any problems; on the contrary, I have discovered that agile work increases my productivity, because I am more serene in the management between work and household chores" (F, 55, clerk).

Not all participants complain of an overload of work. Many claimed to have managed, through this new way of working, to better reconcile working times with family and domestic ones. Furthermore, remote working was perceived as a chance to get involved, an opportunity to experiment with new ways of working: "I carry with me the satisfaction of having learned how to use new programs in a short time" (F, 43, clerk).

Finally, the participants highlighted how, in an emergency situation like the one experienced, remote working represented a valid alternative and above all a privilege when compared to those who had to interrupt their work activities.

b) Affects during lockdown

The macro-category *Affects* includes five different code groups: area of anxiety, area of loneliness, area of fear, area of anger and general negative moods.

Anxious area embodies codes referred to anxiety, distress but above all to concern. This emotion is the most widely present and it is declined in different ways: concern for the future, concern especially for their loved ones and their offspring.

In fact, most interviewees were worried about their offspring and at the same time, they felt the burden and concern for elderly parents: "I am 51, I am still a daughter, and I am a mother; I feel like Aeneas dragging his old father on his shoulders, but I am crushing my children under me" (F, 51, clerk).

Moreover, participants report that they experienced anxiety due primarily to the forced imprisonment: "initially I felt a strong sense of anxiety at the idea of having to stay at home forcibly" (F, 47, scholar).

These concerns provoked interviewees' anxiety and at the same time a real fear.

The code group *area of fear* encloses the fear for the future and the non-return to normality: "imprisonment, anxiety about tomorrow's uncertainty, violation of democratic rights, awareness that nothing will return as before" (F, 41, scholar).

Indeed, "social distancing seems to have more the form of social fear (fear of the other) than of protection" (F, 40, clerk), thus assuming the connotation of distrust of one's neighbor, not only of the other stranger but "the perception of danger even by those who were formerly familiar" (F, 57, clerk).

Furthermore, the unpredictability and the difficulty of managing the pandemic led the interviewees to perceive themselves as exposed to real danger, and therefore more vulnerable: "at the beginning of the isolation I was afraid, a fear I had never felt before, I felt vulnerable" (F, 50, scholar).

Area of loneliness collects codes such as despair, helplessness, loneliness, and sadness. Particularly, participants report that they have experienced "a feeling of powerlessness with respect to such a new event" (F,61, scholar).

Moreover, a consequence of social isolation was the exacerbation of negative emotions such as loneliness and sadness. In fact, the interviews report: "loneliness because this disease must be faced alone" (M,59, clerk).

Anger is the least widely felt emotion by the interviewees. They report that they felt anger towards those who did not respect the rules, thus rendering useless the sacrifices of all and anger "for the asphyxiating slowness of the bureaucracy, for the carelessness of the health organization (testing)" (M,59, clerk).

Lastly, *Moods* collects disorientation, human fragility, uncertainty, and bewilderment. These are the codes that refer to the affective states experienced by the interviewees.

Furthermore, the pandemic has confronted the interviewees with the awareness of their own limits: "human fragility" (F, 41, scholar).

A situation that in some ways was perceived as a loss of meaning: "it seemed impossible how such an experience could lead to a progressive loss of meaning" (F, 70, scholar).

Once again, the attention of the participants is placed on the future, perceived as unpredictable uncertainty: "the sense of precariousness about the future, we risk losing the sense of everything that has been lived up to now" (M, 49, scholar).

c) Interpersonal relationships during lockdown

The Interpersonal relationships macro-category embodies two code groups: positive and negative aspects of the same.

Codes such as absence of contact, lack of social interactions and divided families are included in the *negative aspects of interpersonal relationships*; they described all those situations in which respondents experienced a worsening of their interpersonal relationships or negative feelings deriving from them, or rather from their absence.

In particular, this was due to the ban on leaving the house and therefore on meeting others: "the difficulties of maintaining a good level of relationship with relatives and friends given the obligation to stay at home" (M, 61, clerk).

Undoubtedly, however, the aspect that most negatively affected the participants, in the relational sphere, was the forced separation from their significant others, the lack of contact, especially with distant children.

However, not all participants report detachment from family. On the contrary, in many cases, the lockdown period served to increase the quantity and quality of family time. The code group "*positive aspects of interpersonal relationships*" collects codes such as having time to dedicate to the family, collaboration in the family and rediscovering the sense of family: "certainly the positive aspect of this particular situation was in being able to spend more time with loved ones, talk, tell each other and do things together at home" (F, 51, clerk).

Clerks and scholars: differences in the emotional and relational work experience

From the qualitative analysis, what emerged was that scholars have difficulties and critical issues in remote working, while clerks consider the remote working mostly as a resource.

These results which emerged from the coding process led us to verify specific hypotheses:

1) remote working is mainly perceived as a resource in the texts of clerks and as a critical issue in those of scholars;
2) participants considering remote working mainly as a critical issue more frequently report having felt negative affects;
3) given the positive effect that remote working should have on the work-family balance (Angelici & Profeta, 2020), we expected that in the texts of those who consider remote working more as a resource, also interpersonal relationships would be experienced in a more positive way;
4) finally, we supposed that in the females' texts we should perceive that remote working would be more frequently described as a resource than in males' texts, since it is suggested that it is an advantage especially for women (Sullivan & Lewis, 2001; Angelici & Profeta, 2020).

To confirm these hypotheses suggested by the coding process, all the documents and all the code groups of emerged macro-categories (*Remote working*, *Affects* and *Interpersonal relationships*) were used to create cross-tabs. We used these tabs to understand if there were differences in the way of describing remote working, in the texts of scholars and clerks and in those of female and male workers (see Table 2).

Tab. 2. Cross-table: code groups for scholars and clerks

Code Groups	Scholars	Clerks	Total
	nO/nE	nO/nE	n
Remote working			
Remote working Criticalities	49/40.8	24/32.2	73
Remote working Resources	31/39.2	39/30.8	70
Total (n)	80	63	143
Affects			
Anxiety feelings	17/18.7	26/24.3	43
Fear	10/15.7	26/20.3	36
Loneliness and depressive feelings	13/8.7	7/11.3	20
Anger	0/1.7	4/2.3	4
General negative moods	17/12.2	11/15.8	28
Total (n)	57	74	131
Interpersonal Relationship			
Positive relational aspects	5/5.6	5/4.4	10
Negative relational aspects	14 / 14.4	11/11.6	26
Total (n)	20	16	36

Note. nO = code frequency observed in each cell; nE = code frequency expected in each cell.

Furthermore, to test the significance of these differences, chi-square tests were conducted and the hypothesis were partially confirmed. For each chi-square test, we verified that all assumptions of applicability were respected: the expected value of the cell are greater than 5 in at least 80% of the cells and no observed value is equal to 0. (McHugh, 2013).

Regarding the first hypothesis the scholars' texts, compared to the clerks' ones, refer more frequently to the critical aspects of remote working, rather than resources, and this difference is significant for a 0.01 alpha level ($\chi^2 1 = 7.56$).

For the second hypothesis (regarding the relationship between considering remote working as a criticality and the prevalence of proven denied affects), to meet the applicability assumptions of the chi-square, before performing the test the code group *Area of anger*, that occurred 4 times in the clerks but 0 in the scholars, was merged into the code group *Area of fear*, and so these two areas were considered jointly.

Once the test was applied, the results showed a complex situation. Scholars' texts, who refer more frequently to the negative aspects of remote working, report with greater prevalence the negative affects related to the area of loneliness and to general negative moods. Conversely, the clerks, who refer more to positive aspects of remote working instead, report with more frequency codes related to the areas of anxiety, fear, and anger. This difference, too, was statistically significant at an alpha level of 0.01 ($\chi^2 4 = 13.68$).

Considering the third hypothesis, namely the frequency of referred positive or negative interpersonal relationships, it was not possible to respect the applicability assumptions of the chi-square test (since more than 80% of the expected values are less than 5) and therefore we used the Fisher exact test, but the hypothesis was not confirmed.

Finally, the fourth hypothesis was also not confirmed: there was no significant difference between female and male workers in the way of considering remote working.

Remote workers' well-being during lockdown

The well-being scores reported by the participants using the I COPPE scale - short form were also used to compare clerks' and scholars' experience during the lockdown. Univariate ANOVA showed that there are significant differences in overall well-being and in three specific domains: physical, psychological, and economic. Observing the means of the two compared groups, it appears that all these differences are in favor of the scholars. Table 3 shows that these reported on average higher levels of well-being than the clerks, in all the domains.

Tab. 3. Means, standard deviations and results of the univariate ANOVA

Well-being domain	Scholars		Clerks		ANOVA	
	M	SD	M	SD	F	p
Interpersonal	7.68	1.51	7.60	2.12	.037	.85
Community	6.39	1.33	5.78	1.61	3.66	.06
Occupational	6.92	1.70	6.69	1.51	.415	.52
Physical	7.15	1.36	6.45	1.85	4.09	.04
Psychological	6.88	1.64	6.06	2.15	3.97	.04
Economic	6.92	1.46	5.97	1.78	7.39	.00
Overall	7.31	1.39	6.40	1.89	6.78	.01

Note. The variable set as predictor was Role.

Discussion

Results showed that, during the lockdown due to COVID-19 pandemic, remote working allowed the continuity of work duties even in forced domestic confinement; it also met some needs, such as commuting problems, home-work balancing, transportation costs, and increased effectiveness in daily time organization, confirming what literature describes about its resources (Wheatley, 2012).

However, our results highlighted critical issues related to carrying out one's work remotely, in terms of affects and interpersonal relationships of workers.

As far as affects expressed by the workers interviewed is concerned, what emerges is that during the lockdown there were common feelings of anxiety and fear related to the emergency situation that involved Italy, like the rest of the world. There were also frequent references to a feeling of loneliness and isolation and to the consequent limitation in interpersonal and social interactions. It is also noteworthy that workers never referred to positive affects in interviews.

Regarding interpersonal relationships, the remote working did not fill the gap of wider social interactions in personal life. For many interviewees the possibility of being always available at home reduces their relational time with the family.

Our results also show that the emotional effects of remote working during the lockdown were not the same for all workers. The comparison made between descriptions of university clerks and scholars highlights differences in the affects felt by the two professional categories. Clerks, more than scholars, experienced anxiety, fear, and anger. Scholars, conversely, experienced deep introspection and feelings of loneliness and sadness. This difference could be related to the different duties and tasks of the two professions, which determine different styles of time and workload management involved in remote working (Kossek et al., 2012).

The loneliness of the scholars can be traced, according to their words, to the difficulty of maintaining interaction with their students. If transmission and construction of knowledge is the mattering goal for the university, remote teaching does not help the human and scientific interaction among students and professors, gnawing at the base the role of the universities and of the researchers.

As for the clerks, however, the feelings of anger, anxiety and fear seem linked to the potential negative consequences of the pandemic on their life in general and not closely connected to their work activity. In fact, it is noteworthy that in the words of the clerks, there is no reference to the dimension of relationships in the work context, such as references to interactions with office colleagues.

While for scholars remote working, despite its criticalities, was configured as a tool to maintain working relationships with students, for clerks this mode was only a means of allowing them to continue conducting their work in an even more positive way, given the organizational advantages. But for them, it was not a tool for maintaining relationships with colleagues.

From the textual analysis and from the comparison between the code groups it emerges that clerks experienced remote working more positively than scholars, but the comparison between the levels of well-being of the two groups seems to say something different. The results showed that clerks reported lower physical, psychological, economic, and overall well-being compared to scholars. Therefore, although scholars more often referred to remote working as a criticality, it did not affect their well-being. The clerks, on the other hand, who mostly highlighted the remote working resources, seem to have reported more negative consequences on their well-being.

This difference in well-being descriptions in the two groups of workers could be explained by referring to two factors: independent time management and social support.

According to Charalampous et al.'s (2019) literature review, many researchers highlighted that knowledge workers, i.e., those who do not produce something material and who have low levels of standardization of working times and products (Pyöriä, 2005), such as scholars, can benefit from remote work because this allows them to autonomously manage time and workspaces, with greater control over private life (Suh & Lee, 2017). Furthermore, the autonomy that it allows, increases job satisfaction (Hornung & Glaser, 2009) and reduces emotional exhaustion (Sardeshmukh et al., 2012).

On the other hand, routine workers, such as clerks, who have more fixed working hours and less decision-making autonomy, rely heavily on the social support of colleagues and of organization for their well-being (Sardeshmukh et al., 2012; Bentley et al., 2016). So according to this literature, we assumed that the absence of references to the workplace relationships observed in the words of the clerks, is the perception of receiving little social support from their colleagues, and consequently this could explain their lower levels of well-being.

In conclusion, a higher level of autonomy could protect the well-being of scholars, even if the smart working mode is not positively evaluated by them. Unlike, the lack of references to social support received by the colleagues does not imply a negative evaluation of the remote working by the clerks, but could negatively affect their well-being.

This data prompts us to question the importance of caring for interpersonal interactions in the work context, not only in the moment of emergency: our study highlights the need to protect and maintain the relational dimension with colleagues and students and all those who belong to the working context. The support of the social networks during the lockdown was in fact a fundamental resource that helped to counteract loneliness (Wang et al., 2020).

These considerations brought our team to consider that the core category explaining the narratives under examination is the *mattering role of human relations in work activities*; it focalized the need of relational connections among the university personnel.

Therefore, our data suggests to us that working remotely allows the accomplishment of work duties, but it is not able to also maintain wider relational bonds and bridging.

In this sense, setting up remote working could include also relational connection among the workers (Vayre & Pignault, 2014), aimed at protecting the emotional needs and experiences of workers, thus contributing to the protection of well-being and health of workers in the particular state of emergency.

Limitation and future research

The results of this study must be considered in the light of some limitations. First of all, it should be noted that our results cannot be generalized, given that our research involved a relatively small number of participants and that it is limited to the staff of a single institution. Further studies are therefore needed to confirm our results, on a national and international level also.

Moreover, the absence of a gender difference in the affects and relationships of remote workers could have been conditioned by the fact that females represent about 75% of the participants. So further research is needed to verify, in a more representative sample, whether there are differences related to specific variables such as gender, but also such as the professional roles, the child/children's age, their numbers.

Finally, it must also be considered that the data were collected in a specific emergency period, therefore we could hypothesize that the need for social connection is felt even more because it is not compensated by other interpersonal

relationships with family and friends, also forbidden by the emergency condition.

Conclusions

Most recent studies (Di Napoli et al., 2021; Marzana et al., 2021; Migliorini et al., 2021; Novara et al., 2021; Procentese et al., 2021), conducted in academic context, have highlighted the psychological impact of the new teaching modality adopted during the COVID-19 emergency. However, almost all studies have focused on evaluating the consequences of these new modalities on students only. Conversely, the present study has the innovative aspect of considering the emotional experience of both, scholars and university clerks during the pandemic.

This article also makes it clear that these new tools cannot be conceived only as aseptic modalities to replace or improve the classic modality of face-to-face work. Our results show that without adequate consideration of social relationships (with students and colleagues), remote working, despite its practical resources, can have negative effects on the well-being of workers.

Undoubtedly, further future research needs to evaluate the psychological effects that this way of working can have on individuals' well-being. But, in an applied approach, our data highlight the need to always protect, even during remote activities, the interpersonal relationship among the workers, finding ways that guarantee spaces and tools that pursue this purpose.

Author Contributions
The authors contributed equally to this manuscript.

Compliance with Ethical Standards

Conflict of interest
The authors declare that they have no competing interests.

Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethical approval
All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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UNIVERSITÀ EDITRICE

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© Author(s)
E-ISSN 2724-2943
ISSN 2723-973X

Psychology Hub (2022)
XXXIX, 1, 55-68

Article info

Submitted: 26 December 2021
Accepted: 16 February 2022
DOI: XXXX

The social pandemic from SARS-CoV-2 among Italian university students: a pilot study

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Abstract

The impact of restrictions on movement resulting from the SARS-CoV-2 pandemic may contribute to a disruption of mental health in young people during this era. In March 2021, lockdown restrictions were enforcing national policies of tackling the infectious disease across the globe. In the early stages of the vaccination rollout, public enquires on confidence to endure the virus pandemic have shown high levels of psychological distress. Under the above circumstances, 333 university students were asked to fill in an online-based survey on alcohol consumption, compulsive behavior as a loss of control over eating, fear of weight changes, excessive sleepiness and sleep deprivation. Text mining and multiple correspondence analysis were employed to analyze qualitative data on the lived experience against the occurrence of health-related behaviors. Data analyses have showed that the pandemic was associated with a mixed breakup of clustered lemmas based on sex, age, and relationship status. The extent to which the participants have reported a lower degree of satisfaction on living arrangements, intimate and family relationships were interpreted as meaningfully related with a more negative lived experience. Social confinement has resulted as an immediate action for mitigating a public health crisis from the SARS-CoV-2 disease. Incidentally, social measures to mitigate the virus transmission have sought to protect internal collapse of the health care systems by reducing the number of casualties. Conversely, these findings provide new evidence on the social determinants of health among youth and consequently highlight the potential interference from missing social interactions in the COVID-19 pandemic response.

Keywords: COVID-19; emotions; health behavior; social ties; university students.

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Introduction

The SARS-CoV-2 pandemic has exposed humanity to fear of contagion (Van Bavel et al., 2020) and prompted scientific endeavors in discovering and administering vaccines (Bloom et al., 2021). Infection risks, fatality rates, and disruption of national health services have led to a variety of policy responses to virus containment (Anderson et al., 2020; Manica et al., 2021), and some of those policies have caused significant hardship through their imposition of societal restrictions on their communities (Morgan et al., 2021).

Physical distancing, self-isolation, quarantine, hospitalization, and recovery from SARS-CoV-2 infections have resulted in urgent health burdens (Al-Aly et al., 2021) in the form of severe public costs — in particular, the onset, comorbidity, and exacerbation of physical and mental illnesses (Abrams & Szefler, 2020; Escandón et al., 2021; Nikoloski et al., 2021; Teach & Geme, 2021), whereby a sequela of the disease has emerged in terms of pandemic injustice in health care (Gilmore-Bykovskyi et al., 2021; Padmanabhan, 2021). Under these exceptional circumstances, the nature of social development and interaction among youth has been undermined by a temporary inability for individuals to share their interests with others, to experience social overtures and a complex understanding of peers induced by physical contact (Orben et al., 2020), and to respond to new challenges and have a more nuanced social perspective compared with a pre-pandemic social environment that was largely taken for granted (see Eisenberg & Fabes, 1992).

A perspective on which social meanings would emerge from the pandemic have referred to either personal or collective crises, involving health workers on the frontline (Marinaci et al., 2021), and stress-related clinical and pathological features over the fear of infection (Tambelli et al., 2021). While a pre-existing vulnerability to stress has supposed to influence individual and dyadic processes in response to the pandemic outbreaks (Pietromonaco & Overall, 2021), previous studies have found that anxiety and depression predicted hopelessness after a period of social isolation (Amendola et al., 2021) and milder symptoms of psychological distress were tied to optimism and hopefulness (Tommasi et al., 2020). On this basis it is argued that technological exaptation and evolution have helped to develop innovative solutions (Ardito et al., 2021). Specifically, digital applications and continuity have ensured regular education and social support, whereby a commercial use of distance education technologies has contributed to the ongoing debate on digital transformation and learning loss (Williamson et al., 2021). The pandemic disruption has in turn solicited a more-in-depth comprehension on the potential benefits of technology through the provision of telehealth services (Monaghesh & Hajizadeh, 2020). Furthermore, the unlimited usability features of digital tools have prompted an immediate response and threats, whereas unequal access was emerging in home-schooling and crisis of information spread on social media (Hantrais et al., 2021). Social isolation has led to an increased risk of nomophobia in young females (Caponnetto et al., 2021), alcohol and tobacco consumption (Dubey et al., 2020). In other terms, the virus breach has evoked fear-related emotions (Mazzuca et al., 2021) and has showed a lower ability to regulate those emotions in older adults (Pezzuti et al., 2021). To determine the presence of negative expectations and death-thought among the elderly would serve another purpose of protecting them from increased mortality risks related to age patterns and health status (Goldstein et al., 2021). From a developmental perspective of health in the life course (Halfon et al., 2014), the role of reported loneliness and a loss of structured in-person school have raised major concerns into the long-term effects on mental health (Power et al., 2020), including the emerging psychosocial consequences in adolescence (Wang et al., 2022).

One method of investigation for studying human development suggests that "a person is affected by aspects of their environments that previously have been made meaningful and therefore salient by that very person" (Cornejo et al., 2018, p. 2). As a potential tool of inquiry into the affective-sensitive dimension of psychological life, the affective nature of human social relationships with the environment can be assumed (Valsiner et al., 2016). In support of these sense-making theories, an individual's concrete actions in human-meaning construction serve to provide an affective personal sense. Nevertheless, the essential role of education for sense-making is somewhat considered intangible and hidden, a process through which the child development takes place in-between social settings and where the complexities of ever-evolving mechanisms have unveiled new acquisitions into physical and symbolic borders (Marsico, 2018).

While there is both prior and emerging evidence on the health-related risks of social deprivation (Morina et al., 2021), the long-term consequences from reduced physical contacts and societal restrictions remain largely unknown. Being and feeling socially isolated have previously shown to contribute with early mortality and relate to health risk behavior (Cacioppo & Cacioppo, 2014). Further evidence has showed that social development of youths has changed over the pandemic outbreaks, in terms of decrease in social interactions after school closed and increased depressive symptoms one year later (Gadassi Polack et al., 2021).

In the present study, we examined behavioral patterns within a university student population. Data collection was undertaken during the most severe level of restrictions on movement in Italy, which was precipitated by a national emergency declaration for SARS-CoV-2 infection rates. Regional lockdowns were in force since October 2020 with stop-and-go policies and recommended social distancing measures (Gros & Gros, 2021). In this context, our aim was to investigate what societal challenges emerged from self-reported measures and mixed methods analysis, as well as to explore which relationships, if any, were possible to infer as moderating certain social consequences of the pandemic. A major study focus was on how either behavior or social satisfaction was somehow related to the experiences of lockdown, and in what capacity the effects from a prolonged state of reported challenges have the potential to affect mental health of young people. Overall, the present study was aimed to explore and explain the complexity of the underlying psychosocial mechanisms that may trigger health-related behaviors, negative emotions and thinking during exceptional circumstances of limited physical contacts. For the main purpose of these findings, new evidence has shown how young people experienced the lockdown caused

by the 2019 coronavirus disease (COVID-19), and what the consequences of this exceptional situation have represented on their mental health.

Materials and Methods

Recruitment

A self-completion questionnaire designed for the general population was administered to a non-random and self-selected sample of university students via an electronic form. Ethical standards were met through data-protection regulations in compliance with the procedures on research integrity at the University of Salerno. Participants were enrolled from online classes taught at the Department of Human, Philosophical, and Educational Sciences and were provided an informed consent form for their voluntary participation. Respondents were informed that the study was led by the GRIS -Research Group on Social Interactions[1] with the goal of collecting anonymous data on alcohol consumption, social satisfaction, and lived experiences during the COVID-19 pandemic. No compensation was given for participation.

Key measures

For the demographic questions, we included an adaption of Item Four (Q1) from the *Fagerström Test for Nicotine Dependence* (Heatherton et al., 1991). Response options were: Non-smoking (0 points); 5 or fewer cigarettes per day (1 point); 6 to 10 (2 points); 11 to 20 (3 points); 21 to 30 (4 points); and 31 or more (5 points).

Under the second section of the questionnaire, participants were asked questions regarding their health-related behavioral patterns in the previous 12 months. The following items were included:
Q2. How frequently have you been sleeping more than necessary?
Q3. How frequently have you been sleeping less than necessary?
Q4. Have you ever been in dread of losing or gaining weight?
Q5. Have you ever had the feeling of being out of control with food intake?

Response options were: "Never" (0 points); "Rarely" (1 point); "Sometimes" (2 points); "Most of the Time" (3 points); and "Always" (4 points).

The sequential three items (Q6 to Q8) were from an Italian adaptation of the *Alcohol Use Disorders Identification Test Consumption* (Bush et al., 1998; Scafato et al., 2016), commonly known as the AUDIT-C. The bottom of the second section consisted of an additional four items (Q9 to Q12) from the *CAGE questionnaire* (Mayfield et al., 1974).

The third section, consisting of eight items (Q13 to Q20) from the *Social Satisfaction Questionnaire* (SSQ; Raistrick et al., 2007), used the previous 30 days as the reference period. A fourth and final section consisted of the following open-ended question: "Please describe your personal experience of the COVID-19 pandemic to date up to a maximum of 20 words. You may refer to your thoughts, emotions, or specific - actual or imagery happenings. Please answer in the next 5 minutes".

For practical reasons, questionnaire items about illegal or prescription drugs that might lead to prestige bias (Jiménez & Mesoudi, 2019) were not included. The Italian translation of the items was either from previous studies or involved a back-translation procedure. Participants were required to complete each item, apart from Question 2 of the AUDIT-C (Q7).

Participants

We recruited 333 respondents between March 29th and April 15th, 2021. The study sample consisted of 42 men and 291 women (Mean Age = 22.77, SD = 4.863). One respondent's questionnaire was excluded because the response was submitted after lockdown restrictions had been eased. Other demographic variables are presented in Table I, including invalid responses from level of education and corresponding year of graduation.

Tab. 1. Demographic Variables

Variable[a]	Sample (n)	Percent (%)	Population (N)	Percent (%)
Sex				
Male	42	12.6	1034	23.9
Female	291	87.4	3293	76.1
Age group				
≤ 22	182	54.7	1613	37.3
>22	151	45.3	2714	62.7
Level of education				
University degree	67	20.1		
High school	253	76.0		
Invalid	13	3.9		
Year of graduation				
Up to 2016	110	33.0		
2017 to 2018	35	10.5		
2019	71	21.3		
2020	102	30.6		
Invalid	15	4.5		
Relationship status				
Engaged	206	61.9		
Non-engaged	127	38.1		
Employment				
Employed	30	9.0		
Non-employed	303	91.0		

Note. a. Responses were treated as invalid data when they expressed a level of education more than high school and an expected year of graduation.

[1] https://sites.google.com/unisa.it/gris

Data analysis

Analysis was performed using the R software (R Core Team, 2020). Because men and older participants were under-represented in the observed sample, we used weighting values to manage imbalanced data sampling. A joint distribution for variables Sex and Age was retrieved from academic archives and applied to determine the scores of the post-stratification weighting scheme (Smith, 1991).

For the sole purpose of the Multiple Correspondence Analysis (Abdi & Williams, 2010), a reduced subspace was selected before using distance matrix among observations from SSQ and CAGE items as an input for the Hierarchical Clustering algorithm, and after applying Ward's criterion (Gordon, 1999). Subsequent analysis was carried out using the *FactoMineR* package (Lê et al., 2008).

The Correspondence Analysis (CA) technique was adapted to lexical tables (Benzecri, 1992) and employed for textual data mining (Feinerer et al., 2008). A preprocessing phase in data cleaning was used for text lemmatization to obtain the lexical table T (Lemma x Document), whose generic element tij represents the number of occurrences of the i-th form in the j-th document. Accordingly, words' occurrences from the open-ended question were investigated by applying the Term Frequency scaled by the Inverse Document Frequency scheme (TF-IDF; Salton & Buckley, 1988).

The need for data reduction was obtained through the Singular Value Decomposition (SVD) of data table, which resulted in the Lexical Correspondence Analysis (LCA). Lastly, the Clustering Analysis of lemmas was used to interpret homogeneous groups of words and to represent the common language expressed by respondents in the open-ended question. The final data set resulted in 160 rows (words) and 318 columns (respondents).

Results

Whenever lemmas presented an occurrence of twenty or more responses in the data set of the weighted sample, lemma-related words were listed and considered when interpreting and reporting results. Specifically, four main domains were grouped as follows:

1) Individual and relational domain: Including words such as *friend*, *experience*, *to be*, *family*, *to do*, *person*, *to carry*, *own*, *respect*, *life*, *to live*, *to want*.
2) Spatial-temporal domain: Including words such as *year*, *change*, *never*, *very*, *every*, *period*, *first*, *to succeed*, *always*, *same*, *much*, *time*, *to go out*, *to see*.
3) Emotional-related domain: Including words such as *anxiety*, *freedom*, *fear*, *power*, *to feel*, *to hope*.
d) Situational domain: Including words such as *home*, *what*, *covid*, *covid19*, *to stay*, *pandemic*, *part*, *situation*, *social*, *especially*.

Hence, a relevant area of inquiry examined meaningful associations between the vocabulary used by respondents and social satisfaction trajectories. Specific attitudes and beliefs in relation to the COVID-19 pandemic were revealed by items SSQ2 (Q14), SSQ7 (Q19), and SSQ8 (Q20). As a result of the analysis, the generic cell of the matrix T contained the TF-IDF score. Indeed, the lexical contingency table made by "words per documents" was very large and had few entries.

For analytical purposes, four contingency tables from the open-ended question were drawn by aggregating responses based on the following attributes of interest: a) Relationship Status and cross-classification of Sex and Age; b) SSQ2; c) SSQ7; and d) SSQ8. The first two dimensions of analysis showed a total data set inertia of 68.92% (a), 76.29% (b), 71.40% (c), and 74.21% (d), respectively.

Individual differences in sex, age, and relationship status

Ascending hierarchical classification of lemmas revealed four main clusters (see Figure 1). Cluster 1 included words such as *lockdown*, *experience*, *deprived*, *forced*, and *restriction*, sharing high frequency for the factors Female > 22 and "Engaged". Cluster 2 included words such as *contact*, *feeling*, *loneliness*, *sadness*, *study*, *love*, *change*, *person*, and *covid19*, related to Male > 22 and "non-Engaged". Cluster 3 included a common language sited in the center of the map. Cluster 4 included words such as *start*, *young*, *pass*, *mental*, and *lonely*, related to the Male ≤ 22 level.

The impact of living arrangements

Ascending hierarchical classification of lemmas revealed three main clusters (see Figure 2). Cluster 1 relates to respondents who were "satisfied" with living arrangements and included words such as *living*, *possible*, *new*, *begin*, *today*, *fortunately*, *freedom*, and *love*. Cluster 2 relates to the "somewhat satisfied" and "unsatisfied" categories and included words such as *relationships*, *loneliness*, *unmotivated*, and "*didn't know*". Cluster 3 identifies those who stated they were "very unsatisfied" with their own living arrangements (e.g., "*need everything*", *mental*, *realize*, *anxious*, and *anything*).

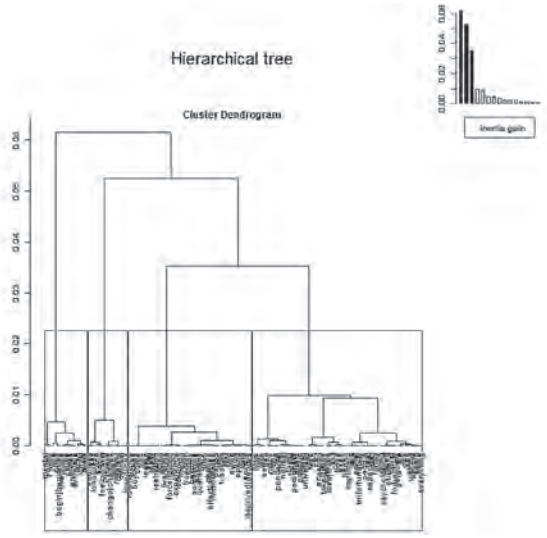
The role of a close and intimate relationship

Ascending hierarchical classification of lemmas revealed three main clusters (see Figure 3). Cluster 1 included words such as *begin*, *new*, *live*, *today*, *fortunately*, and *person*. Cluster 2 included words such as *totally*, *alone*, *affect*, *away*, and *sadness*. Cluster 3 included words such as *lonely*, *feeling*, *tired*, *contact*, and *work*. Cluster 1 identifies those who are "satisfied" with their own close relationship; Clusters 2 and 3 refer to "unsatisfied" or "very unsatisfied" respondents, respectively.

Family relationships and interactions

Ascending hierarchical classification of lemmas revealed four main clusters (see Figure 4). Cluster 1 included words such as *positive*, *good*, *loved*, *hope*, *soon*, and *live.* Cluster 2 lies in the center of the map, and it is not able to characterize a specific level of satisfaction for family relationships. Cluster 3 includes "very unsatisfied" respondents and is related to

Fig. 1. Factor Map of Clustered Lemmas for Relationship Status by Sex and Age



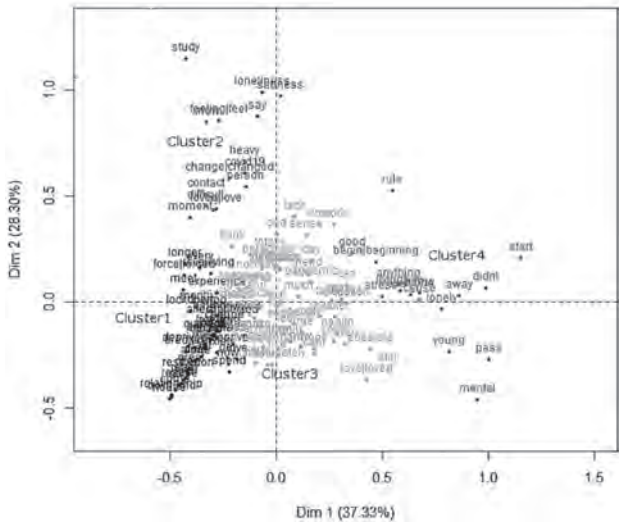
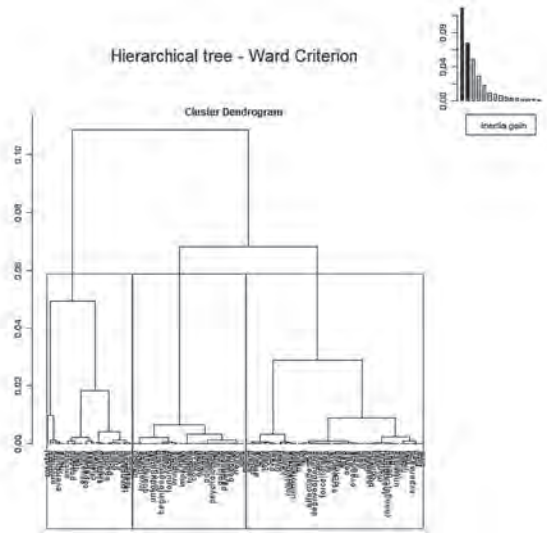


Fig. 2. Factor Map of Clustered Lemmas for SSQ2 (Q14)



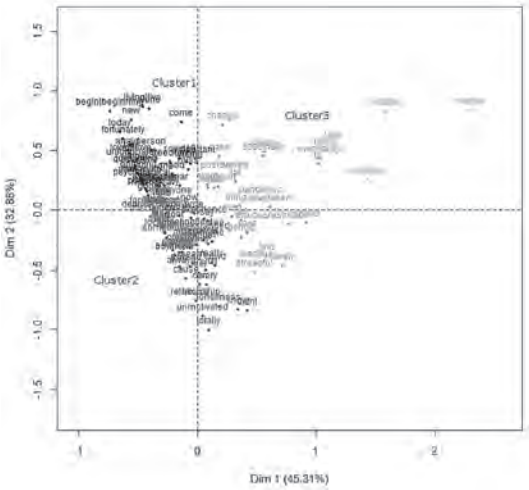
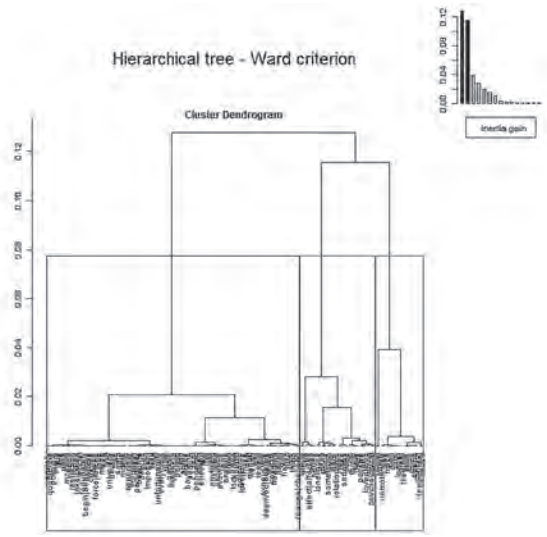


Fig. 3. Factor Map of Clustered Lemmas for SSQ7 (Q19)



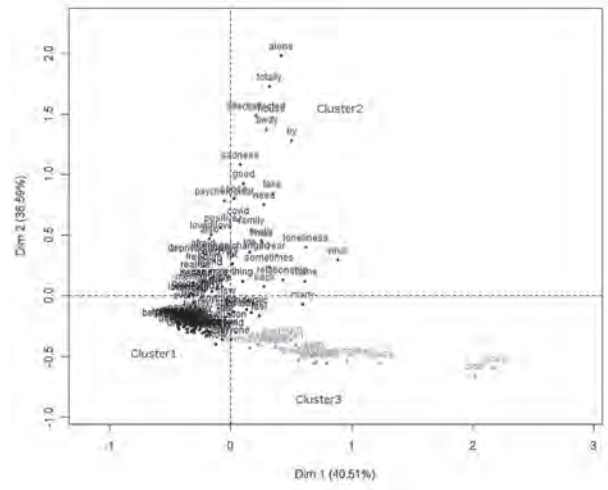
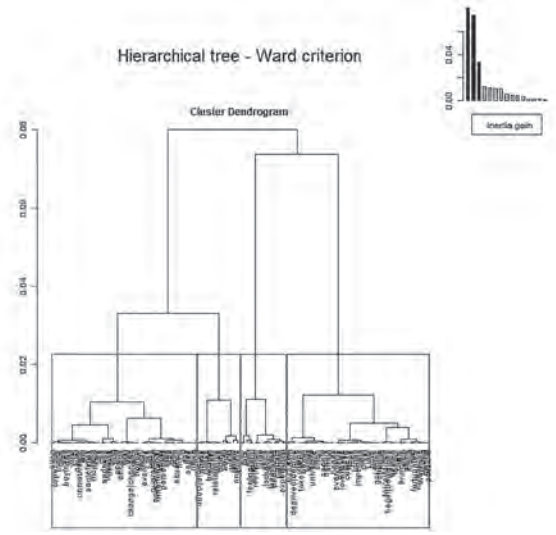
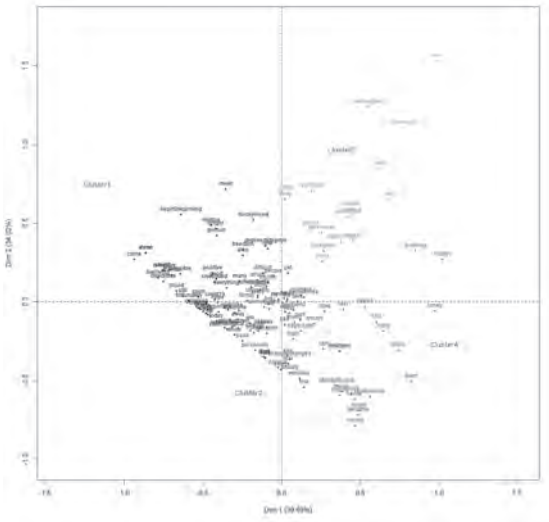


Fig. 4. Factor Map of Clustered Lemmas for SSQ8 (Q20)





words such as *feeling*, *love*, *stressful*, *sad*, and *lack*. Cluster 4 identifies those who are "somewhat satisfied" with family relationships and who used words such as *home*, *become*, *relationship*, *affect*, and *stress*.

Discussion

Preventing the spread of the virus has required taking essential precautions in the socio-political agenda, as well as moving the research efforts forward through the development of vaccines and novel treatments. The impact of the COVID-19 pandemic on social ties and health-related behaviours was observed during a single period in human knowledge and its meta-competencies, namely one's own understanding of experience used for describing and manipulating the surrounding world. Throughout a limited timeframe, unstructured health burden of the virus disease was reported in a sample of university students who were engaged in distance learning in the previous twelve months.

The long-term effects from lived experiences were measured in the year 2021 after lockdown regulations resulted in restrictions on movement, non-essential activities were suspended, and a nationwide night-time curfew was imposed. In the previous-year outbreaks, university students' social activities and functioning had been limited in the nationwide population except for late spring, summer, and throughout the Christmas holidays.

Using a multifactorial approach, this study suggested a complex interaction of underlying factors involved with both risks and protective factors of relationships and social confinement. The questionnaire responses from the observed sample showed that 20.1% of participants were smokers (Q1), 15.6% had been sleeping more (Q2), and 31.8% had been sleeping less (Q3) from "Most of the Time" to "Always." A total of 58.3% had been in dread of losing or gaining weight (Q4) and 27.6% (Q5) had been feeling out of control with food intake from "Most of the Time" to "Always".

The alcohol consumption questions (AUDIT-C; Q6 to Q8) regarding problem drinking showed that 34.8% of participants reported drinking six or more drinks at least less than/once per month. The CAGE questions (Q9 to Q12) resulted in 23.7% of participants being screened as positive for at least one question. Likewise, the items from Q13 to Q20 showed a high prevalence of social dissatisfaction (Mean SSQ: 13.697, SD: 4.019) with 67% of participants belonging to a category requiring further clinical attention (SSQ score < 16; Raistrick et al., 2014).

In general, the lockdown restrictions have undoubtedly changed both individual and communities, and a varying degree of responses have elicited negative emotions and cognitions along with social dissatisfaction. In this study, a pattern of composite health-related issues was found through either textual analysis or selected-response items. The major results have showed similarities with distress-related levels that were found throughout the COVID-19 pandemic survey on the Generation Z of US citizens (American Psychological Association, 2020).

Youth development has appeared undermined in its emotional and social domains, and it has been adversely expressed by those who have reported dissatisfaction with living arrangements, intimate relationships, and presence of family. Overall, text analyses for those sub-groups have identified the prevalence of negative terms over the pandemic experience. In our analysis, lemmas have represented unique words that have been produced in the language used by respondents, including a series of connotated as negative and neutral words such as, "*need everything*", *tired*, *anxious*, *contact*, *work*, *restriction*, *lockdown*, *lack*, *lonely*, *affect*, *time*, *sadness, stressful, covid.*

Given the cross-sectional nature of the study, it was clearly not possible to estimate any differences on the occurrence of behavioral risks compared with a pre-pandemic observation. Current and retrospective measures were mixed on data collection, with the purpose of investigating which roles would have played restrictions on movement, limited in-person interactions, infection transmission and disease.

Female respondents have accounted nearly seven times more the number of male respondents, whilst post-stratification

procedures have showed female students have accounted approximately three times more the number of male students in the population of university students. As reported above, the study sample has included young university students (Mean Age: 22.77, SD = 4.863). Indeed, a total of 76% of study participants has reported to have completed high school and 62.4 % have graduated in the previous four years.

Based on the analysis of demographic variables, the largest sub-group was referring to young undergraduate students enrolled in education studies, which range from three to five years in length according to the Italian university system. Additionally, almost one out of three participants had completed a study programme in 2020, either at university or high school, whereas more than one in three have reported non-engaging in an intimate relationship and less than two in three have reported engaging themselves. Furthermore, non-employed participants have accounted approximately ten times more the number of university students who have reported being employed.

Further to the above limitations, it should be acknowledged for the sake of clarity that it has been beyond our study aims to discriminate between direct and indirect implications of COVID-19. Future research is needed in order to examine developmental processes involved with the "social pandemic", as well as to investigate physical and mental health by using different sampling methods, epidemiological modelling of infection and disease, clinical interviews, and cross-cultural data collection over lockdown and social distancing measures.

According to our findings, the acquisition of relational competencies in adolescence and young adulthood should be investigated wherever social connections from close relationships would have been disrupted or absent. The present study is even raising new challenges ahead on how to help university students to adopt reflective awareness strategies (Savarese et al., 2019) that would consider comorbidities and deal with the occurrence of overlapping health issues. Our results may be supportive for developing and encouraging the adoption of novel prevention measures, evidence-based interventions, and psychosocial programs.

Previous evidence suggests that social relationships would help to recover from mental illness (Schön et al., 2009). Indeed, youth development and health-related concerns over the pandemic need to be re-considered in terms of vulnerabilities and resources, especially for young people where unemployment, economic and social disadvantages have been pre-existing and may constitute potential risk factors other than the pandemic itself. In the light of an emerging evidence, promoting physical and mental health among young people was reported to be crucial (Hawke et al., 2021; Lehmann et al., 2022; Schwartz et al., 2021). Therefore, an increasing availability of resources and reinforcing community efforts should consider how supporting sustainable intervention policies will have to mitigate the "side effects" of the pandemic. In the post-COVID era, teaching coping strategies and enhancing emotional competencies should aim to help at creating health promoting environments and improving health equity.

Author Contributions

Claudio Russo and Giuseppina Marsico contributed to the study conception and design. Giuseppe Giordano reviewed materials and methods and performed data analysis. All authors approved the final version of the manuscript.

Compliance with Ethical Standards

Conflict of interest

The authors declare there are no relevant financial or non-financial interests in any material discussed in this article. Claudio Russo is on a personal employment contract supported by the Campania regional plan 2016 DCA n. 86 for addiction prevention and recovery.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the University of Salerno and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent

Informed consent was obtained from all individual adult participants. Research information included an explanation of the research, the voluntary nature of the study, the right to withdraw, and the principal investigator's name and contact details.

Supporting Information

Further information on participants, data analysis, and results is available for this article.

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Supporting information

Participants

A total of 29 duplicates were detected and responses acknowledged as the result of an online system overloading, whereby the number of respondents exceeded a system capacity to acquire multiple responses at once. The entire online form was not accessible to participants beginning April 23, 2021.

Data analysis

First, a self-selection bias was addressed by comparing sampling quota from a set of demographic variables and matching the corresponding values observed in the population of university students enrolled at the Department of Human, Philosophical, and Educational Sciences.

The sampling units were weighted according to the post-stratification scores. The latter were computed to balance a sampling bias with respect to the population quota (Table I). In order to demonstrate the application of the weighting procedure, the post-stratification weighting scheme for younger women is shown below:

$$942/4327 = x/333 \qquad \text{if } x=72, \text{ score is } 72/156 = 0.46$$

Based on the above equation, younger women individually accounted for a weight of 0.46. Similar calculations generated a weighted value of 1.34 for older women, 1.99 for younger men, and 1.75 for older men.

Response values from item Q1 were grouped in two single categories (Smoking vs. Non-Smoking). Questionnaire items from Q2 to Q5 were encoded separately in either "Never to Sometimes" or "Most of the Time to Always" categories. Functional areas of the AUDIT-C (Q6 to Q8), CAGE (Q9 to Q12), and Social Satisfaction Questionnaire (SSQ; Q13 to Q20) were computed independently. The Q8 item was used to assess problem drinking, with "Never" responses resulting in placement in a "Negative" category and the remaining response values being placed in a "Problem Drinking" category. Items from Q9 to Q12 were considered either "Negative" with all "No" response values, or "Positive" with one or more "Yes" response values. Response values from SSQ items Q13 to Q20 were scored and grouped in either clinical (< 16) or non-clinical (> = 16) categories. Nearly one in four participants answered the Q7 item (24.3%).

Multiple Correspondence Analysis on SSQ and CAGE

The data set contained 333 observations and three (CAGE: Q9 to Q11) plus eight (SSQ: Q13 to Q20) variables with a total of thirty-eight levels (3x2+8x4=38). The variable CAGE4 (Q12) was considered inactive and projected as a supplementary variable in the MCA because of rare observations from the level "EyeOpener_Yes".

In Figure 1, low contribution to the inertia of the first factorial plane (18.80%) was shown for CAGE variables. However, it is common that points close to the plot origin represent common modalities (i.e., response categories) with a lower capacity for discriminating among observations. In accordance with Figure 1, the most important variables were SSQ8 (Q20), SSQ2 (Q14), SSQ1 (Q13), SSQ4 (Q16), and SSQ7 (Q19).

In Figure 2, response categories are represented on the MCA factorial plane. Each variable was used to discriminate answers resulting in the classic horseshoe effect. On the top left portion of the plot, the "Satisfied" categories for SSQ6, SSQ5, SSQ4, and SSQ3 variables are presented. The most common answers are shown when moving toward the plot origin. In particular, the modalities "No" for all CAGE variables and the "Unsatisfied" and "Very Unsatisfied" responses for variable SSQ5 were close to the plot origin. At the bottom of the plot, middle categories of "Somewhat Satisfied" for SSQ1, SSQ2, SSQ7, and SSQ8 are shown. At the top right area of the plot, the "Unsatisfied" and "Very Unsatisfied" responses are drawn along with the modalities "Yes" for CAGE1, CAGE2, and CAGE3.

Tab. 1. Original Frequency Table and Weighted Frequency Table

Observed sample	≤22 y/o	>22 y/o	Total	Population	≤22 y/o	>22 y/o	Total	Weighted Sample[a]	≤22 y/o	>22 y/o	Total
Female	156	135	291	Female	942	2351	3293	Female	72	181	253
								Weight	0.46	1.34	
Male	26	16	42	Male	671	363	1034	Male	52	28	80
								Weight	1.99	1.75	
Total	182	151	333	Total	1613	2714	4327	Total	124	209	333

Note. a. The weighted sample estimates the corresponding quota observed from the population data for Sex and Age by applying the procedure of the post-stratification scores.

Fig. 1. Plot Representation of Variables on the First Factorial Plan

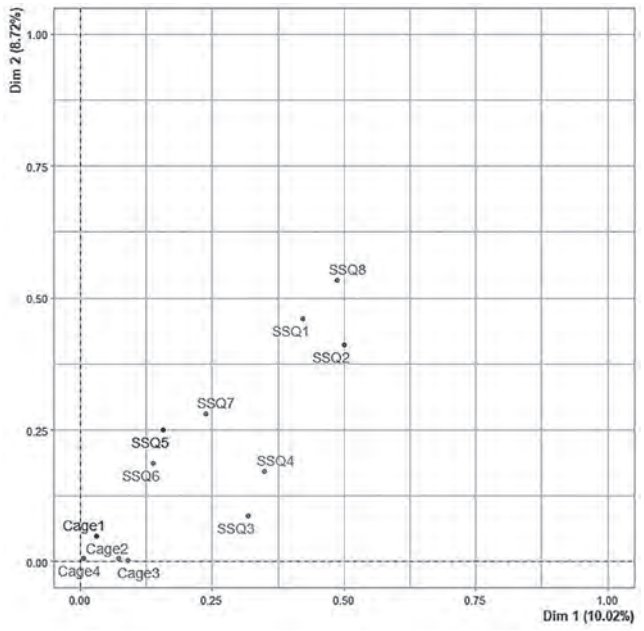
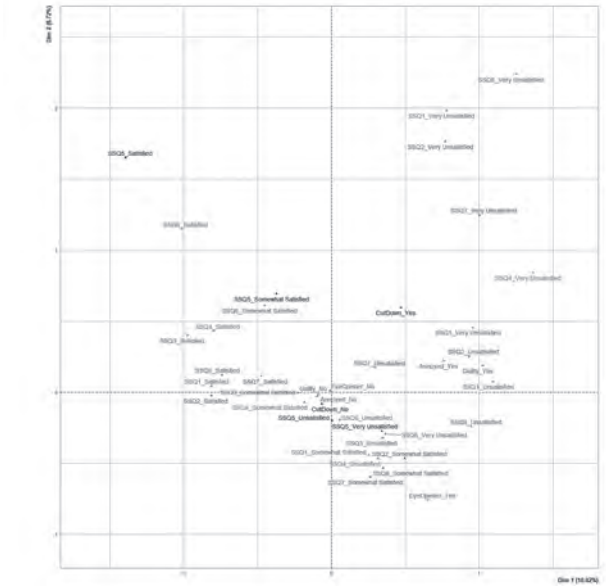


Fig. 2. MCA Map of the Response Categories on the First Factorial Plane



Based on the MCA results, we carried out the Cluster Analysis through Ward's criterion. Three main groups of respondents were clustered from the available response categories (Table II); Cluster 1: The Satisfied; Cluster 2: The Somewhat Satisfied; and Cluster 3: The Unsatisfied and the "CAGER" (CutDown_Yes, Annoyed, Yes, Guilty_Yes).

Tab. 2. Characterization of the Clusters by Response Categories

Attribute-Levels	Cluster 1	Cluster 2	Cluster 3
Cage1=CutDown_No	1.45	1.27	-3.23
Cage1=CutDown_Yes	-1.45	-1.27	3.23
Cage2=Annoyed_No	3.28	0.75	-4.28
Cage2=Annoyed_Yes	-3.28	-0.75	4.28
Cage3=Guilty_No	2.73	-0.33	-2.47
Cage3=Guilty_Yes	-2.73	0.33	2.47
SSQ1_Satisfied	11.10	-6.42	-5.74
SSQ1_Somewhat Satisfied	-7.22	8.89	-3.13
SSQ1_Unsatisfied	-3.60	0.07	3.48
SSQ1_Very Unsatisfied	-3.22	-4.55	8.18
SSQ2_Satisfied	11.80	-6.45	-5.92
SSQ2_Somewhat Satisfied	-8.63	9.23	-2.16
SSQ2_Unsatisfied	-3.01	-0.23	3.28
SSQ2_Very Unsatisfied	-3.50	-3.81	7.73
SSQ3_Satisfied	6.09	-4.65	-1.76
SSQ3_Unsatisfied	-3.88	4.08	-0.77
SSQ3_Very Unsatisfied	-3.46	-1.10	4.85
SSQ4_Satisfied	6.18	-5.75	-0.30
SSQ4_Unsatisfied	-5.26	6.22	-2.09
SSQ4_Very Unsatisfied	-4.61	-1.08	5.49
SSQ5_Satisfied	3.73	-4.74	1.00
SSQ5_Somewhat Satisfied	3.43	-5.16	2.35
SSQ5_Unsatisfied	-0.85	2.52	-2.40
SSQ5_Very Unsatisfied	-3.68	3.25	0.12
SSQ6_Satisfied	2.77	-3.30	0.78
SSQ6_Somewhat Satisfied	5.03	-5.45	0.82
SSQ6_Very Unsatisfied	-4.34	4.23	-0.46
SSQ7_Satisfied	6.62	-3.84	-3.04
SSQ7_Somewhat Satisfied	-5.19	7.36	-3.75
SSQ7_Unsatisfied	-0.37	-1.44	2.29
SSQ7_Very Unsatisfied	-2.90	-3.28	6.68
SSQ8_Satisfied	10.4	-6.35	-4.25
SSQ8_Somewhat Satisfied	-6.87	8.98	-3.80
SSQ8_Unsatisfied	-3.41	1.71	1.44
SSQ8_Very Unsatisfied	-4.09	-6.41	10.50

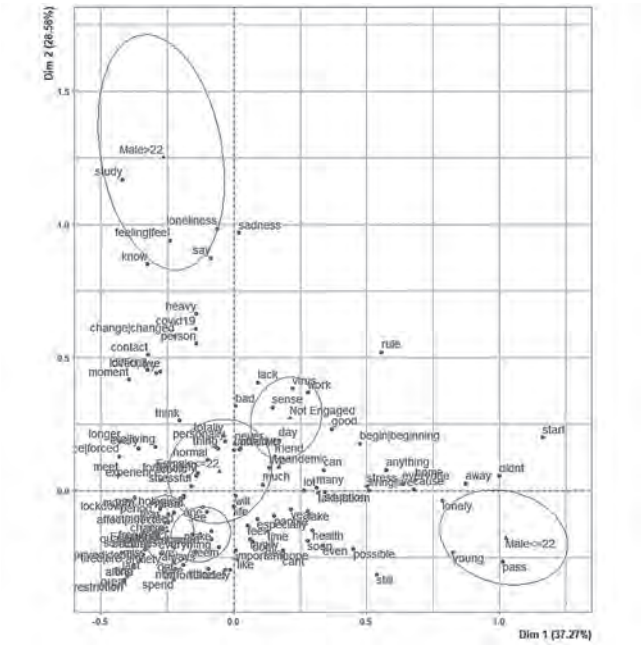
Correspondence Analysis of Lexical Tables

The main purpose of applying CA to a lexical table is to highlight the latent structure underlying the text. The CA procedure involves dimensionality reduction of the linguistic variables or documents, namely, the responses we collected from the open-ended question.

Data 1

The first data set is the lexical table holding the scores for the 160 lemmas used by respondents aggregated in six categories: "Engaged", "Not Engaged", Female < = 22, Female > 22, Male < = 22, and Male > 22 (Figure 3).

Fig. 3. Factorial Map of Lexical Correspondence Analysis on Sex, Age, and Relationship Status

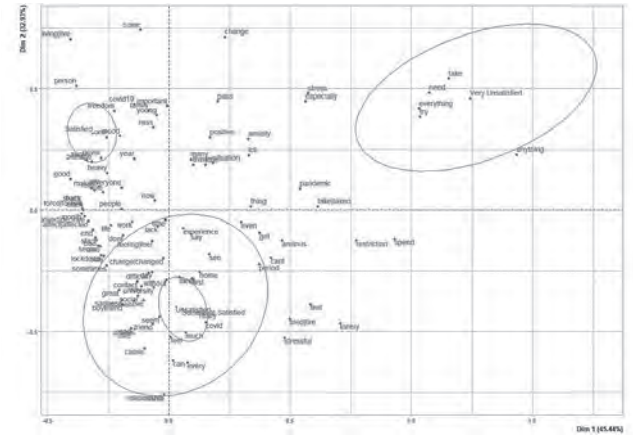


The words *young*, *lonely*, *away*, *pass*, *stress*, *home*, and *start*, and the group Male < = 22, are highly correlated with the first dimension. These words could therefore summarize Dimension 1. Dimension 2 opposes words such as *study*, *feeling*, *loneliness*, *know*, and *sadness* (to the top of the graph, characterized by a strongly positive coordinate on the axis and related to Male > 22) to words characterized by a strongly negative coordinate on the axis such as *stressful*, *fear*, *miss*, *anxiety*, and *deprived* related to Female and "Engaged" participants.

Data 2

The second data set holds the scores of the 160 lemmas aggregated according to the four satisfaction levels of the SSQ2 item (Figure 4). Dimension 1 opposes words such as *need*, *everything*, *try*, *take*, and *anything*, and less close: *stress*, *pandemic*, and *restriction* (to the right of the graph, characterized by a strongly positive coordinate on the axis) associated with the "Very Unsatisfied" level, to words such as *family*, *freedom*, *person*, *important*, *family*, *young*, *and good* (to the left of the graph) associated with the "Satisfied" level. "Unsatisfied" and "Somewhat Satisfied", which are the middle items on the scale, are related to people sharing a common language characterized by lemmas with negative coordinates on the second dimension.

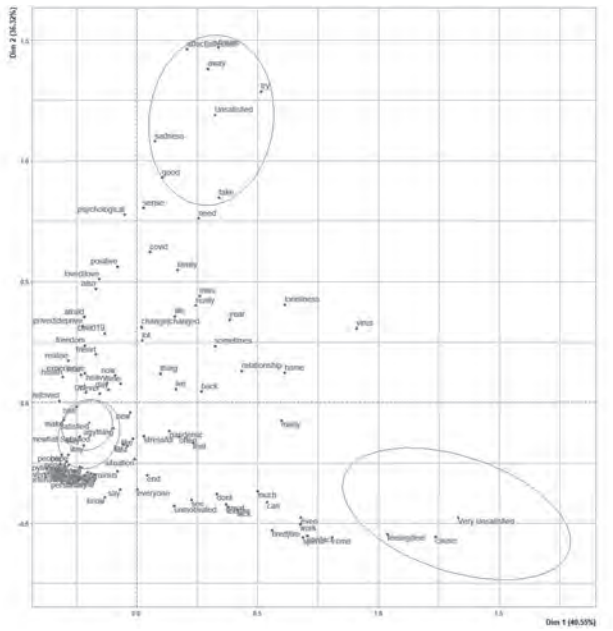
Fig. 4. Factorial Map of Lexical Correspondence Analysis on SSQ2 (Q14)



Data 3

The third data set holds the scores of the 160 lemmas aggregated according to the four satisfaction levels of the SSQ7 item (Figure 5). The first dimension opposes words such as *feeling*, *virus*, *loneliness*, *home*, *work*, and *tired* (to the right of the graph) to words characterized by a negative coordinate on the axis (to the left of the graph). The second dimension opposes the factors "Somewhat Satisfied" and "Satisfied" (on the bottom side, very close to the origin) related to commonly used words to the "Unsatisfied" factor (on the top side) related to words such as *house*, *affect*, *away*, *sadness*, *try*, *good*, and *take*.

Fig. 5. Factorial Map of Lexical Correspondence Analysis on SSQ7 (Q19)

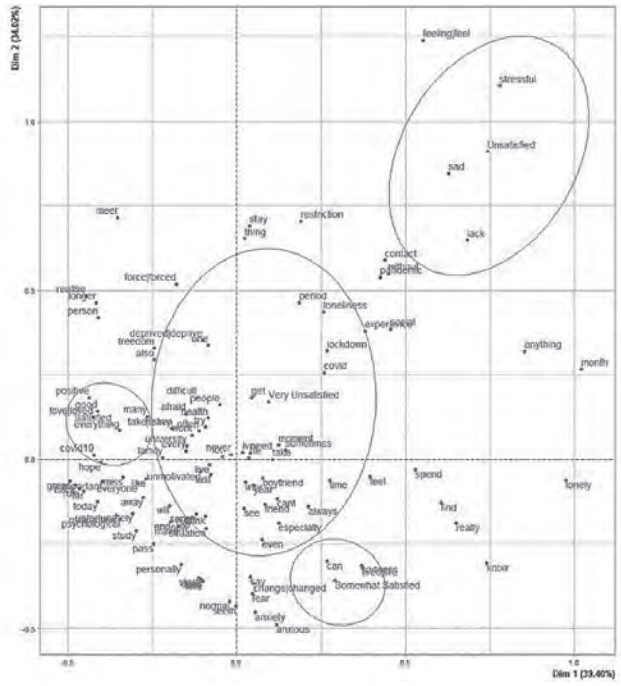


Data 4

The fourth data set holds the scores of the 160 lemmas aggregated according to the four satisfaction levels of the SSQ8 item (Figure 6).

Here it appears that most of the language used expresses a feeling consistent with "Very Unsatisfied". Words characterizing the unsatisfied groups included *stressful*, *sad*, *lack*, *restriction*, *pandemic*, *(without) contact*, *period*, *loneliness*, and *lockdown*. On the left side, the "Satisfied" group uses encouraging connotations regarding COVID-19 such as *good*, *positive*, *hope*, and *love*.

Fig. 6. Factorial Map of Lexical Correspondence Analysis on SSQ8 (Q20)



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© Author(s)
E-ISSN 2724-2943
ISSN 2723-973X

Psychology Hub (2022)
XXXIX, 1, 69-80

Article info

Submitted: 22 October 2021
Accepted: 17 February 2022
DOI: XXXX

Effects of Anti-COVID Face Masks on Contagion Risk Evaluation: Wearing a Mask Intensifies Moral Judgments Towards Risky Behaviors

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Abstract

We investigated the effects of complying with measures aimed at offsetting the risks of spreading COVID-19 on the evaluation of risks themselves. We concentrated on the effects of wearing anti-COVID faces masks, representing one of the most widespread, effective, and debated preventive measures to deal with the pandemic. From the individual's perspective, wearing face masks should be justified as far as there are prudential or moral reasons to avoid the risks posed by COVID-19. Consequently, wearing masks without accepting these reasons is a condition that can trigger inconsistency. The attempt to prevent or reduce such inconsistency should thus promote attitude change with respect to the risks associated with the pandemic, including altering beliefs and emotions about the risks themselves or about the morally appropriate behaviors related to these risks. Based on cognitive dissonance theory (Festinger, 1957) and self-perception theory (Bem, 1967; 1972), we hypothesized and tested whether wearing an anti-COVID face mask causes people to be more sensitive to the risks of the pandemic, perceiving a higher risk of contagion and showing stronger respective emotions and cognitions. To test this prediction, an experiment (N = 118) measured the attitudes toward risks associated with COVID-19 of three randomized groups of participants: a group wore face masks, a second one received no specific instructions/requests, and a third one wore an item of clothing unrelated to the pandemic. Results showed an effect of mask-wearing on the moral judgments towards behaviors at risk of COVID-19 contagion, with no significant results for other morality-unrelated attitudes towards risks. Theoretical and practical implications of these results are discussed.

Keywords: COVID-19; cognitive dissonance; self-perception; risk perception; face masks; morality.

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> Is that which is holy loved by the gods because it is holy,
> or is it holy because it is loved by the gods?
> Plato, *Euthyphro* 10a

In 2020, during what has been described as "the largest psychological experiment ever" (van Hoof, 2020), face masks proved to be effective in limiting the spread of the coronavirus pandemic so that they were made mandatory in many countries (Eikenberry et al., 2020; van Doremalen et al., 2020; Leung, 2020). Surgical masks and other types of face masks therefore rapidly became a ubiquitous element in people's lives, to the point of emerging as a universal symbol of the fight against COVID-19 (Goh et al., 2020; Pestana & Pestana, 2020; Pushpa & Ravi, 2021), as well as an indicator of moral seriousness (Hamilton, 2020).

Behavioral science provides a multiplicity of insights into crucial issues related to the management of the pandemic, for example with regards to threat and risk perception and how social norms affect people's risky behaviors (Bavel et al., 2020). Since understanding what motivates people to adhere to anti-COVID public measures is fundamental for effective policymaking (Toxvaerd, 2020), several recent studies have tried to identify the psychological factors behind the compliance with such preventive measures, including the wearing of face masks capable of limiting the virus spreading (e.g., surgical masks, FFP2 masks, and N95 respirators). In addressing this question, scholars pointed out that the perception of the risk of contagion might be one of the main motivations to use anti-COVID masks (Brewer et al., 2007; Webster et al., 2020; Kamran et al., 2020; Shewasinad Yehualashet et al., 2021; Milad & Bogg, 2021). In so doing, however, while the hypothesis of a causal relationship from risk perception to wearing protective masks has been frequently explored, the opposite relationship has been neglected.

Based on cognitive dissonance theory (Festinger, 1957) and self-perception theory (Bem, 1967, 1972), we suggest that the adoption of preventive measures, such as the wearing of anti-COVID face masks, can cause people to be more sensitive to the pandemic's risks, thus perceiving a higher risk of contagion and showing respective emotions and cognitions. Can wearing a mask influence the perception of risks associated with the pandemic? What are the consequences of wearing a mask on people's attitude towards behaviors at risk of contagion? And, if proved to be true, what implications could this relationship have for public health?

The Psychological Effects of Wearing a Mask: Complying with Anti-COVID Measures Should Intensify Contagion Risk Perception to Maintain Consistency

According to cognitive dissonance theory (Festinger, 1957), inconsistency between relevant cognitions and/or behaviors causes the individual to experience an uncomfortable state of arousal that is called cognitive dissonance (i.e., cognitive dissonance state, CDS; see Vaidis & Bran, 2018). This goal-oriented state motivates the person towards reestablishing consistency. Therefore, when two actions or ideas are not psychologically consistent with each other, the person is expected to do all in their power to change cognitions and/or behaviors until they become consistent. Strategies for minimizing this negative affective state include—but are not limited to—*adapting cognitions to actions*. Thus, since people strive for consistency, we should expect that wearing a protective mask induces people to intensify their beliefs that there is a risk outside to avoid, increasing the perception of being exposed to this risk and respective cognitions (e.g., stronger moral judgments against behaviors exposed to that risk).

The idea of a large-scale wave of cognitive dissonance due to restrictive measures for COVID-19 has already been suggested by some authors (e.g., Schippers, 2020). If this involves risk perception, its consequences would be massive. For example, in a study on the topic (Kachanoff et al., 2021), it has been established that the perception of being threatened by the pandemic correlates with higher distress and lower well-being, greater negative affects, more intrusive thoughts about the pandemic, more anxiety, diminished life satisfaction, but also an increased self-reported adherence to nonrestrictive healthy behaviors (i.e., handwashing). However, no previous study has ever tested this hypothesis in experimental settings. By contrast, cognitive dissonance has been documented in a wide variety of cases, including medical ones (e.g., Ent & Gerend, 2016). Further, many experiments have confirmed one of the theory's main predictions for which cognitive dissonance reduction can be pursued by *adapting attitudes to behaviors* (for a review, see McGrath, 2017). In a frequently mentioned example, cognitive dissonance can draw a smoker who is aware of the risks of smoking cigarettes to the cessation of this unhealthy habit. This would be the most intuitive prediction, like that of coronavirus risks perception predicting people's compliance to anti-COVID measures. Still, smoking is not prevented by risk awareness alone. This is because cognitive dissonance can often be managed merely at the cognitive level, with *no need for behavior change*. In this sense, the person can reduce or prevent the occurrence of this negative affective state by simply changing one of the dissonant cognitions or by adding new cognitions that can accommodate the incoherence between preexisting thoughts and actions. In the case of nicotine addiction, for instance, a smoker who is currently smoking a cigarette can prevent or manage their cognitive dissonance by weakening their belief that smoking is harmful (Gibbons et al., 1997) or adopting a different discount rate to compare long-term harms (e.g., smoking causes cancer) to short-term rewards (e.g., smoking is relaxing).

Even though the literature on cognitive dissonance and risks has mainly focused on how risk awareness could be decreased to fit in with risky behaviors, cognitive dissonance reduction is not only elicited by the negative consequences of actions and habits. In many circumstances, the perceived value of an activity can also be increased to offset dissonance, as explained by the paradigm of effort justification. Individuals who, for instance, accept to incur a high cost to join a group will consequently increase the value they attribute to that group so that this effort will be coherent with their achieved goal (Aronson & Mills,

1959). Regarding behaviors aimed at preventing risks, those who engage in them should experience dissonance as far as they have reasons to believe that the risks do not justify their effort to reduce them. Wearing face masks is undoubtedly an effortful practice due to its intrinsic discomfort and unpleasant interference with everyday activities (e.g., Georgi et al., 2020; Cheok et al., 2021; Lloyd & Mansfield, 2021; for a systematic review, see Bakhit et al., 2021). This effort is justified to the extent that COVID-19 poses a substantial threat to our society and ourselves that we ought to counteract. Therefore, cognitive dissonance theory supports the prediction that wearing a mask will enhance people's psychological sensitivity to the dangers of the pandemic.

Self-perception theory (Bem, 1967, 1972) similarly emphasizes people's need for coherence between behaviors and cognitions. This theory is known for overturning the commonsense assumption that cognitions precede behavior and are transparent to the subjects that act on their basis. On the contrary, self-perception theory argues that people have only indirect access to their attitudes, which are instead *inferred from their own behavior*—similarly to how one can infer the mental states of others. This theory generated predictions in different domains and has been tested by numerous studies (e.g., Aronson & Carlsmith, 1963; Uranowitz, 1975; Egan et al., 2010). Moreover, the effect of self-perception is not confined to introspective reports, but it can influence actual behaviors or, at a deeper level, even the experience of emotions (Laird, 1974, 2007) and the weight of implicit biases (Ito et al., 2006).

To date, no experiment has applied self-perception theory to study the psychological effects of wearing medical face masks. However, the effects that the specific meaning of clothes has on how people behave—which can also be explained in terms of self-perception—have already been explored extensively. Research reported, for instance, that wearing a laboratory coat boosts selective attention in a Stroop task (Adam & Galinsky, 2012), formal clothes increase self-attribution of authoritativeness and competence (Karl et al., 2013), and luxury brand names can incline people toward more conservative political views (Wang & John, *working paper*). This strengthens our prediction that wearing a mask, in virtue of its symbolic value, can alter people's attitude toward risks in a way coherent with such behavior.

The Present Research

Based on cognitive dissonance theory (Festinger, 1957) and self-perception theory (Bem, 1967, 1972), we hypothesized that wearing an anti-COVID face mask causes people to be more sensitive to the risks of the pandemic, thus perceiving a higher risk of contagion and showing stronger respective emotions and cognitions. To test our hypothesis, we administered an online questionnaire about the risks related to the pandemic to a sample of adults. Specifically, we assessed how they evaluated the risk of COVID-19 contagion in three different experimental conditions: While wearing a mask (mask-up condition), while wearing nothing (no-instruction control), and while wearing something similar but different from a mask (comparable control). We expected participants in the mask-up condition to show higher levels of risk evaluation than all their counterparts (e.g., a stronger risk perception, tougher moral judgements towards risky behaviors).

Since risk evaluation is not a unitary construct, we developed a questionnaire that included five subscales of risk evaluation that were specific for the COVID-19 pandemic, in order to capture the most relevant dimensions of this concept within our specific context of interest. Based on previous literature on risk perception (e.g., Trumbo et al., 2016), what inspired these *ad hoc* scales were the distinction between a purely cognitive, an emotional, and a moral dimension of risk evaluation. We also differentiated the probability and magnitude of risks and distinguished between different targets of the potential damages (i.e., the participant vs. other people). The resulting subscales assessed the following five dimensions of risk evaluation: (a) risk magnitude (i.e., perceived magnitude of the consequences of contagion); (b) contagion probability (i.e., the perceived probability of getting infected); (c) collective risk (i.e., risks for society); (d) emotiveness (i.e., expected emotions in case of contagion); and (e) morality (i.e., moral judgments against behaviors at risk of contagion; see Table 1).

Method

Participants, Design, and Sensitivity Power Analysis

In early March 2021, 146 Italian adults[1] (76% females; *M*age = 28.47 years, *SD*age = 11.36) volunteered in a one-factorial between-subject experiment. Participants were recruited online through the publishing of brief invitation posts on several social media pages (e.g., Facebook pages/groups, Instagram profiles, and informal WhatsApp group chats). The wearing of an anti-COVID-19 face mask was manipulated among three experimental conditions, including a mask-up condition and two controls (*Manipulation of Face Mask Wearing*: mask-up vs. no-instruction control vs. comparable control). Participants' attitudes to risks related to the COVID-19 pandemic served as the dependent variable.

Prior to our data collection, we inserted a control question in our procedure intended to ensure that participants followed instructions, to exclude unreliable data before the analyses (*exclusion criterion*). At the end of the study, participants had to confirm whether they followed instructions or not.

[1] Unfortunately, since no previous studies ever investigated the effect we hypothesize in the present paper, we could not determine our sample size according to a critical effect to be included in an a priori power analysis. Thus, we simply planned to recruit a sample size of at least 40 participants per cell—i.e., a sample size adequate to conduct pilot experiments—to test our hypothesis for the first time and, at least, be able to guide future studies by providing new critical effect sizes for their a priori power analyses (e.g., Hertzog, 2008).

Those who responded to the control question with an answer incongruent with their condition were removed and excluded from the analyses (10 subjects from the mask-up group and 18 from the comparable control). With a final sample of 118 participants (73.7% females; *M*age = 28.94 years; *SD*age = 11.77), the study had 80% power to detect an effect size of at least $f = .29$ in omnibus tests in one-way ANOVAs (i.e., $\alpha = .05$; numerator df: 2; denominator df: 115; number of groups: 3; non-centrality parameter $\lambda = 9.89$; see G*Power 3.1; Faul et al., 2007).

Procedure and Materials

The research was introduced to participants as investigating people's sensations and opinions concerning the risks associated with the COVID-19 pandemic. Participants were asked to complete the questionnaire while being at home, to be sure that they were not wearing face masks by default since it was compulsory in most public places in Italy at the time of the study. After participants gave their informed consent, they filled out an anonymous online questionnaire. The questionnaire consisted of two parts. The first part entailed demographic questions and the instructions concerning the manipulation. Upon randomization, participants in the mask-up condition were asked to wear a mask for the entire duration of the survey (i.e., "*For the completion of this questionnaire, you are required to wear a mask, covering nose and mouth completely*"), that is, for around five minutes; participants in the no-instruction condition received no instruction about what to wear; lastly, participants in the comparable treatment condition were asked to wear a scarf, a hat or some other item of clothing related to the external environment, to mimic the condition of the mask-up condition at a superficial level (e.g., getting up and wearing something unusual).

The second part of the questionnaire consisted of five scales intended to assess different dimensions of people's evaluation of risks related to COVID-19. Although inspired by previous questionnaires on risk perception in general (e.g., Trumbo et al., 2016), these scales have been developed *ad hoc* since no similar study was present in the literature. The attitudes investigated by the questionnaire were organized according to the following subdimensions: (a) participants' expected harms if they would be infected by the virus ("risk magnitude" scale; 5 items; $\alpha = .88$); (b) participants' perceived likelihood of being infected in different social circumstances ("contagion probability" scale; 6 items; $\alpha = .70$); (c) participants' expected negative impact of the pandemic on society ("collective risk" scale; 5 items; $\alpha = .72$); (d) participants' expected negative emotional response in the case they or their close ones tested positive for COVID-19 ("emotiveness" scale; 5 items; $\alpha = .86$); (e) participants' moral judgment against behaviors with a high risk of spreading the virus ("morality" scale; 5 items; $\alpha = .82$).[2] Answers were provided on Likert-like scales ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). A total score of contagion risk evaluation was also computed. At the end of the survey, a control question asked the participants if they wore the item required at the beginning of the questionnaire. Finally, they were debriefed and thanked for their participation. Although a formal ethical approval was not requested to administer our online survey, our research was in full accordance with the APA ethical guidelines, the 1964 Helsinki declaration, and its later amendments.

Results

Results were in only partial accordance with our prediction. When considering the total score of contagion risk evaluation as the dependent variable, we found no significant difference between the three experimental groups (mask-up: $M = 5.02$, $SD = .81$; no-instruction control: $M = 4.71$, $SD = .93$; comparable control: $M = 4.85$, $SD = .90$), $F(2, 115) = 1.27$, $p = .286$, partial $\eta^2 = .022$. In accordance with our hypothesis, though, one of our dimensions of contagion risk evaluation reacted to the wearing of an anti-COVID mask (Table 2). A one-way ANOVA indeed revealed a significant difference between the groups in terms of morality scale levels, $F(2, 115) = 3.14$, $p = .047$, partial $\eta^2 = .052$. Planned contrasts revealed that the participants who wore a mask had significantly higher scores for the morality questionnaire than participants in both control groups, $t(115) = 2.50$, $p = .014$, $r = .23$ (see Figure 1). According to our predictions, we also found no difference between the two control conditions, with participants in the no-instruction condition and those in the comparable control condition showing similar levels of negative moral judgements, $t(115) = .009$, $p = .930$, $d < .01$. Against our hypotheses, however, the analyses showed no difference among groups in terms of risk magnitude, $F(2, 115) = .81$, $p = .446$, partial $\eta^2 = .014$, contagion probability, $F(2, 115) = .24$; $p = .790$, partial $\eta^2 = .014$, collective risk: $F(2, 115) = .33$, $p = .720$, partial $\eta^2 = .006$, and emotiveness, $F(2, 115) = .91$, $p = .406$, partial $\eta^2 = .016$.

Notably, most of the means tended to the expected direction and, in particular, the mask-up group showed higher scores than the no-instruction control group for the total score of risk evaluation and all the five subscales. In other words, the subjects wearing masks appeared to be more sensitive to COVID-related risks than the subjects that were not asked to wear anything. This result, however, was not significant and should thus be substantiated by future studies. The data file of the present research is available on Open Science Framework (OSF; Sciara & Perini, 2022).

[2] The following items (translated from Italian) represent an example for each one of the six scales: (a) risk magnitude scale: "*[In case I get COVID-19] I may have long-term health consequences*"; (b) contagion probability scale: "*[There is a significant risk of getting infected in case of] dinner at home with relatives (more than 8 people)*"; (c) collective risk scale: "*I think Covid-19 will continue to do damage [to my country] in the years to come*"; (d) emotiveness scale: "*[In case I or a close friend or family member of mine tested positive for COVID-19] I would feel frightened*"; (e) morality scale: "*Anyone who infects their relatives after contracting the virus through some causal sex is not excusable*". For the morality scale, the fact that the described behavior was at risk of spreading the contagion was explicitly stated. For the translation of all the items, see Appendix 1.

Tab. 1. Descriptive Statistics and Correlations for the Five Subscales of Contagion Risk Evaluation

	M	*SD*	1	2	3	4	5
1. Risk Magnitude	3.77	1.44	–				
2. Contagion Probability	5.04	.99	.38**	–			
3. Collective Risk	5.43	1.00	.31*	.46**	–		
4. Emotiveness	4.84	1.38	.54**	.39**	.36**	–	
5. Morality	5.14	1.33	.51**	.46**	.23*	.38**	–

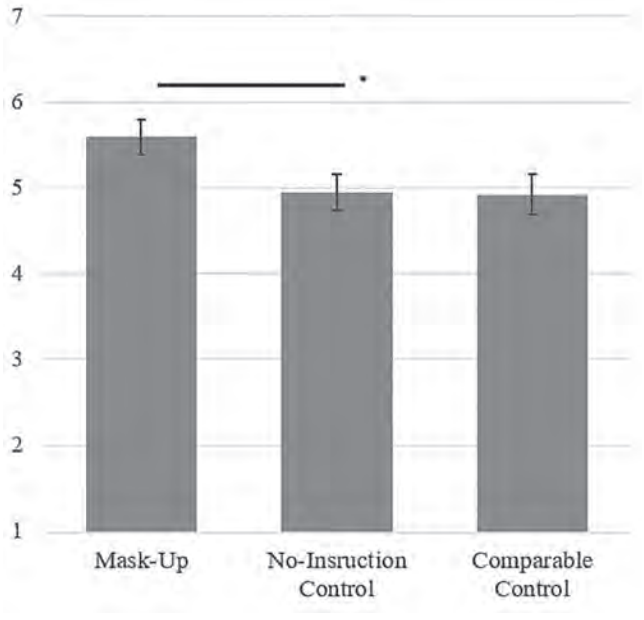
Note. *p < .05. **p < .01.

Tab. 2. Participants' Attitudes Toward Risks Related to COVID-19 According to Their Experimental Condition

	Condition				
	Mask-Up	No-Instruction Control	Comparable Control	$F(2, 115)$	p
Risk Magnitude *M(SD)*	3.94 (1.29)	3.56 (1.34)	3.87 (1.69)	.81	.446
Contagion Probability *M(SD)*	5.13 (.98)	5.02 (.95)	4.97 (1.07)	.24	.790
Collective Risk *M(SD)*	5.45 (.85)	5.34 (1.16)	5.52 (.93)	.33	.720
Emotiveness *M(SD)*	4.99 (1.37)	4.63 (1.37)	4.96 (1.32)	.91	.406
Morality *M(SD)*	5.59 (1.19)	4.95 (1.31)	4.92 (1.40)	**3.14**	**.047**
N	36	46	36		

Note. Means and standard deviations refer to the different dimensions of attitudes toward risk related to COVID-19 expressed by the participants. Answers' scales ranged from 1 *"strongly disagree"* to 7 *"strongly agree."*

Fig. 1. Participants' scores for the scale measuring the strength of moral judgements against behaviors at risk of COVID-19 contagion according to their experimental condition (mask-up vs. no-instruction control vs. comparable control).



Note. **Answers' scale ranged from 1** "*strongly agree*" **to 7** "*strongly agree.*" Error bars represent standard errors of the means. The asterisk indicates a significant difference between conditions (p < .05).

Discussion

Based on cognitive dissonance theory (Festinger, 1957) and self-perception theory (Bem, 1967, 1972), we hypothesized that wearing an anti-COVID face mask increases people's perception of being at risk of COVID-19 contagion, thus maintaining congruence between behavior (i.e., wearing a mask) and cognitions (i.e., believing there is a risk outside). Specifically, we expected that wearing a mask (and not wearing something in general, or nothing at all) could motivate our participants to increase their perceived risk magnitude, contagion probability, collective risk, expected negative emotions in case of contagion, as well as their moral judgments against behaviors at risk of contagion. The present results only partially sustain our hypothesis. Wearing a mask appears to influence some aspects of risk evaluation to reduce the cognitive dissonance, a negative state that, we argued, would arise in the case in which attitudes are inconsistent with behavior. However, we found this effect on one single subdimension of risk evaluation. In particular, we found that face masks exacerbate moral judgments against behaviors at risk of contagion (e.g., condemning social behaviors that put someone at risk of being infected by COVID-19).

Notably, the effect of anti-COVID masks on moral judgments against risky behaviors appeared to depend on specific features of anti-COVID face masks. We indeed asked a comparable control group to complete the survey while wearing a scarf or a similar item of clothing. Since we found no difference between the two control groups, we are able to conclude that the effect observed on morality was not due to the fact of being asked something unusual for an online survey, complying with a request in general, and/or wearing something associated with the external environment. Our result is also in line with the self-perception theory, which postulates a similar effect of behavior on cognitions.

A concern may arise as to why only the scale on morality—and not the other scales measuring cognitive and affective reaction to the risk—presented the expected result. There are two categories of cognitions that can be affected by cognitive dissonance reduction in relation to risks: *normative* vs. *descriptive* cognitions.[3] An explanation of why we have not observed any effect for the non-moral ("descriptive") scales may be that different groups of people have cognitions with different *resistance to change*, a notion used by Festinger (1957) to explain why certain cognitions have a lower probability of being altered to reduce dissonance. According to cognitive dissonance theory, an attitude can be more resistant because "(a) of reality constraints, (b) changing one cognition may produce dissonance among other cognitions, and/or (c) of the pain or effort required to change it" (McGrath, 2017, p. 8). A sample mainly composed of university students could be expected to be exposed to higher-quality information about COVID-19, then the descriptive attitudes would be better established and then more resistant changed by the manipulation. Consequently, the only dissonance reduction strategy available to them would have been to alter the normative cognition related to risk-taking (i.e., the beliefs about what behavior is morally correct

[3] This could be related to the distinction between prudential and properly moral reasons used in ethics (Crisp, 2018).

given a certain level of risk). Even if the risk is undeniable, one can still opt for looser and tighter moral attitudes toward risky behaviors to justify specific actions. These considerations suggest future research about cognitive dissonance and risk perception to investigate if the degree of certainty about risks moderates the effect of dissonance-inducing manipulations.

Our study has some limitations. The first one regards our testing of the basic predictions of cognitive dissonance theory (Festinger, 1957). We indeed assumed that people wearing an anti-COVID mask would have perceived more risk of contagion due to their need to psychologically justify their self-protective behavior and thus avoid experiencing cognitive dissonance (in this case, caused by the inconsistency between doing something to protect the self and the absence of a substantial, external risk). Based on this assumption, we expected our masked participants to avoid cognitive dissonance by adapting different aspects of their risk evaluation and adjusting relevant cognitions, such as by augmenting their perception of the risk of contagion or intensifying their judgments towards risky behaviors. This cognitive adaptation, according to the theory, should be functional to reduce cognitive dissonance. However, the reduction of inconsistency is not the only way people have to cope with a cognitive dissonance state. Other strategies include trivialization (Simon et al., 1995), denial of responsibility (Gosling et al., 2006), self-affirmation efforts (Steele & Liu, 1981), or value affirmations (Randles et al., 2015). Given the number of all the possible strategies available to deal with a cognitive dissonance state, assessing only one of these possibilities clearly limited the scope of our study, as well as its capacity to actually test the foundations of the theory. In other words, since we did not measure participants' dissonance but only inferred masked people would have shown a specific strategy to reduce inconsistency, and since this is only one of the many possible strategies to handle dissonance arousal, a strategy that could even depend on other phenomena (e.g., a *priming* effect; Doyen et al., 2014; Klauer, 1997), we cannot conclude that our participants did really experience a cognitive dissonance state. Most importantly, based on the present study's results, we are not able to assert that a process of cognitive dissonance reduction actually mediated the reported effect (see Vaidis & Bran, 2019, for the complete rationale). Future studies are therefore needed to shed light on this.

A second limitation regards the possibility to generalize this partial result to the real world since cognitive dissonance arises only when the effortful behavior is freely chosen by the individual (Festinger & Carlsmith, 1959), while face masks are compulsory in most countries. However, we believe that it overemphasizes the degree of control that governments have on individuals at least to some extent. There are certainly some cases where people's decision to wear a mask could be represented by sentences such as "I have to tolerate this mask, or I will get in trouble with the law." However, this kind of government's mandate still relies on individual independent responsibility of accepting to sharing the goal of the policymaker. If it is so, we are back to our starting point: the citizens' choice to share the goal of the government assumes that the pandemic is a serious threat that must be dealt with by any means necessary.

Additionally, it could be argued that unsupervised participants could not have complied with the condition required for the mask-up group (i.e., wearing the mask). For safety reasons, it was not possible to run our experiment in person, and the recruitment through social networks exposed us also to the limitation of having an unbalanced sample. The control question at the end of the survey was not an absolute guarantee, given that we cannot be sure of the participant's truthfulness. Nonetheless, this alleged weakness might prove to be a strength of our study. We want our experiment to represent the ecological condition, where people are relatively free to choose to use masks or not. This is important because, as mentioned above, effort justification does not work where compliance is forced. This is a feature of our experimental design that distinguishes it from all the other studies we reviewed on the behavioral effects of face masks, where no such relative freedom was contemplated (e.g., Luckman et al., 2020; Seres et al., 2020a; Seres et al., 2020b).

Even if previous research reported that wearing a face mask usually causes discomforts (e.g., impairment to breathing, communication difficulties, dermatological issues, sweating, ears discomfort; Cheok et al., 2021; Lloyd & Mansfield, 2021; Bakhit et al., 2021), these discomforts can be attenuated by habituation and other moderators (e.g., the comfort of the ear loops; general fitting, duration of use; Lloyd & Mansfield, 2021; Green et al., 2021). In some social circumstances, wearing a mask can even have positive effects on the person's psychology, such as an increased propensity towards spontaneity and ideas' expression (e.g., Perini & Sciara, 2022). In our study, however, we did not include control measures that could detect the perceived discomfort of our participants and thus ensure that they truly experienced discomfort due to wearing anti-COVID face masks. We then cannot be sure that an effect of justification of the effort actually mediated the hypothesized and reported effect. This represents another limitation of the present research that should be considered and addressed by future research.

Our paper casts doubt on the assumption that people have fixed attitudes toward risks, which has repercussions on the influential theory of risk compensation (Petlzman, 1975), already invoked to question the efficacy of COVID-19 measures (Luckman et al., 2020; Seres et al., 2020a). According to this theory, since people have a predetermined preference about which level of risk is acceptable, introducing new safety measures by law should cause people to adopt riskier behavior. This would happen because individuals have the tendency to bring back the overall risk to the level they freely chose previously, compensating for the positive effect of safety devices such as seatbelts or other measures. Risk compensation has also been observed in relation to contagious diseases (e.g., Toxvaerd, 2019; Talamàs & Vohra, 2020). To the extent that this phenomenon affects measures as anti-COVID-19 face masks, the efficacy of preventive policies is offset by behavioral adaptation to the new level of risk by, for instance, encouraging people to increase the frequency of in-person social interactions with vulnerable relatives.

Our results undermine the premise of the risk compensation theory since they show how the assumption of a rigid set of preferences concerning risks is unplausible. This entails that, whenever a measure involves subjects that take at least part of the responsibility of risk management, it can trigger cognitive

dissonance in the form of effort justification and, consequently, prevent risk compensation. In other words, the adoption of preventive measures against the spread of the coronavirus, rather than promoting risk-oriented behaviors as predicted by the risk compensation theory, can trigger a positive feedback loop between behaviors and cognitions that would reduce risk exposure even further.

In conclusion, wearing face masks can cause cognitive dissonance unless the person has reasons to avoid the risks posed by COVID-19. This would, in turn, make the person try to reduce or prevent this dissonance by increasing their commitment to the reasons for adopting preventive behaviors. If our model could inspire some confidence in the efficacy of certain public health measures, this is not true for every kind of restriction to individual freedom. If the fear of the government becomes the main reason to follow healthy practices, this will prevent effort justification from occurring among the citizens of a nation in what can be described as a case of motivational crowding out (e.g., Esteves-Sorenson & Broce 2020). On the contrary, in light of the positive value of effort justification in risk prevention, governments should opt for public policies that do not exceed people's willingness to freely comply with them and, at the same time, resist the temptation of excessive measures of law enforcement. To end the article with a further note of caution, it is not even guaranteed that exacerbating people's risk aversion is always desirable. If underestimating threats is certainly dangerous, "[h]istory suggests that we are actually at much greater risk of exaggerated fears and misplaced priorities" (Jones, 2020, p. 1683), and a political opinion too afraid of risks could favor closure reactions and the development of policies not based on evidence with many side effects (e.g., Shippers, 2020; see also Pica et al., 2019; Thórisdóttir & Jost, 2011).

Author Contributions
The authors contributed equally to this manuscript.

Compliance with Ethical Standards

Conflict of Interest
The authors declare that they have no competing interests.

Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethical Approval
All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Availability of Data and Material. The data file of the present research is available on Open Science Framework (OSF): https://osf.io/ma6gj The authors are also willing to share their analytics methods and study materials with other researchers upon request.

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Appendix 1

Five subscales of contagion risk evaluation.

Five subscales:
1) Risk Magnitude
2) Contagion Probability
3) Collective Risk
4) Emotiveness
5) Morality

1. Risk Magnitude subscale

IT:
Pensando all'impatto del Covid-19 su di te nel caso in cui venissi contagiato, quanto ritieni probabili i seguenti scenari:
(1: Molto in disaccordo; 2: In disaccordo; 3: Abbastanza in disaccordo 4: Né d'accordo né in disaccordo; 5: Abbastanza in accordo; 6: D'accordo; 7: Molto d'accordo.)
Item 1: Potrei avere febbre e altri sintomi aspecifici.
Item 2: Potrei avere sintomi gravi.
Item 3: Potrei perdere diversi giorni di lavoro.
Item 4: Potrei avere conseguenze di salute a lungo termine.
Item 5: Potrei essere ricoverato in terapia intensiva.
Item 6: Penso che potrei perdere la vita.

EN:
Thinking about the impact of Covid-19 on you in case you were infected, how likely do you think the following scenarios are?
(1: Strongly disagree; 2: Disagree; 3: Somewhat disagree; 4: Neither agree nor disagree; 5: Somewhat agree; 6: Agree; 7: Strongly agree.)
Item 1: I may get a fever and have other nonspecific symptoms.
Item 2: I may have severe symptoms.
Item 3: I may miss several days of work.
Item 4: I may have long-term health consequences.
Item 5: I may be hospitalized in an intensive care unit.
Item 6: I may lose my life.

2. Contagion Probability subscale

IT:
Pensando alle diverse fonti di contagio, come valuteresti il rischio di contagiarti se ti trovassi in una delle seguenti situazioni:
(1: Molto basso; 2: Basso; 3: Moderatamente basso 4: Né basso né alto; 5: Moderatamente alto; 6: Alto; 7: Molto alto.)
Item 1: Cena a casa con parenti (più di 8 persone).
Item 2: Classe di liceo con 30 o più studenti.
Item 3: Mezzi pubblici moderatamente affollati.
Item 4: Festa all'aperto con più di 30 persone.
Item 5: Cinema senza distanziamento.
Item 6: Ricovero in ospedale.

EN:
Thinking about the different sources of contagion, how would you evaluate the risk of getting infected if you were in one of the following situations?
(1: Very low; 2: Low; 3: Moderately low; 4: Neither low nor high; 5: Moderately high; 6: High; 7: Strongly high.)
Item 1: Dinner at home with relatives (more than 8 people).
Item 2: High school class with 30 or more students.
Item 3: Moderately crowded public transport.
Item 4: Outdoor party with more than 30 people.
Item 5: Movie theater with no social distancing.
Item 6: Hospital recovery.

3. Collective Risk subscale

IT:
Le persone comprendono la pandemia in modi diversi. Pensando all'impatto del Covid-19 sul tuo paese, quanto sei d'accordo o in disaccordo con le seguenti affermazioni?
(1: Molto in disaccordo; 2: In disaccordo; 3: Abbastanza in disaccordo 4: Né d'accordo né in disaccordo; 5: Abbastanza in accordo; 6: D'accordo; 7: Molto d'accordo.)
Item 1: Penso che i danni del Covid-19 in termini di vite umane siano catastrofici.
Item 2: Penso che da qui all'arrivo della immunità di gregge i danni del Covid-19 saranno ancora enormi.
Item 3: Penso che il Covid-19 sia tutt'ora una grave minaccia per l'economia.
Item 4: Penso che i danni sociali del Covid-19 siano in genere sottovalutati.
Item 5: Penso che il Covid-19 continuerà a fare danni anche negli anni a venire.

EN:
People understand the pandemic in different ways. Considering the impact of Covid-19 on your country, how much do you agree with the following statements?
(1: Strongly disagree; 2: Disagree; 3: Somewhat disagree; 4: Neither agree nor disagree; 5: Somewhat agree; 6: Agree; 7: Strongly agree.)
Item 1: I think the damage caused by Covid-19 in terms of human life is catastrophic.
Item 2: I think that from now on to the arrival of herd immunity, the damage caused by Covid-19 will still be enormous.
Item 3: I think Covid-19 is still a major threat to the economy.
Item 4: I think the social harms of Covid-19 are generally underestimated.
Item 5: I think Covid-19 will continue to do damage in the years to come.

4. Emotiveness subscale

IT:
Le persone hanno diverse risposte emotive alla minaccia della pandemia. Immagina di venire a sapere che un tu o un tuo caro abbiate contratto il Covid-19, quanto sei d'accordo con le seguenti affermazioni?
(1: Molto in disaccordo; 2: In disaccordo; 3: Abbastanza in disaccordo 4: Né d'accordo né in disaccordo; 5: Abbastanza in accordo; 6: D'accordo; 7: Molto d'accordo.)
Item 1: Mi sentirei spaventato.
Item 2: Mi sentirei preoccupato.
Item 3: Mi sentirei intimorito.

Item 4: Mi sentirei depresso.
Item 5: Mi sentirei ansioso.

EN:
People have different emotional responses to the threat of the pandemic. Imagine learning that you or a dear one had been infected by Covid-19; how much do you agree with the following statements?
(1: Strongly disagree; 2: Disagree; 3: Somewhat disagree; 4: Neither agree nor disagree; 5: Somewhat agree; 6: Agree; 7: Strongly agree.)
Item 1: I would feel scared.
Item 2: I would feel worried.
Item 3: I would feel frightened.
Item 4: I would feel depressed.
Item 5: I would feel anxious.

5. Morality subscale

IT:
La pandemia ha costretto molti a fare grandi sacrifici. Quanto sei d'accordo con le seguenti affermazioni:
(1: Molto in disaccordo; 2: In disaccordo; 3: Abbastanza in disaccordo 4: Né d'accordo né in disaccordo; 5: Abbastanza in accordo; 6: D'accordo; 7: Molto d'accordo.)
Item 1: È immorale lamentarsi di non poter uscire la sera quando centinaia di persone muoiono ogni giorno per la pandemia.
Item 2: Non è mai legittimo anteporre il profitto economico alla tutela della salute.
Item 3: È doveroso fare tutto il possibile per ridurre il numero dei contagi.
Item 4: Chi contagiasse i propri parenti dopo aver contratto il virus per del sesso occasionale non è scusabile.
Item 5: I giovani dovrebbero fare di più per evitare di diffondere il Covid-19.

EN:
The pandemic has forced many people to make great sacrifices. How much do you agree with the following statements?
(1: Strongly disagree; 2: Disagree; 3: Somewhat disagree; 4: Neither agree nor disagree; 5: Somewhat agree; 6: Agree; 7: Strongly agree.)
Item 1: It is immoral to complain about not being able to go out at night when hundreds of people die every day from the pandemic.
Item 2: It is never legitimate to put economic profit before the protection of health.
Item 3: It is a duty to do everything possible to reduce the number of infections.
Item 4: Anyone who infects their relatives after contracting the virus through some causal sex is not excusable.
Item 5: Young people should do more to avoid spreading Covid-19.



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