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## Research paper

# The trajectories of anxiety and depression during the COVID-19 pandemic and the protective role of psychological flexibility: A four-wave longitudinal study

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## ABSTRACT

**Background:** Published reports on the adverse mental health impacts of the initial phase of the COVID-19 pandemic suggest an emerging global mental health crisis. However, the trajectories of these mental health impacts over multiple COVID-19 peaks and corresponding lockdowns are unknown. This study explored the trajectories of anxiety and depression over two consecutive lockdowns during the first nine months of the pandemic in Europe (April 2020–January 2021) and examined whether they varied as a function of different psychological flexibility and inflexibility profiles.

**Methods:** A total of 569 Italians completed online surveys at four assessment points. Trajectories of anxiety and depression were examined with latent growth modeling and according to different psychological flexibility and inflexibility profiles.

**Results:** Anxiety increased linearly throughout the study period, whereas depression displayed a quadratic trajectory evidencing a decrease with the easing of the first lockdown followed by an increase during the second lockdown. Furthermore, two profiles were identified that displayed different anxiety and depression trajectories. Compared to the psychologically flexible profile, the psychologically inflexible profile reported significantly higher anxiety and depression which remained higher across the study period.

**Limitations:** A reliance on self-report measures and convenience sampling constitute key study limitations.

**Conclusions:** Results suggest that high psychological inflexibility is a risk factor for prolonged elevated anxiety and depression during the COVID-19 pandemic, whereas high psychological flexibility is a protective factor. Psychological flexibility and inflexibility should be targeted by preventive public health interventions that harness evidence-based strategies shown to effectively target these factors.

## 1. Introduction

The serious adverse mental health impacts of the ongoing COVID-19 pandemic have been documented internationally (Kan et al., 2021; Xiong et al., 2020). They constitute an emerging global mental health crisis that is likely to remain for the duration of the pandemic and into the future, after the pandemic subsides (Holmes et al., 2020). The COVID-19 disease and governmental attempts to control the pandemic (e.g., large-scale ‘lockdowns’ and quarantining) are associated with a wide range of significant life stressors including severe illness, forced

lifestyle changes and disruptions, bereavement, loss of employment, debt, loneliness and social isolation (Hertz-Palmor et al., 2021; Wu et al., 2021a). These negative life events are in turn associated with two common debilitating mental health problems, anxiety and depression (Landi et al., 2021a; Pakenham et al., 2020; Xiong et al., 2020). Even people who have not directly experienced these pandemic-related stressors can nevertheless be negatively affected by the fear of experiencing them, often fueled by exposure to a continuous deluge of negative media coverage of the serious consequences of the pandemic (Garfin et al., 2020; Taylor et al., 2020). The pandemic can also evoke existential

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threats by making salient the uncertainties of life, our mortality, the uncontrollable elements of life, and the omnipresence of disease (Bakioğlu et al., 2020; Courtney et al., 2020), which can challenge and adversely affect the stability of mental health (Tomaszek and Muchacka-Cymerman, 2020).

Reviews and meta-analyses of community-based cross-sectional studies across more than thirty-five countries and five continents during the first phase of the COVID-19 emergency (consisting of the first exponential increases in cases and subsequent containment) have reported average prevalence rates for clinically significant anxiety symptoms ranging from 27 to 38% and depressive symptoms ranging from 25 to 34% (Bueno-Notivol et al., 2020; Kan et al., 2021; Necho et al., 2021; Salari et al., 2020). However, these data are derived from cross-sectional studies and therefore do not provide information on the trajectories of mental health over different phases of the COVID-19 pandemic.

We found thirteen longitudinal studies that assessed anxiety and depression at the beginning of the pandemic and then again at subsequent points as the pandemic progressed (Bendau et al., 2021; Czeisler et al., 2021; Daly and Robinson, 2021; Fancourt et al., 2021; González-Sanguino et al., 2021; Gopal et al., 2020; Gullo et al., 2020; Mata et al., 2021; Pieh et al., 2021; Planchuelo-Gómez et al., 2020; Riehm et al., 2021; Varga et al., 2021; Wang et al., 2020). Samples ranged from 159 to 205,084 participants, with 2 to 20 assessments over periods spanning one to five months, with all assessment points within the first COVID-19 phase and no assessments occurring after September 2020. The predominant pattern of results from these studies shows an increase in anxiety (Gopal et al., 2020; Gullo et al., 2020; Planchuelo-Gómez et al., 2020) and depression over the first two months of the pandemic, which included strict lockdowns (Daly and Robinson, 2021; González-Sanguino et al., 2021; Gopal et al., 2020; Planchuelo-Gómez et al., 2020), followed by a stabilization or slight decrease in anxiety and depressive symptoms in the subsequent months, which corresponded with better control of the pandemic and the easing of restrictions (Bendau et al., 2021; Daly and Robinson, 2021; Mata et al., 2021; Varga et al., 2021). Two studies further reported improvements in anxiety and depression up to the fifth month of the pandemic (Fancourt et al., 2021; Riehm et al., 2021), with one of these investigations (Riehm et al., 2021) showing that the odds of clinically significant distress had returned to levels comparable to the beginning of the pandemic by the end of the fifth month.

Two reviews and meta-analyses have also been conducted on 115 longitudinal studies that had collected mental health data from the community prior to the COVID-19 emergency and then again at a later point during the first COVID-19 phase. Samples ranged from 9 to 11,599 adults. Most of these studies undertook two assessments (before and during the first phase of COVID-19) and evaluated anxiety, depression or general mental health (Prati and Mancini, 2021; Robinson et al., 2021). Overall, results revealed trends similar to those of the abovementioned longitudinal studies. In particular, they showed significant increases in general mental health symptoms in the first two months of the pandemic, the first exponential spread of COVID-19, with a steady reduction during the third and fourth months, and a return to levels that were close to pre-pandemic by the fifth month (Prati and Mancini, 2021; Robinson et al., 2021).

The two aforementioned bodies of longitudinal COVID-19 pandemic research have in the main focused on the first phase of the pandemic and the corresponding initial lockdown and the subsequent easing of restrictions. However, the extent to which the ongoing pandemic impacts the mental health of the general population in the longer-term (later than September 2020) and over the first and repeated or prolonged subsequent lockdowns is still unknown. Therefore, the first aim of the present study was to explore the trajectories of anxiety and depression over two consecutive lockdowns during the first nine months of the pandemic (up to January 2021).

Furthermore, these prior longitudinal COVID-19 studies mostly reported only average mental health changes or trajectories. Although

most findings converge on indicating that elevated levels of anxiety and depression associated with the beginning of the pandemic are transient, there are findings indicating different patterns. For example, two studies found that levels of anxiety and depressive symptoms did not significantly change from the second to the seventh month of the pandemic (Czeisler et al., 2021; Pieh et al., 2021), with one-third of participants still showing elevated anxiety or depression during the seventh month of the COVID-19 emergency (Czeisler et al., 2021). Similarly, a study of 14,769 university students found one cluster of participants who reported low levels of anxiety or depression before the pandemic and several months into the outbreak, and a second cluster who reported high anxiety or depression levels pre-pandemic, which increased throughout the study period (Wu et al., 2021b). Finally, another longitudinal investigation conducted in the UK ( $n = 21,938$ ) found that most respondents reported low levels of anxiety and depression which improved with the easing of restrictions and lowering of COVID-19 cases (Saunders et al., 2021). In addition, there were sub-groups of participants who reported moderate or severe levels of symptoms which increased throughout the first phase of the outbreak, and other sub-groups which displayed high anxiety levels that rapidly decreased during the lockdown or worsening anxiety and depressive symptoms during the lockdown that improved with the relaxation of restrictions (Saunders et al., 2021).

Overall, these variations in the mental health impacts of the pandemic and lockdowns suggest that while there are sub-groups of people who are at risk of persistent anxiety and depression, there are also sub-groups that appear to be less vulnerable to increases in distress. Identifying these sub-groups is paramount to enact targeted public-health interventions during a pandemic. In addition, finding key malleable factors that characterize these sub-groups will provide intervention targets for enhancing resilience. Hence, this study also examines whether sub-groups of people based on their profile of psychological flexibility, a mental health protective factor, and psychological inflexibility, a mental health risk factor, manifest different anxiety and depression trajectories across the pandemic and, therefore, potentially serve as intervention targets.

### 1.1. Psychological flexibility and inflexibility as COVID-19 mental health protective and risk factors

Psychological flexibility is a transdiagnostic concept that is related to a range of inter- and intra-personal skills and is regarded as the cornerstone of mental health that is closely linked to resiliency (Kashdan and Rottenberg, 2010). According to the psychological flexibility framework which underpins acceptance and commitment therapy (ACT), psychological flexibility is defined as the ability to effectively manage unwanted inner experiencing (e.g., thoughts, memories, bodily sensations) in the present, while adjusting behaviors in the context of changing situational demands to ensure one is behaving consistently with personal values (Hayes et al., 2006, 2012). In other words, psychological flexibility enables individuals to change behavioral repertoires facilitating optimal adaptation to changing circumstances (Kashdan and Rottenberg, 2010). In contrast, psychological inflexibility involves the unwillingness to remain in contact with unwanted inner experiencing in the present, which in turn is associated with rigid and reactionary behavioral responses which derail the pursuit of personal values (Hayes et al., 2012).

A substantial body of evidence supports psychological flexibility as a mental health protective factor associated with adaptive responses to distress and better mental health outcomes across diverse contexts (Bluett et al., 2014; Hayes et al., 2006; Kashdan and Rottenberg, 2010; Landi et al., 2021b). In contrast, evidence shows that psychological inflexibility is associated with psychopathology and poor mental health outcomes and is, therefore, a mental health risk factor (Bond et al., 2011; Stabbe et al., 2019).

A growing body of literature highlights the protective role of

psychological flexibility and the detrimental role of psychological inflexibility in shaping mental health during the first phase of the COVID-19 pandemic. There are more than fifteen cross-sectional studies that have examined psychological flexibility and/or inflexibility during the pandemic. Samples range from 170 to 9565 participants across various populations including adults from the community (Dawson and Golijani-Moghaddam, 2020; Gloster et al., 2020a; Kroska et al., 2020; Landi et al., 2020; McCracken et al., 2020; Pakenham et al., 2020; Smith et al., 2020; Wąsowicz et al., 2021; Wielgus et al., 2020), suspected COVID-19 patients (Huang et al., 2021), university students and young adults (Arslan and Allen, 2021), parents (Crasta et al., 2020; Daks et al., 2020), and people with chronic pain (Yu et al., 2021). In particular, a cross-sectional study ( $n = 1035$ ) conducted during the first Italian lockdown highlighted the protective role of psychological flexibility in mitigating the detrimental impacts of COVID-19 and lockdown contextual risk factors (e.g., lockdown duration, COVID-19 infected or family infected), and the harmful role of psychological inflexibility in exacerbating the adverse impacts of COVID-19 risk factors on anxiety and depression (Pakenham et al., 2020).

### 1.2. The present study

This study has two aims. The first aim is to investigate the trajectories of anxiety and depression over two consecutive lockdowns during the first nine months of the pandemic in an Italian community sample. The second aim is to examine whether the trajectories of anxiety and depression vary as a function of different profiles of psychological flexibility and inflexibility. We predicted that psychological flexibility and inflexibility would constitute mental health protective and risk factors, respectively, during the COVID-19 pandemic and associated lockdowns. Specifically, we hypothesized that people who report high psychological inflexibility would display higher levels of anxiety and depression across the nine-month study period relative to those who report high psychological flexibility.

## 2. Methods

### 2.1. Participants and procedures

The study design involved four assessments, three months apart.

Fig. 1 summarizes the study timeline and the daily numbers of new COVID-19 cases in Italy throughout the study period. Time 1 assessment occurred 9–19 April 2020 during the first strict national lockdown. Time 2 assessment was conducted 9–19 July 2020, a period of better control of the pandemic in which all restrictions were lifted. Time 3 assessment occurred 9–19 October 2020 when the number of new COVID-19 cases started to increase again but with no corresponding restrictions. Time 4 assessment was conducted 9–19 January 2021, two months after the start of the second, less stringent, national lockdown in which Italian regions were classified into one of three risk categories: red zone – like the first strict national lockdown; orange zone – people could not leave their province; yellow zone – “late evening” curfews and a mandatory request to wear masks at all times. From the beginning of the second lockdown to the end of Time 4, about 48.36% of regions were classified as orange zones, and 33.57% as red zones.

A total of 569 participants took part in the study (78.21% female; Time 1  $M_{age} = 39.77$ ,  $SD_{age} = 13.56$ ). Most participants were native Italian (98.24%), had a bachelor's degree (71.70%), were employed (63.62%), and reported being in the middle socioeconomic class (82.07%). Half of the respondents were either married or living with a partner (48.68%), with most of the remainder being single (44.11%). A total of 20.04% of participants reported pre-existing mental and physical health problems, respectively. Participants lived with a mean of 2.54 cohabitants. A total of 22.85% reported having lost work or were receiving a lockdown redundancy fund. At Time 1, 20.04% of participants declared COVID-19 infection, while 8.26%, 3.16% and 2.28% reported having a family member infected by COVID-19, hospitalized, and death due to COVID-19, respectively. During the remaining study period, an additional 20.01% reported COVID-19 infection, while 21.61%, 4.57% and 4.04% declared having a family member infected by COVID-19, hospitalized, and death due to COVID-19, respectively.

The sample at Time 1 was recruited through social media and a snowballing approach, whereby participants invited friends and acquaintances to participate in the study. With this procedure, we obtained a heterogeneous sample of participants reflecting a wide range of demographics (see Supplementary Material 1). Compared to key socio-demographic variables in the Italian adult population, the present sample has an overrepresentation of females, people with a bachelor's degree, and individuals from the middle socio-economic class. In addition, the mean age of the present sample is marginally lower than that of

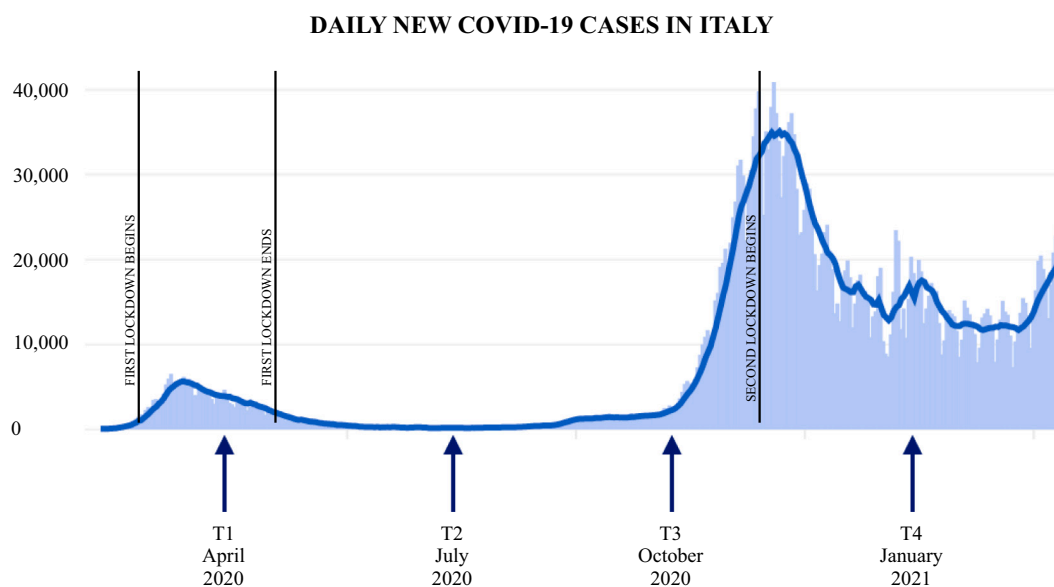


Fig. 1. Daily new COVID-19 cases in Italy throughout the study timeline.

Notes. T1 = Time 1 assessment at; T2 = Time 2 assessment; T3 = Time 3 assessment; T4 = Time 4 assessment. Adapted and modified from the Center for Systems Science and Engineering (CSSE) (2020).

the general population. Nevertheless, according to the Global Burden of Disease study (GBD 2019 Mental Disorders Collaborators, 2022), the age-standardized estimates of mental health problems in Italy in 2019 was 21.61% (Institute for Health Metrics and Evaluation, n.d.). This data is aligned with the percentage of pre-pandemic mental health problems reported by participants in our sample (i.e., 20.4%).

At each of the four assessment points participants completed an online questionnaire, which took 15–20 min to complete. Inclusion criteria were  $\geq 18$  years old, and a resident in Italy. This study was approved by the Ethics Committee of the University of Bologna.

## 2.2. Measures

### 2.2.1. Anxiety

Anxiety symptoms were evaluated at all four assessments with the Italian validated version (Kroenke and Spitzer, 2010) of the standardized General Anxiety Disorder Scale (GAD-7; Spitzer et al., 2006). The GAD-7 measures anxiety symptoms over the past two weeks. Items are rated on a 4-point scale (0 = *not at all* to 3 = *nearly every day*). Observed Cronbach's alphas were 0.90, 0.91, 0.89, and 0.90 at Times 1, 2, 3, and 4, respectively.

### 2.2.2. Depression

Depressive symptoms were measured at all four assessments by the Italian validated version (Mazzotti et al., 2003) of the standardized Patient Health Questionnaire (PHQ-9; Spitzer et al., 1999). The PHQ-9 assesses depressive symptoms over the past two weeks. Items are rated on a 4-point scale (0 = *not at all* to 3 = *nearly every day*). Observed Cronbach's alphas were 0.86, 0.86, 0.85, and 0.83 at Times 1, 2, 3, and 4, respectively.

### 2.2.3. Psychological flexibility and inflexibility

The Italian version (Landi et al., 2021d; Landi et al., 2021c) of the psychometrically sound Multidimensional Psychological Flexibility Inventory (MPFI; Rolffs et al., 2018) was utilized to measure psychological flexibility and inflexibility at Time 1. Respondents rated the extent to which they agreed with each item on a 6-point scale (1 = *never true* to 6 = *always true*). Observed Cronbach's alphas for psychological flexibility and inflexibility were 0.95 and 0.94, respectively.

## 2.3. Data analysis approach

Statistical analyses were conducted in *Mplus* 8.4 with the maximum likelihood robust (MLR) estimator (Muthén and Muthén, 1998-2018). The evaluation of tested models was based on multiple indices (Marsh et al., 2005): the Comparative Fit Index (CFI) and the Tucker–Lewis Index (TLI), with values  $>0.90$  representing acceptable fit and values  $>0.95$  indicative of excellent fit; and the Root Mean Square Error of Approximation (RMSEA), with values  $<0.08$  representing acceptable fit and values  $<0.05$  representing good fit.

Analyses on attrition, missing data and longitudinal invariance of anxiety and depression are reported in Supplementary Material 1. To analyze mean-level changes in anxiety and depression over the four assessment points, we ran a series of Latent Growth Model (LGM; Duncan and Duncan, 2009) analyses, which provided estimates of the mean levels (i.e., intercepts) and rates of change (i.e., slopes) of each variable, as well as the variance of these latent growth factors. For both anxiety and depression, we conducted a series of LGMs, beginning with the baseline model (estimating just the intercept) and testing both linear and quadratic models.

We further conducted Latent Profile Analysis (LPA; Berlin et al., 2014) on Time 1 observed values of psychological flexibility and inflexibility. LPA is a mixed modeling approach designed to probabilistically assign each participant to a profile that shares strong similarities on a set of variables, with the aim of finding the smallest number of profiles or classes that capture most of the variance among participants.

A parsimonious number of classes is identified by evaluating the: (a) Sample Size Adjusted Bayesian Information Criterion (SSA-BIC), with the optimal model represented by the lowest SSA-BIC; (b) entropy, which is an index of classification accuracy to assign a participant to a class, with values  $>0.75$  representing clarity of classification (Reinecke, 2006); (c) adjusted Lo-Mendell-Rubin Likelihood Ratio Test (LMR-LRT), with a non-significant result indicating that adding an extra class does not significantly improve the model; (d) content, interpretability and theoretical meaningfulness of each class in the various solutions, preferring the most parsimonious solution; (e) presence in every class of at least 5% of the sample for meaningful interpretation and further analysis.

Finally, according to the identified psychological flexibility and inflexibility profiles, a multi-group approach with Multivariate Latent Growth Model (MLGM) analyses was used to yield distinct models of the intercepts and slopes of anxiety and depression for the different profiles, while significant differences in these parameters were tested by the Wald test.

## 3. Results

### 3.1. Preliminary analyses

Descriptive statistics and Person's Correlations for all study variables at each time point are displayed in Table 1. Psychological flexibility was significantly negatively correlated with psychological inflexibility, anxiety and depression at each time point with the magnitude of coefficients ranging from small to medium. Psychological inflexibility was significantly positively associated with anxiety and depression at each time point with coefficients mostly of a high magnitude. Anxiety and depression at each time point were significantly positively related, with most coefficients being of a high magnitude.

Based on normative data for the anxiety and depression scales, 10.56%, 10.81%, 12.81%, 12.68% of participants reported moderate anxiety, and 5.46%, 4.32%, 5.29% and 6.20% severe anxiety at Times 1, 2, 3, and 4, respectively. Regarding depression at each time point, 18.13%, 16.49%, 15.88% and 19.72% reported moderate depression and 2.99%, 1.35%, 0.84% and 1.13% severe depression.

### 3.2. Anxiety and depression trajectories

The trajectories of anxiety and depression over the two consecutive lockdowns during the first nine months of the pandemic are displayed in Fig. 2. Results of the LGMs are summarized in Table 2. Findings indicated a linear growth for anxiety,  $\chi^2(5) = 8.36$ , CFI = 0.992, TLI = 0.990, RMSEA = 0.034 [0.000, 0.074]. On average, participants reported moderate anxiety during the first lockdown which increased linearly throughout the study period including the easing of restrictions and the second lockdown. LGM analyses revealed quadratic growth for depression,  $\chi^2(1) = 1.58$ , CFI = 0.998, TLI = 0.989, RMSEA = 0.032 [0.000, 0.122]. Participants displayed moderate depression during the first lockdown which decreased as the lockdown eased (Time 2) and remained at this lower level during the next few months (Time 3), and then increased at the second mandatory lockdown (Time 4).

### 3.3. Psychological flexibility and inflexibility profiles

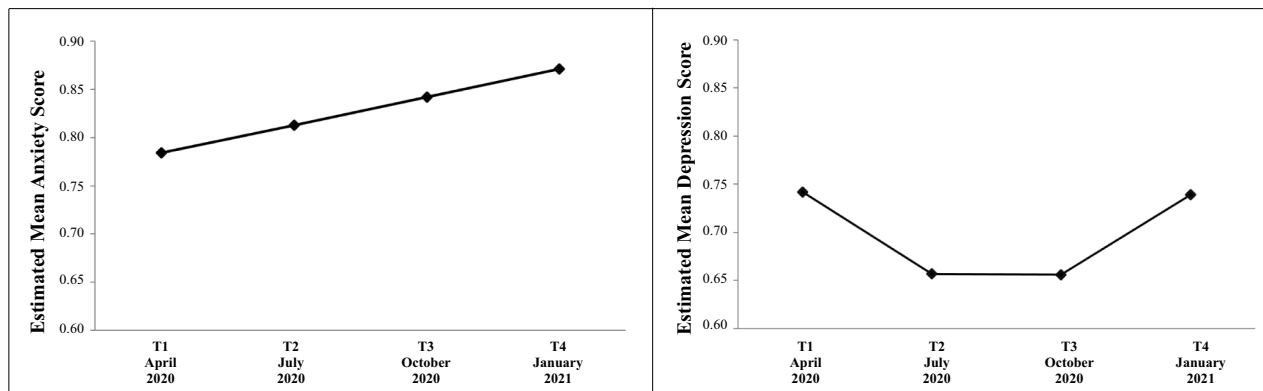
We conducted LPAs extracting two to four classes. As reported in Supplementary Material 2, the fit indices indicated that the two-class solution was the most parsimonious. It was better than the single class solution (LMR-LRT  $p < 0.01$ ) and, although the SSA BIC was lower in the three- and four-class solutions, adding a third or a fourth class was not theoretically meaningful, since the third and fourth classes were slight variations of one of the classes in the two-class solution. Furthermore, when a third and fourth class were extracted, a class representing less than 3.75% of the sample appeared in each class solution, decreasing its

**Table 1**

Observed means (M), standard deviations (SD), ranges, and person's correlations for all study variables at each assessment.

	M (SD)	Range	1	2	3a	3b	3c	3d	4a	4b	4c
1. Psychological flexibility T1	3.73 (0.90)	1–6	–								
2. Psychological inflexibility T1	2.20 (0.74)	1–5.57	–0.35***	–							
3a. Anxiety T1	0.80 (0.62)	0–3	–0.31***	0.66***	–						
3b. Anxiety T2	0.74 (0.64)	0–3	–0.19***	0.52***	0.64***	–					
3c. Anxiety T3	0.82 (0.62)	0–3	–0.21***	0.52***	0.59***	0.64***	–				
3d. Anxiety T4	0.86 (0.63)	0–3	–0.23***	0.47***	0.61***	0.67***	0.74***	–			
4a. Depression T1	0.74 (0.54)	0–2.67	–0.31***	0.67***	0.79***	0.59***	0.55***	0.54***	–		
4b. Depression T2	0.62 (0.52)	0–2.56	–0.20***	0.51***	0.57***	0.81***	0.57***	0.59***	0.65***	–	
4c. Depression T3	0.65 (0.49)	0–2.89	–0.16**	0.46***	0.45***	0.51***	0.75***	0.58***	0.53***	0.60***	–
4d. Depression T4	0.74 (0.48)	0–2.33	–0.19***	0.42***	0.47***	0.58***	0.59***	0.76***	0.57***	0.64***	0.65***

Notes. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . T1 = Time 1 assessment; T2 = Time 2 assessment; T3 = Time 3 assessment; T4 = Time 4 assessment (N = 569).



**Fig. 2.** Estimated growth of anxiety and depression during the first nine months of the pandemic.

**Table 2**

Latent growth model (LGM) analyses for anxiety and depression.

	Growth factors			Model Fit					Model comparisons			
	Intercept M ( $\sigma^2$ )	Slope M ( $\sigma^2$ )	Quadratic slope M ( $\sigma^2$ )	$\chi^2$	df	CFI	TLI	RMSEA [90% CI]	Models	$\Delta\chi_{sb}^2$ ( $\Delta df$ )	$\Delta CFI$	$\Delta RMSEA$
<b>Anxiety</b>												
M1: intercept-only model	0.817*** (0.244***)			28.889	8	0.949	0.962	0.068 [0.042, 0.095]				
<b>M2: linear model</b>	<b>0.784***</b> <b>(0.255***)</b>	<b>0.029**</b> <b>(0.013**)</b>		<b>8.362</b>	<b>5</b>	<b>0.992</b>	<b>0.990</b>	<b>0.034</b> <b>[0.000, 0.074]</b>	<b>M2–M1</b>	<b>21.129***</b> <b>(3)</b>	<b>–0.043</b>	<b>0.034</b>
M3: quadratic model	0.799*** (0.360***)	–0.023 (0.143)	0.017 (0.005)	3.676	1	0.993	0.961	0.069 [0.000, 0.149]	M3–M2	5.270 (4)	–0.001	–0.035
<b>Depression</b>												
M1: intercept-only model	0.705*** (0.155***)			36.455	8	0.909	0.932	0.079 [0.054, 0.106]				
M2: linear model	0.707*** (0.192***)	0.002 (0.009**)		25.029	5	0.936	0.923	0.084 [0.053, 0.118]	M2–M1	10.807* (3)	–0.027	–0.005
<b>M3: quadratic model</b>	<b>0.742***</b> <b>(0.276***)</b>	<b>–0.127***</b> <b>(0.110)</b>	<b>0.042***</b> <b>(0.003)</b>	<b>1.576</b>	<b>1</b>	<b>0.998</b>	<b>0.989</b>	<b>0.032</b> <b>[0.000, 0.122]</b>	<b>M3–M2</b>	<b>22.344***</b> <b>(4)</b>	<b>–0.062</b>	<b>0.052</b>

Notes. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . M = estimated mean score;  $\sigma^2$  = variance;  $\chi^2$  = Chi-Square; df = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker–Lewis index; RMSEA [90% CI] = Root Mean Square;  $\Delta$  = change in the parameter. Bold indicates the best fitting factor solution (N = 569).

interpretability and meaningfulness. Hence, the two-class solution was selected because it displayed satisfactory entropy (0.79), indicating appropriate levels of clarity in the classification associated with it.

The first profile was composed of 481 participants (84.68%) reporting high levels of psychological flexibility (M = 3.89), and low levels of psychological inflexibility (M = 1.96) and was labeled “psychologically flexible profile.” The second profile was composed of 87 participants (15.32%) reporting high levels of psychological inflexibility

(M = 3.43, >1 SD above the sample mean) and medium-low levels of psychological flexibility (M = 3.12) and was labeled “psychologically inflexible profile.”

Based on normative data for the anxiety and depression measures, in the psychologically flexible profile 6.86%, 4.99%, 6.86%, 5.41% of participants reported moderate anxiety, and 1.87%, 1.66%, 1.46% and 2.29% severe anxiety, while in the psychologically inflexible profile 31.03%, 18.39%, 14.94%, and 21.84% moderate anxiety, and 25.29%,

9.20%, 13.79%, 12.64% severe anxiety, at Times 1, 2, 3, and 4, respectively. Regarding depression, in the psychologically flexible profile 3.3%, 3.74%, 1.87% and 1.87% reported moderate depression, and 0.62%, 0.83%, 0.21% and 0.42% severe depression, while in the psychologically inflexible profile 14.94%, 12.64%, 10.34%, and 10.34% reported moderate depression, and 16.09%, 9.20%, 2.30% and 2.30% severe depression.

### 3.4. Trajectories of anxiety and depression for the psychologically flexible and inflexible profiles

To examine whether the anxiety and depression trajectories vary as a function of the psychologically flexible and inflexible profiles, we conducted MLGMs to model intercepts and slopes separately for the two profiles. We tested multigroup MLGMs in which we included a linear model for anxiety and a quadratic model for depression. We conducted pairwise parameter comparisons with the Wald test. These multivariate models yielded a good fit with the data for both anxiety,  $\chi^2 = 14.754$ ,  $df = 10$ , CFI = 0.987, TLI = 0.985, RMSEA = 0.041 [0.000, 0.082] and depression,  $\chi^2 = 2.126$ ,  $df = 2$ , CFI = 1.000, TLI = 0.997, RMSEA = 0.015 [0.000, 0.120]. Intercepts and slopes for the total sample and for the psychologically flexible and inflexible profiles are reported in Table 3 and estimated means across the study period are depicted in Fig. 3.

Regarding anxiety, the psychologically flexible and inflexible profiles significantly differed in terms of intercept and linear slope. For the psychologically inflexible profile, anxiety is significantly higher during the first lockdown and stays relatively high across the first nine months of the pandemic. In contrast, for the psychologically flexible profile anxiety is significantly lower at Time 1 and, although it slightly increases over the study period, it remains lower than anxiety in the psychologically flexible profile across the nine-month period.

Regarding depression, the psychologically flexible and inflexible profiles significantly differed with respect to intercept and linear slope but not on the quadratic slope (although the respective linear slopes were positive and significant in both profiles). Depression in the psychologically inflexible profile starts significantly higher than in the psychologically flexible profile, decreases during the easing of restrictions (Time 2), then decreases further over the next few months (Time 3), and increases at the second lockdown (Time 4), while throughout the study period remaining at a higher level than depression

**Table 3**

Multivariate latent growth model (MLGM) analyses: mean (M) and variance ( $\sigma^2$ ) of the latent growth factors (intercepts and slopes) for anxiety and depression in the psychologically flexible and inflexible profiles.

	Growth factors		
	Intercept M ( $\sigma^2$ )	Slope M ( $\sigma^2$ )	Quadratic slope M ( $\sigma^2$ )
<b>Anxiety – linear growth model</b>			
Psychologically flexible profile	<b>0.660***</b> (0.161***)	<b>0.040***</b> (0.012**)	
Psychologically inflexible profile	<b>1.474***</b> (0.269***)	<b>–0.028</b> (0.025)	
Total sample	<b>0.784***</b> (0.255***)	<b>0.029**</b> (0.013**)	
<b>Depression – quadratic growth model</b>			
Psychologically flexible profile	<b>0.628***</b> (0.192**)	<b>–0.094***</b> (0.076)	<b>0.037***</b> (0.001)
Psychologically inflexible profile	<b>1.372***</b> (0.305*)	<b>–0.300***</b> (0.316*)	<b>0.073**</b> (0.019)
Total sample	<b>0.742***</b> (0.276***)	<b>–0.127***</b> (0.110)	<b>0.042***</b> (0.003)

Notes. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . Values in bold are significantly different ( $p < 0.05$ ) for the psychologically flexible and inflexible profiles at the Wald test (N = 569).

in the psychologically flexible profile. Although depression starts significantly lower in the psychologically flexible profile, it shows a similar trajectory in that it decreases slightly during the easing of restrictions (Time 2), increases slightly over the next few months (Time 3), and continues to increase at the second lockdown (Time 4).

## 4. Discussion

The first study aim was to examine the trajectories of anxiety and depression over two consecutive lockdowns during the first nine months of the pandemic in a community sample. Results revealed that anxiety increased linearly throughout the study period, whereas depression displayed a quadratic trajectory evidencing a decrease with the easing of the first lockdown followed by an increase during the second lockdown.

The linear anxiety trajectory differs from the predominant pattern of results from longitudinal COVID-19 research focused on the first COVID-19 phase indicating an increase in anxiety over the first two months followed by a stabilization or slight decrease in anxiety in subsequent months (e.g., [Daly and Robinson, 2021](#); [Fancourt et al., 2021](#)). In contrast, results from several longitudinal studies show that elevated anxiety persists from the second to the seventh month of the pandemic ([Czeisler et al., 2021](#); [Pieh et al., 2021](#)). The latter findings are more aligned with those of the present study. Pandemic-associated uncertainties (e.g., unpredictable COVID-19 infection peaks, and fluctuations in vaccine availability) and fears (e.g., of COVID-19 infection and death) are likely to accrue and intensify over time and exacerbate anxiety ([Bakioğlu et al., 2020](#); [Landi et al., 2020](#)).

Regarding depression, findings from this study are consistent with those of previous longitudinal studies indicating elevated depression associated with the first lockdown decreases over subsequent months ([Daly and Robinson, 2021](#); [Fancourt et al., 2021](#)). However, the present study provides data on the course of depressive symptoms over an extended timeframe showing that depression increases during the second lockdown, reaching a level similar to that of the first lockdown. Anxiety is likely to be more easily triggered by pandemic-related uncertainties and fears ([Pakenham et al., 2020](#); [Taylor et al., 2020](#)), whereas depression appears to be intensified by lockdown restrictions that limit social support and engagement in valued leisure, work and socializing activities, which can in turn cause multiple losses, isolation, and loneliness, all of which exacerbate depression ([Groarke et al., 2021](#); [Hamama-Raz et al., 2021](#)). Future studies should further investigate the longer-term mental health impacts of the COVID-19 pandemic and repeated or prolonged lockdowns.

Regarding the second study aim, we found that the anxiety and depression trajectories varied as a function of two psychological flexibility and inflexibility profiles. We found that compared to participants with a psychologically flexible profile, those with a psychologically inflexible profile reported significantly higher levels of anxiety and depression, which remained higher across the study period. These findings are consistent with those from other studies that have revealed sub-groups of people who are at risk of persistent anxiety and depression, and sub-groups that appear to be less vulnerable to COVID-19-related distress ([Saunders et al., 2021](#)).

As hypothesized, we found that people characterized by high psychological inflexibility, a mental health risk factor, reported higher anxiety and depression across the study period than those characterized by high psychological flexibility, a mental health protective factor. These findings are consistent with prior research that has highlighted the roles of psychological flexibility and inflexibility in mitigating and exacerbating the adverse mental health impacts of the COVID-19 pandemic, respectively ([Gloster et al., 2020a](#); [Hernández-López et al., 2021](#)). The longitudinal design of the present study extends this mainly cross-sectional research by mapping the differing trajectories of anxiety and depression for those with psychologically flexible and inflexible profiles during the first nine months of the pandemic.

Notably, although compared to the psychologically inflexible sub-

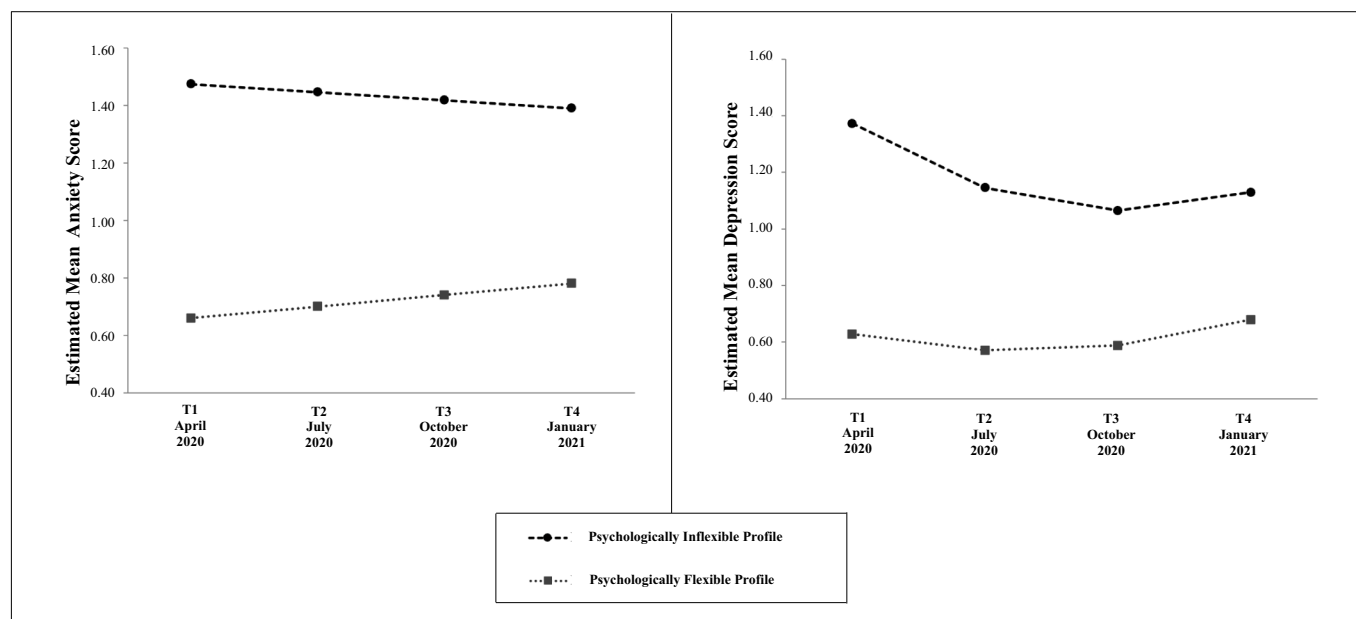


Fig. 3. Estimated growth of anxiety and depression in the psychologically flexible and inflexible profiles during the first nine months of the pandemic.

group the psychologically flexible sub-group evidenced lower levels of anxiety and depression over the study period, the psychologically flexible sub-group nevertheless reported gradual ongoing increases in anxiety and an upturn in depression during the second lockdown. These findings are consistent with the emphasis of the psychological flexibility framework on how a person relates to their distress rather than on the distress itself. For example, attentive absorption in troublesome pandemic-related thoughts and feelings or resisting these experiences (psychologically inflexible behavior) is likely to intensify distress, whereas mindful acceptance of them in the present (psychologically flexible behavior) mitigates the intensification of discomfort (Presti et al., 2020). Hence, psychological flexibility involves mindfully accepting distress rather than eliminating it. The inherent hardships of a pandemic understandably elicit anguish. People with high psychological flexibility are able to acknowledge and mindfully accept this distress and redirect their attention to engagement in values-based action, thereby minimizing their vulnerability to mental health problems. Post hoc analyses showed that compared to the psychologically inflexible sub-group, a significantly lower proportion of participants in the psychologically flexible sub-group reported moderate to severe levels of anxiety and depression at Time 1 (anxiety,  $\chi^2[1568] = 78.29, p < 0.001$ ; depression,  $\chi^2[2568] = 72.61, p < 0.001$ ) and Time 4 (anxiety,  $\chi^2[1568] = 19.95, p < 0.001$ ; depression,  $\chi^2[2568] = 19.95, p < 0.001$ ). Overall, these findings suggest that psychological flexibility fosters resilience in adversity and protects mental health (Kashdan and Rotenberg, 2010).

Given the growing evidence indicating that psychological flexibility and inflexibility are malleable transdiagnostic protective and risk mental health factors, respectively, it is paramount that during the pandemic, public health interventions target them using evidence-based strategies. The psychological flexibility framework specifies six therapeutic processes that nurture psychological flexibility. In brief, these processes involve mindful acceptance of mental and emotional discomfort, and active engagement in behaviors that foster the pursuit of personal values (Hayes et al., 2012). ACT involves helping people acquire the skills inherent in these processes. A large body of research shows that psychological flexibility is cultivated, and psychological inflexibility reduced in youth and adults by ACT-based interventions. A review of 20 meta-analyses that included 133 randomized control trials of ACT ( $n = 12,477$ ) reported effect sizes ranging from small to medium

for anxiety and depression (Gloster et al., 2020b). ACT-based interventions are effective in reducing anxiety and depression across diverse contexts using flexible modes of delivery including group (Giovannetti et al., 2020), online (Viskovich and Pakenham, 2020), and mobile app (Levin et al., 2017). In view of the social restrictions used to manage the COVID-19 pandemic, flexible delivery is critical for the large-scale dissemination of mental health interventions (Mahoney et al., 2021; Moreno et al., 2020).

This study has several limitations. First, our online convenience sampling limits the generalizability of findings to the general population. Specifically, the present sample had an overrepresentation of people with the following socio-demographic characteristics: higher education, middle socio-economic status, younger age, and being female. Regarding the latter, it should be noted that females have reported worse COVID-19 mental health impacts than males and, therefore constitute an important at risk target group (Saunders et al., 2021). In contrast, the baseline rate of pre-existing mental health problems, which is the strongest predictor of mental health status, was aligned with the 2019 Italian census data. Hence, it is likely that the pandemic trajectories of anxiety and depression evidenced in the present study reflect those of the general Italian population. Second, the reliance on self-report data increases the risk of common method variance. Third, although the overall retention rate was good, there was a marginal underrepresentation of participants with pre-existing mental health problems in those who completed at least two assessments compared to those who only completed baseline assessment (see Supplementary Material 1). However, it should be noted that the total sample at Time 1 was employed in data analyses, and as mentioned above, rates of pre-existing mental health problems in the total sample were reflective of those in the general population. Forth, a larger sample size may have yielded more than two psychological flexibility/inflexibility profiles. Finally, although we employed a longitudinal design, psychological flexibility and inflexibility were not assessed at all time points. This precluded the use of Latent Growth Model analyses to evaluate how psychological flexibility and inflexibility fluctuate over time and how these fluctuations are, in turn, associated with variations in anxiety and depression levels throughout the pandemic. Future studies should further explore the roles of psychological flexibility and inflexibility in shaping resilient trajectories during and beyond the pandemic. Study strengths include the investigation of anxiety and depression trajectories over the first two



COVID-19 peaks and lockdowns across nine months, and the identification of malleable protective and risk mental health factors that can be targeted by public health interventions during the COVID-19 pandemic.

## 5. Conclusion

This study provides much needed data on the trajectories of anxiety and depression over two consecutive COVID-19 peaks and associated lockdowns. Results revealed a linear increase in anxiety over the study period, and a quadratic trajectory for depression involving an initial rise followed by a decrease and then an increase with fluctuations corresponding to imposed social restrictions. As predicted, results showed that high psychological inflexibility is a risk factor for prolonged elevated anxiety and depression during the pandemic, whereas high psychological flexibility is a protective factor. Given the COVID-19 pandemic is not abating in most countries, preventive public health interventions should be delivered that target psychological flexibility and inflexibility. These interventions should harness evidence-based approaches like ACT that have been shown to effectively target these factors.

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jad.2022.03.067>.

## CRedit authorship contribution statement

GL, KP, SG, and ET designed the study. GL implemented the study. GL, KP and ET wrote the first draft of the manuscript. GL undertook the statistical analysis and EC supervised them. KP and EC provided critical revisions and feedback. All authors contributed to the manuscript and have approved the final manuscript.

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## Declaration of competing interest

The authors report no conflict of interests.

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