The impact of emotion regulation and mental health difficulties on health behaviours during COVID19

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A B S T R A C T

The COVID-19 outbreak is having a profound impact on individuals' psychological and physical wellbeing. The aim of this study was to assess the extent of this impact and its mechanisms on a sample of adults living in Italy during the first lockdown (April–May 2020). Two hundred ninety-two individuals (67.1% females) were recruited from the community through social media. They completed baseline online questionnaires to collect demographic information, data on past and present general health and health behaviours, and to assess emotion regulation strategies. Participants completed a brief survey to assess mood and health behaviours three times a week, for three weeks. Individuals with lifetime psychiatric disorders (about 50%) reported greater negative mood and use of unhealthy behaviours over time, compared to those with no psychiatric vulnerability. The use of cognitive reappraisal to regulate emotions was associated with greater resilience (i.e., feelings of hope and resourcefulness, and ability to seek social support and enjoyable activities). Cognitive reappraisal is a skill that can be trained and could be utilised to buffer the effect of general stress (i.e. stress caused by the pandemic) on individuals' wellbeing.

1. Introduction

The coronavirus disease 2019 (COVID-19) is having a profound impact worldwide, both on individuals' wellbeing and societies at large. In the United Kingdom, a recent paper based on experts and service users' opinions on the use of mental health science to cope with the effects of the pandemic highlighted the importance of quantifying the extent of the problem, as well as the mechanisms through which COVID-19 is impacting on health-related behaviours (Holmes et al., 2020). This is aimed at developing effective psychological strategies to mitigate negative consequences and mobilise resources, as the pandemic unfolds. In line with these research priorities, this study monitored the use of health-related behaviours in a community sample living in Italy at the time of lockdown (April–May 2020). It focused, in particular, on the modifiable process of emotion regulation, which might confer risk or resilience to the impact of the pandemic on individuals' wellbeing.

There is a plethora of studies demonstrating how policies designed to contain the spread of the pandemic - such as forced isolation, lockdown, school closure and furlough scheme - have exerted negative psychological effects on the general population in various countries, including China, Spain, Italy, Iran, the US, Turkey, Nepal, and Denmark (Fitzpatrick et al., 2020; Twenge and Joiner, 2020; Rossi et al., 2020; Rodríguez-Rey et al., 2020; Shahriarirad et al., 2020; Liu et al., 2020; Wang et al., 2020; Shevlin et al., 2020; Sønderskov et al., 2020; Yıldırım and Arslan, 2020). These effects coincide with heightened symptoms of anxiety, depression, post-traumatic stress disorder, and stress, together with a general tendency to experience unhelpful health behaviours including disrupted sleeping, abnormal eating and alcohol consumption or substance abuse (Kaiser Family Foundation, 2020). The negative impact of the pandemic on wellbeing has been particularly severe on women, young people, those in lower income brackets, those who experienced loss of income, and subjects with pre-existing health conditions (Shevlin et al., 2020; Xiong et al., 2020; Frank et al., 2020). In line with these findings, studies in psychiatric populations, indicated an exacerbation of symptoms and risky behaviours since the beginning of the COVID-19 outbreak (Hao et al., 2020; Baenas et al., 2020; Fernández-Aranda et al., 2020), with a weaker impact on those with the most severe and chronic disorders (Pan et al., 2021).

This evidence has recently led to the formulation of a model to explain the impact of COVID-19 stress-related burden on health behaviours and psychological problems (Zvolensky et al., 2020). This model posits that individual differences in the way in which people experience and regulate emotions play a key role in amplifying risk or resilience (Zvolensky et al., 2020). Emotion regulation is aimed at modifying emotional responding. Two main strategies have been researched widely in the literature: cognitive reappraisal and emotion suppression (Gross, 2002). The former consists of cognitively reframing or reformulating the meaning of an event to downregulate emotions and reduce behavioural, experiential and physiological responses (Gross, 2002). The latter entails decreasing expressive behaviour associated with emotional responding while producing no or little changes in the ongoing emotion experienced (Gross, 2002). Emotion suppression has been typically associated with greater levels of psychopathology (medium to large effect sizes, across symptoms of depression, anxiety, eating disorders and substance-related disorders), whereas reappraisal has been negatively associated with psychiatric symptoms (small to medium effect size) (Aldao et al., 2010). One of the mechanisms through which suppression and reappraisal have opposite effects on general wellbeing is through their associations with positive and negative emotions (Brans et al., 2013; Richardson, 2017). For example, individuals who use reappraisal more often are more likely to experience positive affect in their lives (Richardson, 2017), whereas the use of suppression has been associated with decreases in positive affect and increases in negative affect in participants completing momentary assessments of their emotions and use of emotion regulation strategies (Brans et al., 2013).

1.1. Aims of the study

Against this background, the goal of this study was to establish the role that emotion regulation and individual factors play in shaping health-related behaviours at the time of COVID-19. We explored the association between emotion regulation, mood and health-related behaviours surveying a sample of adults during the first-wave lockdown in Italy (April–May 2020). Participants were assessed at baseline for demographic characteristics, living and employment conditions as well as pre-existing medical/psychological problems. They were asked to report changes in health-related behaviours following the COVID-19 outbreak and to complete a questionnaire to assess emotion regulation. Finally, they were encouraged to disclose the use of behaviours suggestive of risk or resilience over time, for three weeks. It was expected that baseline factors, such as younger age, female gender, unemployment, pre-existing medical or psychiatric conditions and the prominent use of suppression to regulate emotions would be associated with (1) higher negative mood (i.e. sadness, anxiety, anger) (2) more frequent use of risky health behaviours (i.e. overeating, drinking alcohol, sleep disturbances), and (3) lower resilience (i.e. feelings of hope and resourcefulness, and access to social support and enjoyable activities). We also anticipated that participants would report a worsening of physical and/or psychiatric symptoms and greater use of risky health behaviours (smoking, alcohol use and overeating) following the outbreak of the pandemic, compared to before.

2. Materials and methods

2.1. Participants and procedure

Eligible participants were included if aged 18 or over, and if able to access an electronic device (*e.g.*, mobile phone, computer, laptop, tablet) connected to the Internet. Data were collected during a period of national lockdown, from April 6 to May 4, 2020 (phase 1 of the COVID-19 outbreak). Participants completed a baseline online assessment on the Qualtrics web platform (http://www.qualtrics.com/). This assessment included sociodemographic and health-related questions and a self-report questionnaire to assess emotion regulation strategies. For three

weeks, participants completed a brief survey three times/week, to assess mood and health-related behaviours.

2.2. Measures

- Sociodemographic and health related questionnaire: this included questions about age, gender, years of education, current employment status, previous and current history of mental health difficulties and chronic physical illnesses.
- Emotion Regulation Questionnaire (ERQ) (Gross and John, 2003). This 10-item self-report questionnaire measures two emotion regulation strategies: (1) Cognitive Reappraisal and (2) Expressive Suppression. Items are rated on a 1–7 Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Two scores are obtained by summing up the relevant items: a cognitive reappraisal score and an expressive suppression score. Higher scores reflect greater use of that particular emotion regulation strategy. In the present study, Cronbach's alphas were in the acceptable range; $\alpha = .745$ and $\alpha = 0.799$, for cognitive reappraisal and emotion suppression, respectively.

Brief survey: this consisted of 10 items and was created by the authors to assess participants' health behaviours and mood during lockdown. All items were rated on a 1–5 Likert scale, ranging from 1 (not at all) to 5 (always/all the time). The questions included: frequency of social contacts, experience of loneliness, sadness, fear and anger, time spent in enjoyable activities, difficulties sleeping and abnormal eating patterns, consumption of alcohol and drugs, frequency of going out and reasons for it, and time spent listening/reading COVID-19-related news. The survey is provided in Supplementary Materials 1.

2.3. Analyses

The study has three core outcome variables. They are all the product of combining several survey items. First, a *negative mood* score was created summing up answers to the questions: "*To what extent have you felt low in mood (e.g., sad, depressed, with low energy)?*", "*To what extent have you felt fearful and/or anxious?*" and "*To what extent have you felt irritable/angry?*". Secondly, answers to the questions: "*To what extent have you used food to regulate your emotional states (e.g. have you eaten sweets to feel better in yourself/calm down your negative emotions)?*", "*To what extent have you used alcohol to regulate your emotional states (e.g. have you drunk to feel better)?*" and "*To what extent have you experienced difficulties falling asleep or staying asleep (e.g. sleeping less than 6 h/night)?*" were aggregated to generate an *unhelpful habits* score. Finally, a *resilience* score was determined, summing up answers to the questions: "*To what extent do you feel hopeful about the future?*", "*To what extent do you feel you have the resources to cope with the present situation (COVID-19 related outbreak)?*", "*To what extent have you sought social support to regulate your emotional states (e.g. have you called a friend to feel better)?*" and "*To what extent have you engaged in an enjoyable activity?*". A *psychological vulnerability* score was also created based on the answers provided to the questions "*Have you ever suffered from mental health difficulties?*" and "*Are you currently experiencing mental health issues?*" asked at baseline, i.e., participants answering "yes" to either or both were considered to be in the group with psychological vulnerability. Measures of central tendency and dispersion were calculated for the variables assessed at baseline and are reported below in Table 1.

The analysis was performed on the longitudinal panel. Table 2 reports the results of three Hierarchical Random Effects models with time points nested within individuals (estimates are produced in STATA 15), accounting for the repeated measures per individual participant. Missing data were dealt with by using pairwise deletion. Data normality was checked through Skewness-Kurtosis and Kernel Density Estimation. Normality plots are provided in Supplementary Materials 2. The role of emotion regulation and psychological vulnerability over time were estimated using the same predictive linear models on the three

Table 1

Baseline demographic and clinical data. Data expressed as means and standard deviations (SD), or frequencies. The number of respondents is indicated as "N".

	N	Mean (SD) or frequency
Gender	292	Females = 67.1%, Males = 32.9%
Age	292	37.74 (14.23)
Years of education (from primary school)	287	16.99 (4.21)
Employment status before COVID-19	290	Full time = 42.8%
		Part-time = 8.3%
		Self-employed = 14.1%
		Unemployed = 8.3%
		Student = 22.1%
		Retired = 4.5%
Employment status during COVID-19	291	Not working due to COVID-19/with a salary = 7.2%
		Not working due to COVID-19/no salary = 8.9%
		Smart working = 38.8%
		Studying at home = 20.6%
		Unemployed = 7.2%
		Receiving benefits = 6.9%
		Other = 10.3%
Self-isolation because of COVID-19	291	No = 43.0%, Yes = 57.0%
Duration of self-isolation	166	Less than a week = 0%
		A week = 0%
		Two weeks = 2.4%
		Three-four weeks = 31.3%
		Five-six weeks = 44.0%
		Seven-eight weeks = 13.9%
		More than eight weeks = 8.4%
Living with	290	Family = 84.2%
		Flatmates/friends = 5.5%
		Alone = 9.6%
Lifetime history of mental health difficulties?	290	No = 62.1%, Yes = 37.9%
Type of mental health difficulties in the past	120	Depression = 30.0%
		Anxiety = 48.3%
		Eating Disorders = 12.5%
		Psychosis = 1.7%
		Other = 7.5%
Psychiatric diagnosis of mental health disorder in the past	240	No = 91.3%, Yes = 8.8%
Type of diagnosis	19	Anxiety = 3.1%
		Mood disorders = 2.4%
		Anorexia Nervosa = 0.3%
		Personality disorders = 0.3%
		Other = 0.3%
Current mental health problems	280	No = 71.1%, Yes = 28.9%
Type of current mental health problems	95	Depression = 20.0%
		Anxiety = 54.7%%
		Eating Disorders = 12.6%
		Psychosis = 1.1%
		Other = 11.6%
Mental health problems triggered by COVID-19	166	No = 75.9%, Yes = 24.1%
Mental health problems exacerbated by COVID-19	169	No = 53.8%, Yes = 46.2%
Currently taking psychiatric medication	270	No = 95.9%, Yes = 4.1%
Type of psychiatric medication	11	Anxiolytics = 1.4%
		Antidepressants = 2.1%
		Other = 0.3%
Current medical condition	283	No = 78.4%, Yes = 21.6%
Type of medical condition	67	Cardiovascular disease = 17.9%
		Diabetes = 1.5%
		Obesity = 9.0%
		Physical impairment = 1.5%
		Cancer = 1.5%
		Congenital disorders = 7.5%
		Inflammatory/immune system diseases = 14.9%
		Neurological diseases = 3.0%
		Other = 43.3%
Medical condition triggered by COVID-19	147	No = 98.0%, Yes = 2.0%
Medical condition exacerbated by COVID-19	195	No = 72.8%, Yes = 27.2%

Table 1 (*continued*)

	N	Mean (SD) or frequency
Medication for medical condition	274	No = 77.4%, Yes = 22.6%
Smoking	288	No = 69.4%, Yes = 30.6%
Number of cigarettes/day now	91	Ten or more than ten = 14.0%
		Less than ten = 15.1%
Number of cigarettes/day before COVID-19	91	Ten or more than ten = 13.4%
		Less than ten = 15.8%
		Electronic cigarette = 0.3%
Increase in number of cigarettes since COVID-19	91	No = 74.7%, Yes = 25.3%
Alcohol consumption	287	No = 39.4%, Yes = 60.6%
Weekly consumption of alcohol now	178	One-two glasses = 56.2%
		Three-four glasses = 18.0%
		Five-six glasses = 8.4%
		Six-eight glasses = 9.6%
		More than eight glasses = 7.9%
Weekly consumption of alcohol before COVID-19	190	One-two glasses = 46.3%
		Three-four glasses = 24.7%
		Five-six glasses = 11.6%
		Six-eight glasses = 8.9%
		More than eight glasses = 8.4%
Increase in alcohol consumption since COVID-19	191	No = 91.1%, Yes = 8.9%
Currently eating more than expected from someone of same age and gender	291	No = 56.7%, Yes = 43.3%
Overeating as a consequence of negative emotions (*e.g.* feelings of loneliness, sadness, frustration, anger)?	186	No = 60.8%, Yes = 39.2%
Frequency of overeating	130	More than once a day = 17.7%
		Once/day = 21.5%
		At least three-four times/week = 19.2%
		Once/week = 22.3%
		Two-three times/month = 11.5%
		Once/month = 0.8%
		Less than once/month = 6.9%
Overeating triggered by COVID-19	185	No = 64.9%, Yes = 35.1%
Overeating exacerbated by COVID-19	208	No = 48.1%, Yes = 51.9%
Emotion Regulation Questionnaire Reappraisal	291	29.28 (5.50), Range (12–42)
Emotion Regulation Questionnaire Suppression	291	13.19 (4.98), Range (4–26)
Negative mood	291	6.85 (2.12), Range (2–13)
Unhelpful habits	291	5.64 (1.93), Range (3–14)
Resilience	291	11.31 (2.56), Range (4–18)
Psychiatric/psychological vulnerability	281	No = 53.0%
		Yes = 47.0%

dependent variables outlined above. In addition to measures of reappraisal and suppression, the models controlled for working, health and living conditions, and for socio-economic status. The study was pre-registered on the OSF pre-registration website (https://osf.io/3mueh/).

3. Results

Two hundred ninety-two individuals (67.1% females) from the community were recruited in Italy, through social media (*e.g.*, Facebook, Instagram). Table 1 reports central tendency, variance and frequencies for variables collected at baseline. Two-hundred ninety-two participants completed the baseline assessment; two-third of whom, approximately, were of female gender. On average, participants were in their thirties and reported 18 years of education. Almost half of the sample reported being employed before the lockdown. After lockdown, 40% of the total sample were working from home, whereas the proportion of people unemployed were similar before and after the outbreak. Approximately 80% of the sample were living with the family and almost half were not leaving the house except for grocery shopping at the time of recruitment, the majority of whom had done so for the previous five-six weeks. Almost 40% reported a lifetime history of psychiatric disorders (anxiety

Table 2
Effects of psychiatric/psychological vulnerability and emotion regulation on negative mood, health-related behaviours and resilience.

	Model (1)	Model (2)	Model (3)
	Negative Mood	Unhealthy Habits	Resilience
Vulnerability	0.497***	0.505**	−0.341
	(0.151)	(0.188)	(0.226)
Gender	−0.0855	0.0603	−0.0461
	(0.151)	(0.193)	(0.233)
Age	−0.0191**	−0.00482	−0.0233*
	(0.00621)	(0.00840)	(0.00994)
Reappraisal	0.0252	0.0175	0.0558**
	(0.0130)	(0.0165)	(0.0194)
Suppression	0.0113	0.0382	−0.0404
	(0.0149)	(0.0225)	(0.0234)
Time			
T1	0.283	1.833***	−2.479***
	(0.164)	(0.187)	(0.230)
T2	−0.113	1.069***	−1.678***
	(0.167)	(0.182)	(0.215)
T3	−0.371*	0.996***	−1.709***
	(0.174)	(0.190)	(0.239)
T4	−0.421*	0.986***	−1.984***
	(0.190)	(0.202)	(0.269)
T5	−0.287	1.333***	−1.983***
	(0.191)	(0.221)	(0.299)
T6	−0.295	1.401***	−2.274***
	(0.214)	(0.218)	(0.336)
T7	0.144	1.631***	−3.096***
	(0.236)	(0.241)	(0.339)
T8	0.0125	0.878***	−1.665***
	(0.266)	(0.256)	(0.357)
T9	−0.391	−0.409	−0.205
	(0.327)	(0.403)	(0.353)
Working Status			
Not working, no salary	−0.156	0.475	−1.119*
	(0.398)	(0.599)	(0.512)
Working from home	−0.0348	−0.186	−0.443
	(0.337)	(0.400)	(0.422)
Studying at home	0.127	0.0867	−0.599
	(0.350)	(0.424)	(0.503)
Unemployed since before CV-19	−0.545	−0.352	−1.011
	(0.387)	(0.457)	(0.599)
Retired	0.201	−0.0995	−0.219
	(0.423)	(0.603)	(0.664)
Other	0.406	0.0466	1.006
	(0.417)	(0.483)	(0.546)
Cohabitants			
Flat mates	0.910*	0.239	1.166**
	(0.354)	(0.427)	(0.426)
Alone	0.0174	−0.137	1.048*
	(0.245)	(0.309)	(0.442)
Constant	6.495***	4.506***	11.57***
	(0.610)	(0.708)	(0.838)
Rho	0.226	0.251	0.16
Observations	1459	1459	1459
Number of id	273	273	273

Robust standard errors in parentheses.
***p < 0.001, **p < 0.01, *p < 0.05.
Reference categories are as follows: T0 for *Time*; Not working but recipient of furlough for *Working Status* and Living with family for *Cohabitants*.

or depression most frequently) and a third reported suffering from mental health difficulties at the time of testing. Approximately a fifth of the sample were suffering from a medical condition (mostly with cardiovascular diseases). A greater proportion of people reported that their

mental health difficulties were triggered or exacerbated by COVID-19, compared to the proportion of people reporting that their medical condition had been triggered or exacerbated by COVID-19.

With regards to health-related behaviours, a fourth of the smokers reported smoking more often after the outbreak compared to before, whereas only 10% of those drinking alcohol, reported greater consumption of alcohol since the outbreak. At the time of testing, overeating was reported by almost half of the sample, mostly in response to negative emotions. Participants' overall level of negative mood averaged at 7 (on a range 2–13), whereas the mean score for unhealthy behaviours was almost 6 (on a range 3–14). Finally, participants' mean scores on the cognitive reappraisal and suppression subscales of the Emotion Regulation Questionnaire were comparable to those reported in the community sample among which the questionnaire was validated (mean score for cognitive reappraisal in men = 4.6, women = 4.61; mean scores for expressive suppression in men = 3.64, women = 3.1; Gross and John, 2003).

In Table 2 we report results for three models testing the effects of psychiatric/psychological vulnerability, gender, age, emotion regulation (i.e., reappraisal and suppression) and time, on the three outcome variables of this study: negative mood, unhelpful habits and resilience. Model 1 explains the impact of the predictors on the extent to which participants experienced negative mood throughout the lockdown period. Those in the group with psychological vulnerability displayed a clear tendency to experience higher levels of negative mood. The variable was significant at the highest level (p < 0.001) and suggested a difference of the magnitude of half a point on negative mood scores. The coefficient for age was also significant and of negative sign, indicating that younger people experienced higher level of negative mood. Yet, the magnitude was relatively small, a difference of 10 years between subjects would lead to a difference of 0.2 in the *Negative Mood* scale. Differences due to time were only significant twice (Time 3 and Time 4) compared to the first measurement at Time 0. Participants started their participation in the project at different time points within the specified period (April–May 2020), but for 56% of the sample, T3 and T4 corresponded to the time when an extension of the first lockdown was announced by the Italian Government. Finally, compared to those who lived with family during this time, those who lived with flatmates experienced considerably higher levels of negative mood with a difference of almost one point. Other predictors had no statistically significant impact on negative mood.

Model 2 examined the impact of psychiatric/psychological vulnerability, gender, age, emotion regulation (i.e., reappraisal and suppression) and time on the variable "unhelpful habits". In Model 2, psychological vulnerability was again significant at the highest level and had a similar coefficient to the one displayed in Model 1. Those with preexisting or current psychological difficulties were more likely to engage in unhealthy behaviours than those with no such difficulties. The impact of time was significant and positive, if non-linear in growth gradient. There was no significant difference between the first and the last measurement, but T1 to T8 displayed higher levels of unhealthy habits compared to the beginning of lockdown, suggesting that the uptake of hose habits increased over time. No other predictor displayed a significant impact on the outcome variable.

Model 3 examined the impact of psychiatric/psychological vulnerability, gender, age, emotion regulation (i.e., reappraisal and suppression) and time on levels of resilience. Findings indicated that Reappraisal was a significant predictor of resilience, with the relationship being positive and significant at the 99% level. This coefficient indicates that an increment in the Reappraisal scale of 10 points corresponded to an increase in Resilience of the magnitude of 0.6 points. If modest, this is certainly an impactful element in explaining variance in Resilience. As in the case of Model 2, time was once again having a strong impact on the outcome, this time a negative one. Resilience went down over time. Living arrangements were significant factors in Model 3, in that those living with flatmates or alone displayed higher levels of

resilience than those living with members of their family. With regards to working status, not working and/or not receiving a salary were associated with lower resilience.

4. Discussion

This study surveyed a sample of adults during the first-wave lockdown in Italy (April–May 2020). Demographic and clinical information, and emotion regulation were assessed at baseline. Mood and health-related behaviours were assessed over three weeks. It was hypothesised that baseline factors, such as younger age, female gender, unemployment, pre-existing medical or psychiatric conditions and greater use of suppression to regulate emotions would be associated with (1) higher levels of negative mood (i.e. sadness, anxiety, anger), (2) more risky health behaviours (i.e. overeating, drinking alcohol, sleep disturbances), and (3) lower levels of resilience (i.e. lower feelings of hope and resourcefulness and less access to social support and enjoyable activities). It was also hypothesised that participants would report a worsening of physical and/or psychiatric symptoms and greater use of risky health behaviours (smoking, alcohol use and overeating) following the outbreak of the pandemic, compared to before.

A sample composed predominantly by women was recruited. Most of the participants were living with their family or with flatmates at the time of testing and had had no dramatic changes in employment conditions since the beginning of the pandemic, except for the use of smart working. Approximately 40% of the sample reported a history of psychiatric disorders and a third thought to be suffering from psychological/psychiatric disorders at the time of testing. This resulted in almost 50% of individuals reporting psychiatric disorders in their lifetime. Twenty-five percent thought that COVID-19 had triggered the psychiatric symptoms and a greater proportion (50%) reported that COVID-19 had exacerbated pre-existing psychological difficulties. This compares to a smaller proportion of individuals reporting a medical condition triggered (20%) or exacerbated (27%) by COVID-19. As expected, individuals with lifetime psychiatric disorders experienced greater negative mood and greater use of unhelpful behaviours over time, compared to those with no psychiatric vulnerability. This is in line with findings indicating that people with psychiatric conditions are at greater risk for the development or exacerbation of psychiatric symptoms or psychological distress (Vindegaard and Benros, 2020; Zhou et al., 2020).

The greater use of unhelpful health behaviours during the pandemic was also partly reflected by the data in the general population (including those with or without psychiatric vulnerability), which indicated a tendency for increasing cigarette smoking (25%) and alcohol consumption (10%) since the outbreak, compared to before. Interestingly, almost 60% of the sample reported overeating and emotional eating (i. e., eating in response to negative emotions), which for a portion of individuals had been triggered or exacerbated by the pandemic (35% and 48%, respectively). These results are mirrored by the overall increase in unhealthy behaviours over time and are in line with theories that postulate the use of unhelpful behaviours to cope with psychological distress; a mechanism which over time results in a paradoxical increase of risky behaviours and psychological distress (Folkman and Lazarus, 1980; Pearlin et al., 2005).

Interestingly, the use of suppression was not associated with unhealthy behaviours, as hypothesised. One possible explanation for this is that the use of emotion suppression is not maladaptive *per se*, rather the impact of emotion regulation strategies depends on the characteristics of a specific situation (Aldao and Nolen-Hoeksema, 2012). It is possible that the use of emotion suppression during the Pandemic might have been adaptive to some extent. Also, if there is evidence for the association between suppression and psychopathology, such as symptoms of anxiety and depression (Hu et al., 2014), there is less evidence to support the correlation between emotion suppression and wellbeing. A recent meta-analysis, for example, indicated that while suppression was not related to wellbeing, reappraisal was associated to it (Kraiss et al.,

2020). Similarly, in this study, the tendency to use cognitive reappraisal as a way to regulate emotions was associated with greater resilience, that is feelings of hope and resourcefulness, and ability to seek social support and enjoyable activities. These behaviours can be considered indices of wellbeing and might explain the alignment with the meta-analytic findings.

The finding that cognitive reappraisal was associated with resilient behaviours is in line with the prediction that the ability to down-regulate negative emotions can boost resilience in the face of distress (Khantzian, 1997), and is particularly important, considering that cognitive reappraisal is a skill that can be learned through emotion regulation trainings. There is evidence that trainings to improve reappraisal are associated with reduced negative interpretations and negative emotions in response to stress (Tabibnia, 2020; Webb et al., 2012). Cognitive reappraisal is also associated with a decrease in depression symptoms and worry, and with an increase in mental health wellbeing (Burklund et al., 2014; LeBlanc et al., 2020), as well as with reduced unhealthy behaviours such as dietary restriction (Mazlomi Barm Sabz et al., 2020), binge eating (Haynos et al., 2016) and alcohol consumption (Svaldi et al., 2014). This evidence points towards the potential of using emotion regulation trainings aimed at improving reappraisal in order to face psychological stress and protect from using risky behaviours. In this study, resilience decreased over time, indicating that early interventions are warranted.

When looking at non-psychological risk factors, such as gender, age employment condition, and living conditions, it was found that younger age and living with flatmates were associated both with greater levels of negative mood and also with greater use of resilient behaviours, such as engaging in enjoyable activities and seeking social support (for example, from families). These findings appear in contrast and might suggest a failure of the attempts to regulate negative emotions, or that greater levels of negative emotions motivate greater efforts to be resilient. Nonetheless, the finding that younger people report higher levels of negative emotions is in line with the evidence from other studies investigating the impact of COVID-19 on wellbeing across the lifetime (Rodriguez et al., 2019; Vahia and Jeste, 2020). Living alone was also associated with greater resilience, possibly through motivating people to make greater efforts to seek pleasant activities and social support to upregulate positive emotions. Finally, not working and/or not receiving a salary were associated with less resilience. This is line with studies finding that job insecurity, reduction to one's income and financial concerns during COVID-19 are associated with higher levels of stress and depressive symptoms (Coulombe et al., 2020; Wilson et al., 2020).

Overall, this study showed that the use of unhealthy behaviours increased, and that resilience decreased over time, during the first lockdown in Italy. Younger people and people with pre-existing or current mental health difficulties appeared at greater risk to use unhealthy behaviours and experience negative mood during this time. Findings also suggested that the use of adaptive emotion regulation strategies, such as cognitive reappraisal, was associated with resilient behaviours, such as seeking enjoyable activities and social support, and positive emotions, such as feelings of hope. The implication is that the use of emotion regulation trainings might strengthen people's resilience towards the adverse effects of the pandemic on psychological wellbeing.

4.1. Strengths and limitations

The strengths of this study are associated with the use of a longitudinal design and the assessment of modifiable psychological factors, such as emotion regulation. An allied strength is the evaluation of a range of health-related behaviours and the recruitment of individuals from one of the countries which have been most badly affected by COVID-19, Italy. Nonetheless, findings are limited by the relatively small number of individuals recruited and the use of non-standardised measures to quantify the impact of COVID-19 on health-related behaviours. Findings are also limited by potential residual confounding and by

the requirement to access a mobile device and mobile technology knowledge to participate. This criterion might represent an obstacle for participation to those from a less advantageous background and limits the inclusivity of the study. In future studies, it would be important to budget for the acquisition of mobile devices in order to expand inclusivity to those who do not own or do not have access to mobile technology.

Unfortunately, we need to acknowledge that there was no funding for this research, and therefore the provision of a mobile device to those in need of one was not possible. Also, lack of funding meant that participants could not be incentivized to take part by offering monetary reimbursement. The unprecedented conditions also meant that specific standardised measures to assess the impact of the pandemic on individuals' behaviours were not available at the time of testing.

5. Data availability statement

The data that support the findings of this study are available on request from the corresponding author [VC].

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychires.2021.10.001.

Authorship

CV and CG designed the study. GA recruited participants and collected and scored the data. LS conducted statistical analyses. CV, GA, LS and CG all contributed to write and revise critically the manuscript. All authors provided final approval of the version submitted and all are in agreement to be accountable for all aspects of the work.

Ethics statement

All participants provided written signed informed consent prior to participation. The study was approved by the Research Ethics Committee of the Department of General Psychology at the University of Padova.

Declarations of interest

Declarations of interest: none.

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