

Introduction

Research on the psychological impact of quarantine due to the Covid-19 pandemic has largely focused on estimating the prevalence of mental health disorders (e.g. anxiety and depression) in the general population (Brooks et al., 2020) and related socio-demographic risk factors. Very few psychological and clinical studies have examined individual characteristics that can support mental health under such circumstances (Asmundson & Taylor, 2020). In addition to the mental health burden most often reported in the literature, there is some evidence of positive changes occurring after a pandemic, including an increase in compassion and empathy, post-traumatic growth, and self-empowerment (Chew et al., 2020). Positive psychology is increasingly addressing the scientific study of how positivity affects life struggles, and how life challenges can bring about positivity (Niemiec, 2019). Character strengths (Peterson & Seligman, 2004) are among the most investigated individual characteristics in the field of positive psychology. They are mainly stable general dispositions that have been repeatedly associated with well-being (Niemiec, 2013), and resilient growth following events such as the September 11 attacks (Peterson & Seligman, 2003), natural disasters (Duan & Guo, 2015), shooting tragedies (Schueller et al., 2015), and the Paris terrorist attacks (Lamade et al., 2019). Therefore, character strengths can be seen as useful individual characteristics in protecting mental health (reducing symptoms of distress and increasing self-efficacy) following a pandemic too. The present study newly examines the influence of character strengths on mental health in the time of Covid-19.

Evidence of the psychological impact of Covid-19

Literature on the psychological impact of the Covid-19 pandemic is on the rise. A review of its impact on mental health (Nobles et al., 2020) retrieved 6 published cross-sectional studies, all conducted on the Chinese general population (Cao et al., 2020; S. Li et al., 2020; Z. Li et al., 2020; Liu et al., 2020; Wang et al., 2020a; Y. Zhang & Ma, 2020;). The findings resemble those relating to previous pandemics (Brooks et al., 2020; Chew et al., 2020), with symptoms of anxiety, depression, and post-traumatic stress disorder (PTSD) being the most often reported in the general population. Several demographic variables were associated with worse outcomes, including: female gender; living in Wuhan and Hubei province (the hardest-hit area); being a student; having relatives infected; job loss due to the pandemic; and pre-existing physical health issues (e.g. chronic disease). Similar results emerged in large community samples ($n = 7236$, Huang & Zhao, 2020), and in countries other than China (Iran, Moghanibashi-Mansourieh 2020; India, Roy et al., 2020; Italy, Cellini et al., 2020; Moccia et al., 2020; North-Spain, Dosil-Santamaria et al., 2020; Paraguay, Rios-González & Palacios, 2020; UK, Shevlin et al., 2020). Furthermore, a 4-week longitudinal study (Wang et al., 2020b) focusing on PTSD symptoms and psychological distress ($n = 478$) showed a significant decline in PTSD symptoms over time, though they remained above cut-off, while no significant changes were seen in depression, anxiety and stress levels. In other words, the psychological impact of Covid-19 may persist, as seen in survivors after the SARS pandemic (Mak et al., 2009), in university students (Cheng & Cheung, 2005; Qian et al., 2005), and the general population (Yeung & Fung, 2007). Some evidence has also emerged regarding the protective

factors, which include: living in urban areas; living with parents; having a steady family income (Cao et al., 2020); moderate physical exercise (Zhang et al., 2020); both secure and avoidant attachment styles (Moccia et al., 2020); confidence in doctors; perceived likelihood of surviving and low risk of contracting Covid-19; and satisfaction with health information and personal precautionary measures (Wang et al., 2020a). Interestingly, a study conducted in 31 Chinese regions (J. Li et al., 2020) found that a low self-control (in the sense of not being able to adopt an appropriate behavior) was associated with a greater perceived dangerousness of Covid-19 and more mental health problems. The present study is one of the few to focus on the importance of individual personality traits for mental health during the Covid-19 lockdown.

Character strengths and adversity: relationships with distress and self-efficacy

Character strengths (Peterson & Seligman, 2004) consist of 24 positive traits pertaining to six culturally-derived moral virtues (wisdom, courage, humanity, justice, temperance, and transcendence). Empirical research has identified from three to five second-order factors (e.g. McGrath, 2015; Littman-Ovadia, 2015). One commonly reported solution comprises five factors usually named emotional, intellectual, interpersonal, restraint and transcendence. Character strengths have long been considered among the personal assets that support well-being, particularly in challenging life situations. From a theoretical standpoint, Niemiec (2019) recently pointed out that character strengths have three “adversity functions”, enabling individuals to thrive when times are hard: buffering – character strengths use can prevent problems (prior to adversity); reappraisal – character strengths can help explain or reinterpret problems (during adversity); and resilience – character strengths support recovery (after adversity).

As regards the buffering function, transcendence (e.g. hope, spirituality) and restraint strengths (e.g. perseverance, self-regulation) were found to predict resilience over and above factors such as positive affect, self-efficacy, optimism, social support, self-esteem, life satisfaction, and sociodemographic variables (Martínez-Martí & Ruch, 2017). All character strength factors (except for transcendence strengths) showed positive associations with general self-efficacy. All these factors (except for interpersonal strengths, such as humility, fairness and teamwork) were also significant predictors of general self-efficacy beliefs in Israeli adolescents (Weber et al., 2013); and self-efficacy mediated the relationship between emotional strengths and life satisfaction. Moreover, restraint and interpersonal strengths have been found negatively associated with depression and anxiety in college students reporting stressful situations (Duan, 2016). All character strengths have also shown significant positive correlations with life satisfaction (see Bruna et al., 2019 for a meta-analysis).

Concerning the reappraisal function, some authors (Duan & Wang, 2018; Haridas et al., 2017) identified different profiles of individuals based on their character strengths, and found these profiles associated with different levels of psychological distress. For instance, a latent profile analysis conducted by Duan & Wang (2018) distinguished their sample between “at-strengths” and “at-risk” individuals, who respectively exhibited high and low levels of restraint, and intellectual and interpersonal strengths. The “at-strengths” group experienced higher levels of psychological well-being and lower levels of psychological distress than the “at-risk” group. Interpersonal, restraint and transcendence strengths also correlated negatively with general psychological distress in adolescents exposed at length to war, political conflict, and terrorism

in Israel (Shoshani & Slone, 2016), thus supporting the resilience function of character strengths.

In short, character strengths are personal features fundamental to well-being and life satisfaction, but particularly important in times of adversity. They help people to adapt positively and manage difficulties. They could therefore have a fundamental role in a pandemic lockdown too.

The present study

In the aftermath of severe Covid-19-related restrictions, Italian people's personal and working lives have undergone necessary, drastic changes. Italy was the first Western country to experience the dramatic effects of Covid-19, and it has been among the countries hardest hit by the pandemic (World Health Organization, WHO, 2020). According to the Italian Higher Health Institute (HHS, 2020), by April 28th 2020 (when our data collection ended), there had been nearly 200,000 people infected, and more than 25,000 had died. It is important to study the effects of positive individual characteristics in such a situation to clarify whether certain personal resources can buffer the negative impact of lockdown and the dramatic health care situation of a pandemic, confirming their importance in yet another life situation.

Two early studies in Italy, conducted respectively two weeks and one month after the lockdown was imposed in early March 2020 (Cellini et al., 2020; Moccia et al., 2020), identified from moderate to extreme levels of psychological distress in quite a large proportion of participants (18.6% in Moccia et al., 24.2-50.2% in Cellini et al.). The present study examines the individual features potentially helping individuals in the Italian general population to cope after a month in quarantine, given the reports of negative effects of such situations on mental health (e.g. anxiety and depression) persist over time (Wang et al., 2020b). More specifically, the main goal of our study was to analyze whether and which character strengths sustain people's mental health (i.e. contain their psychological distress) and Covid-19-related self-efficacy.

In line with previous reports on populations experiencing stress (e.g. Martínez-Martí & Ruch, 2017; Duan, 2016; Shoshani & Slone, 2016; Weber et al., 2013), we expect transcendence strengths (such as hope, gratitude, love, spirituality, and zest), and restraint strengths (including perseverance, prudence, and self-regulation) to be the most strongly associated with psychological distress and self-efficacy. It has repeatedly been suggested that these strengths are particularly important in giving individuals the energy and determination to face challenging situations and helping them to regulate their behavior under stressful circumstances. We hypothesize that these strengths yield lower levels of psychological distress (i.e. depression, anxiety and stress), and higher levels of Covid-19-related self-efficacy.

Materials and methods

Participants

The study included individuals at least 18 years of age and living in Italy. All participants took part in the study voluntarily and approved the consent form before taking part. The study was approved by the Ethical Committee of the University of Padova (n. 3531). Data collection lasted 3 weeks, from April 7th (one month after lockdown was officially declared) to April 28th, 2020. Starting on March 9th, 2020, the nationwide lockdown measures made it

impossible to travel anywhere (except for well-grounded work-related or health reasons), all schools and universities were closed, gatherings in public places were prohibited, sporting events were suspended, all except vital businesses (supermarkets and pharmacies and related shops) were closed, and public transport was curtailed. Our survey was accessed by 1281 respondents, but 337 did not complete it and were consequently excluded from our analyses. Socio-demographic information was collected on respondents' gender, age, number of children living at home, working or student status, and province of residence. The final sample of 944 participants (241 males) was a mean age of 37.24 years ($SD = 14.50$), and an age range between 18 and 81 years. In the sample as a whole, 35% had at least one child living at home with them, 49% were full-time workers, 21% were students, 9% worked part-time, 6% were unemployed, and 4% were retired. Respondents were living in 87 of Italy's 106 provinces. Among the information requested, occupational changes were measured on a self-reported scale indicating how much respondents felt the pandemic had changed their job situation (from 1 = not at all, to 5 = drastically).

Materials

Values in Action Inventory of Strengths-120 (VIA-IS-120; Peterson & Seligman, 2004). This tool consists of 120 items measuring character strengths (for a complete description, see <https://www.viacharacter.org/>). There are 5 items for each strength, and answers are given on a 5-point Likert scale (1 = "not at all like me" to 5 = "very much like me"). For instance, curiosity is measured with items such as "I am always curious about the world" and perseverance is measured by items such as "I always complete what I begin". The original measure showed a high internal consistency for every strength (Cronbach's alpha range: .67 - .90, Peterson & Seligman, 2004).

Depression, Anxiety, and Stress Scale-21 (DASS-21, Lovibond & Lovibond, 1995; validated in Italian by Bottesi et al., 2015). This scale comprises 21 items measuring three factors: depression, in terms of dysphoria, low self-esteem and absence of incentives (e.g. "I could not feel any positive emotion"); anxiety, in terms of somatic symptoms and fear responses (e.g. "I felt I was having a panic attack"); and stress, in terms of tension, high general arousal, impatience and irritability (e.g. "I felt stressed"). Respondents score on a 4-point Likert scale (0 = "never happened" to 3 "it happened almost every day") how often they felt in such a way in the previous week. A total general distress score was calculated because it had proved highly reliable in the Italian validation study (Cronbach's alpha = .90; Bottesi et al., 2015). After multiplying the score by 2, the cut-offs for moderate to extremely severe symptoms of anxiety, depression and stress are: >9, >13 and >18, respectively (Lovibond & Lovibond, 1996).

General Health Questionnaire-12 (GHQ-12, Goldberg, 1978; validated in Italian by Giorgi et al., 2014). There are 12 items measuring general psychological health. Respondents indicate how often they felt as described during the previous two weeks (e.g. "Have you been able to concentrate on whatever you are doing?") on a 4-point Likert scale (0 = "more than usual" to 4 "much less than usual"). A total score was calculated as in the Italian validation study, which

showed a high internal consistency for the overall scale (Cronbach's alpha = .85; Giorgi et al., 2014). The cut-off for lower than usual health is >12, as indicated by Goldberg et al. (1997).

Self-efficacy measure for Covid-19 (SEC). Five questions were developed for the present study to measure self-efficacy beliefs about succeeding in various aspects of everyday life under quarantine (based on Bandura, 2006): emotion regulation (e.g. "I feel I can manage the emotions I feel every day efficiently"); routine activity planning and completion (e.g. "I feel I can complete all my scheduled activities"); and interpersonal relationships (e.g. "I feel I can keep good relations with people important to me"). Answers are given on a 5-point Likert scale (1 = "not at all" to 5 = "completely"). A total score was calculated, given the high internal consistency (Cronbach's alpha = .85; current sample).

Procedure

The questionnaires used in the survey were implemented in Qualtrics and took a mean 22 minutes to complete. A brief introduction to the study was sent to personal contacts, and posted on social media, with a link to the set of questionnaires. When participants opened the link, the consent form was presented, specifying the general aims and structure of the study. If they consented, they were first asked for various socio-demographic information, then they completed the survey in the following order: VIA-IS-120, DASS-21, GHQ-12 and SEC.

Results

Preliminary analysis

Scores obtained in the DASS-21 and GHQ-12 were calculated using standardized cut-offs to describe the severity of psychological distress in the population. On the three subscales of the DASS-21, 46% of participants presented moderate to extremely severe symptoms of depression, 40% presented moderate to extremely severe symptoms of stress, and 30% presented moderate to extremely severe symptoms of anxiety. From the results of the GHQ-12, 83% of participants reported a lower general state of health than usual.

Table 1 shows the means, standard deviations, and Cronbach's alpha for all the character strengths, DASS-21, GHQ-12 and SEC, and the correlations between character strengths and other variables. All the measures revealed a good internal consistency, with Cronbach's alpha ranging between .68 (for teamwork strength) and .96 (DASS-21).

Descriptively, the strengths most strongly correlated with better psychological outcomes were: hope, zest and gratitude for the DASS-21 and the GHQ-12; and zest, hope, curiosity and perseverance for the SEC. Overall, 9 strengths showed a correlation of .20 or more with the DASS-21, 6 with the GHQ-12, and 11 with the SEC.

Insert Table 1 about here

Structure of character strengths

The theoretical 6-virtues structure proposed by Peterson and Seligman (2004) was not confirmed by subsequent statistical analyses, and various studies have since suggested different sets of second-order factors (e.g., three factors in McGrath, 2015, and Shryack et al., 2010; or five in Höfer et al., 2019; Azañedo et al., 2017; Martínez-Martí & Ruch, 2017; Littman-Ovadia, 2015; McGrath, 2014, and Ruch et al., 2010). We opted to examine the structure of the VIA-IS-120 using principal component analysis to reduce the number of factors to consider in subsequent analyses.

As suggested by Velicer, Eaton, and Fava (2000), we first identified the number of components to extract from the data. Two criteria were used to do so: parallel analysis (PA, Horn, 1965), and the minimum average partial (MAP) analysis (Velicer et al., 2000). Five eigenvalues were higher than 1 (7.78, 2.19, 1.83, 1.45, 1.09, .99), but both PA and MAP analysis indicated 4 as the number of factors to extract from the data.

A principal component analysis was run to extract 4 factors using oblique rotation (promax), given that character factors hypothetically correlate with one another. Strengths were included in the factor in which they had the highest loading as long as the loading was at least .30. The results (see Table 2) showed that the four factors extracted were easy to interpret and composed by similar strengths than previous five-factor solutions, with the usually labelled emotional and intellectual factors being partially melted in a single factor, that we named openness, i.e. a positive attitude to exploring and open-mindedness, as represented by strengths such as creativity, curiosity, and bravery. Based on previously used names, the four factors were labeled: transcendence, interpersonal, openness, and restraint. These four factors jointly explained 55% of the variance, with a similar proportion each (i.e. 29%, 26%, 27%, and 19%, respectively). Exploring the five-factor structure, as suggested by the number of eigenvalues higher than 1, and by many other studies (e.g. Martínez-Martí & Ruch, 2017; McGrath, 2014; Ruch et al., 2010), we found two factors consisting of three strengths only, many cross-loadings, and strengths not loading on any factor. The four-factor structure was therefore preferable, and the four factors identified were used in the subsequent analyses.

Insert Table 2 about here

Effects of character strengths on psychological distress, mental health and self-efficacy

Table 3 shows the correlations between the four factors and the DASS-21, GHQ-12 and SEC scores. Three linear regression models were run to measure the effect of the four factors (transcendence, interpersonal, openness and restraint) on the three psychological measures considered (DASS-21, GHQ-12 and SEC). In line with previous research on pandemics, demographic variables (such as age, gender, being a student, the day on which the participant took the survey, having at least one child living at home, and work-related changes) were added as possible factors explaining psychological distress and low mental health under quarantine

(Nobles et al., 2020; Wang et al., 2020). All the strength-related and outcome variables were standardized before running the regression analyses. Given our exploratory approach, the large number of participants, and the numerous dependent and independent variables, we took a conservative approach and considered as significant only the effects with an associated p value lower than .001.

The results of the three regression models (see Table 4) concerning the demographic variables identified more general distress (DASS-21) in women and respondents who reported more drastic work-related changes, and a lower self-efficacy (SEC) in women. None of the other demographic variables were significant, with β values lower than .22. The results for the effect of character strengths showed significant and constant findings for transcendence across all three measures. This factor had the greatest effect on the DASS-21 ($\beta = -.48$) and SEC ($\beta = .48$), followed by the GHQ-12 ($\beta = -.38$), indicating that people well-endowed with transcendence strengths (e.g. hope, zest, gratitude) scored higher for general mental health, lower for psychological distress (fewer symptoms of depression, anxiety and stress), and higher for self-efficacy in coping with the lockdown situation. None of the effects of the other strengths on the three dependent variables were significant ($p > .001$) or large, as their β value never exceeded .08. The only exception was the effect of openness, which showed a small but significant positive relation ($\beta = .13$) with the DASS-21, indicating that people scoring higher for openness (i.e. creativity, bravery, curiosity, humor, social intelligence, and love of learning) tended to experience more symptoms of depression, anxiety and stress under quarantine. Table 4 shows all the results of the three regression analyses.

Insert Table 3 about here

Insert Table 4 about here

Discussion and conclusion

The present study contributes to enlarge knowledge of the psychological impact of Covid-19 on the general population. It provides novel evidence of the association between character strengths and psychological distress, and between character strengths and self-efficacy, in the context of a pandemic. We addressed the problem in the Italian population, one of the most badly-affected countries in the world (WHO, 2020). First, it is important to mention that the levels of psychological distress exhibited by our respondents after a month under quarantine were similar to those reported in recently-published studies conducted both in Italy (e.g. Cellini et al., 2020; Moccia et al., 2020) and elsewhere (e.g. Wang et al., 2020b; Zhang et al., 2020), and indicate that the psychological impact of Covid-19 persists over time, as previously seen with SARS (Yeung & Fung, 2007). Consistently with a four-week longitudinal study (Wang et al., 2020), general distress levels in our sample were not affected by the day on which the survey was completed and remained stable over the three weeks during which our data were collected.

The structure of the 24 character strengths was analyzed and second-order components were found. Principal component analysis pointed to a four-factor solution, in line with some other

studies (Brdar, & Kashdan, 2010; Macdonald, Bore, & Munro, 2008), while others identified five or three factors (e.g. Martínez-Martí & Ruch, 2017; McGrath, 2014). The strengths aggregated in much the same way as in previous reports, with some notable exceptions. For one, self-regulation and perseverance loaded in the transcendence instead of the restraint factor. Second, the openness factor considered in the present study is a combination of strengths usually belonging to the emotional factor (e.g. bravery, humor and social intelligence) and the intellectual factor (e.g. curiosity and love of learning).

All the strength factors showed significant positive associations with Covid-19 self-efficacy. This is consistent with previous findings on the relationship between character strengths and general self-efficacy in Israeli adolescents living in a stressful environment (Martínez-Martí & Ruch, 2017).

Turning to our main aim, examining the correlations between character strengths and both mental health (in general, and depression, anxiety, and stress in particular) and Covid-19-related self-efficacy, we found that – apart from restraint – the strengths all yielded significant negative correlations with both measures of psychological distress. As mentioned earlier, the restraint factor differed from that of other studies, and did not include perseverance and self-regulation, which had been found related to both psychological distress and self-efficacy (e.g. Weber et al., 2013). This partly explains why the correlation between this factor and psychological distress (expected in the light of previous reports) was not significant. Overall, factor analysis showed that the second-order character strengths factors identified in this study have an important role in the psychological fallout of the Covid-19 pandemic.

Regression models including demographic variables known to relate to psychological distress associated with pandemics (e.g. Brooks et al., 2020; Nobles et al., 2020) show that female gender and perception of work-related change due to Covid-19 were the only demographic variables significantly predicting the levels of general distress and self-efficacy. These findings are in line with previous reports regarding female gender and drastic work changes as predictors of psychological distress in people under quarantine (e.g. Huang & Zhao, 2020; Shevlin et al., 2020). Nevertheless, since gender balance was not achieved in our sample our results on women displaying higher psychological distress than men could be biased, thus not necessarily supporting previous reports.

As for character strengths, transcendence was the only factor showing strong negative associations with the indicators of psychological distress (DASS-21 and GHQ-12), and with Covid-19-related self-efficacy, in terms of people's ability to manage their emotions, daily activities, and relations with others.

Transcendence refers to a sense of purpose beyond oneself, an orientation towards others (love), meaning (spirituality), positivity (hope, gratitude, zest), or self-sacrifice (persistence, self-regulation). Such personal characteristics may have been especially relevant in a situation of prolonged quarantine, when all citizens – whether they were experiencing symptoms or not – were asked to stay at home and self-isolate to prevent the virus from spreading. Interestingly, preliminary analysis identified hope (expecting the best for the future), and zest (approaching

life with energy and vitality) as the two single character strengths exhibiting the strongest correlations with all three psychological outcomes considered. These two strengths reportedly have a strong effect on life satisfaction (see Bruna et al., 2019 meta-analysis), and are negatively associated with depression and anxiety (Niemiec, 2013). They are also suggested to make individuals perceive less stress, and thus contain the psychological distress experienced in challenging situations – including being a caregiver (García-Castro et al., 2019), or experiencing an earthquake (Duan & Guo, 2015), for instance. Their role may help to explain the positive effect of transcendence on the strain of lockdown in a pandemic. Following Niemiec's conceptualization (2019), these strengths may have both a reappraisal and a resilience function in a lockdown: they can support individuals' positive reframing of the situation, making them better able to appreciate smaller pleasures. Such a positive attitude is usually associated with better psychological outcomes, in both normal and exceptional conditions (Niemiec, 2013; Shoshani & Slone, 2016). As lockdown measures become less stringent, transcendence may also support people's resilience, possibly helping them to experience less psychological distress in the future as well (Martínez-Martí & Ruch, 2017).

Surprisingly, when the other strengths factors were considered in the analysis, the openness factor showed a significant positive relation with psychological distress, as measured by the DASS-21. Though the effect was small, and not seen for the other dependent variables, this finding goes against our expectations from a theoretical standpoint (Niemiec, 2019) and is inconsistent with the outcome of the correlation analyses. The change of sign from the correlation to the result of the regression analysis might be explained statistically by multicollinearity between the openness and transcendence factors ($r = .63$). In addition, it is worth noting that openness (which comprises creativity, bravery, curiosity, humor, social intelligence, and love of learning) refers to a general disposition to seek and create stimuli and emotions to make life fulfilling. Such a disposition might be curtailed by the inability to express these feelings due to limitations on an individual's interpersonal relationships and activities under lockdown. Similar findings were reported in a study on Israeli adolescents exposed to prolonged war and terrorism (Shoshani & Slone, 2016): intellectual strengths, such as curiosity, creativity and love of learning, revealed a small, but significant positive relationship ($\beta = .13$) with psychological distress, as measured by the Global Severity Index. The study's authors suggested that, in highly-stressful situations, seeking information and enjoying knowledge could have a detrimental effect, exacerbating psychological distress instead of alleviating it. Studies on media exposure after terrorist attacks show, for instance, that media consumption is associated with post-traumatic stress symptoms (Ahern et al., 2002), and anxiety (Slone & Shoshani, 2010). A study on the impact of Covid-19 (Huang & Zhao, 2020) also found that the amount of time spent each day focusing on news about the infection was significantly associated with anxiety in Chinese general population. Further studies are needed to better understand the effect of openness factor on psychological distress and to investigate whether character strengths levels change following lockdown, as seen after September 11 (Peterson & Seligman, 2003). Our study, in fact, relies on data collected during the pandemic and cannot ensure that strengths levels are representative of before-pandemic strengths, this being a possible limitation of our research.

In conclusion, this study newly examines the predictive and supporting value of character strengths on Covid-19-related psychological distress and self-efficacy under lockdown in such a severely-affected population as the Italian one. A fundamental role for transcendence emerged from our analyses: it seems to ensure better mental health (with lower levels of stress, anxiety and depression) and higher self-efficacy regarding how best to approach the situation brought on by the pandemic. In the light of our results, the Italian Covid-19 slogan “*andrà tutto bene*” (i.e. everything is going to be alright) disseminated by the media seems to express the right attitude, helping people to deal with the lockdown and engage in positive behaviors and hopeful thoughts, which can ultimately sustain their psychological response to these stressful circumstances.

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Conflict of interest

The authors have no potential conflict of interest to report.

Availability of data and material

Data are available on Figshare. doi: 10.6084/m9.figshare.12366494

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Table 1. Means, standard deviations, Cronbach's alpha and correlations

	M	SD	α	DASS-21 ^a	GHQ-12 ^b	SEC ^c
Character strengths						
Appreciation of beauty	20.03	2.89	.78	.03	-.05	.11
Bravery	18.31	3.20	.80	-.10	-.08	.20
Creativity	18.26	3.41	.87	-.10	-.15	.25
Curiosity	17.90	3.30	.82	-.22	-.24	.37
Fairness	19.67	2.64	.73	-.01	.01	.09
Forgiveness	17.36	3.76	.83	-.21	-.10	.17
Gratitude	18.88	3.35	.84	-.27	-.25	.34
Honesty	21.31	2.33	.78	-.13	-.07	.26
Hope	17.50	3.56	.78	-.40	-.31	.43
Humility	17.56	3.25	.75	-.06	-.03	.10
Humor	18.63	3.34	.81	-.07	-.14	.14
Judgment	20.48	2.65	.77	-.02	-.02	.11
Kindness	20.65	2.58	.80	-.06	-.04	.12
Leadership	17.99	3.04	.79	-.06	-.08	.16
Love	19.38	3.28	.79	-.23	-.17	.28
Love of learning	17.58	3.61	.78	-.04	-.10	.19
Perseverance	18.88	3.41	.87	-.26	-.16	.37
Perspective	17.75	3.20	.82	-.03	-.04	.13
Prudence	17.71	3.29	.79	-.11	-.04	.13
Self-regulation	16.77	3.52	.71	-.22	-.17	.30
Social intelligence	18.63	2.70	.70	-.09	-.10	.19
Spirituality	15.29	4.09	.79	-.24	-.22	.28
Teamwork	18.31	2.70	.68	-.15	-.11	.16

Zest	17.27	3.54	.83	-.35	-.31	.44
DASS-21	15.10	10.70	.96	1.00	.54	-.52
GHQ-12	17.01	4.90	.79	.54	1.00	-.58
SEC	15.06	3.99	.85	-.52	-.58	1.00

Note. All correlations with $|r| > .11$ are significant at the .001 level.

For all tables: DASS-21 = Depression, Anxiety, and Stress Scale-21; GHQ-12 = General Health Questionnaire-12; SEC = Self-Efficacy measure for Covid-19. ^a higher values indicate greater distress ^b higher values indicate worse mental health than usual, ^c higher values indicate higher self-efficacy.

Table 2. Four-factor solution for the VIA-IS 120

	Transcendence	Interpersonal	Openness	Restraint	h^2
Hope	.77	-.10	.33	-.06	.71
Spirituality	.74	.04	.02	-.17	.52
Zest	.71	-.01	.47	-.20	.78
Gratitude	.69	.15	.11	-.06	.63
Perseverance	.64	-.20	.16	.25	.54
Self-regulation	.54	-.17	-.10	.41	.49
Love	.41	.22	.15	-.04	.36
Fairness	-.16	.86	.01	.07	.66
Kindness	.01	.77	.16	-.09	.65
Teamwork	.07	.73	-.08	-.02	.54
Leadership	-.11	.66	.28	.06	.56
Humility	.07	.55	-.47	.25	.51
Forgiveness	.39	.43	-.29	-.12	.43
Appreciation of beauty	.10	.38	.28	.06	.38
Creativity	.14	-.06	.71	.09	.59
Bravery	.13	-.07	.68	.03	.51
Curiosity	.50	-.10	.61	-.06	.67
Humor	-.05	.33	.58	-.24	.47
Social intelligence	.03	.36	.44	.14	.51
Love of learning	.18	-.05	.40	.15	.28
Prudence	-.03	.08	-.27	.88	.76
Judgment	-.16	-.02	.17	.84	.71
Perspective	-.13	.05	.34	.63	.57
Honesty	.20	.22	.15	.32	.41
Variance	.16	.14	.15	.10	

Note. Bold = loading higher than .30.; h^2 = communality.

Table 3. Correlations between second-order character strength factors (transcendence, interpersonal, openness and restraint) with psychological distress, mental health and self-efficacy under Covid-19 lockdown.

	1.	2.	3.	4.	5.	6.	7.
1. Transcendence	1.00						
2. Interpersonal	.51	1.00					
3. Openness	.63	.39	1.00				
4. Restraint	.33	.32	.32	1.00			
5. DASS-21	-.39	-.14	-.15	-.07	1.00		
6. GHQ-12	-.32	-.09	-.20	-.04	.54	1.00	
7. SEC	.48	.20	.32	.15	-.52	-.58	1.00

Note. All correlations with $|r| \geq .11$ are significant at the .001 level.

Table 4. Results of the regressions

Predictor	DASS-21		GHQ-12		SEC	
	β	CI	β	CI	β	CI
Age	-.06	[-.13, .01]	.09	[.02, .17]	.02	[-.05, .09]
Gender	-.30*	[-.44, -.17]	-.20	[-.35, -.07]	.26*	[.13, .39]
Student	.11	[-.06, .28]	.23	[.05, .40]	-.10	[-.26, .06]
Day of survey	-.01	[-.02, .00]	-.01	[-.01, .01]	.01	[.00, .02]
Work change	.06*	[.03, .10]	.04	[.00, .08]	-.04	[-.07, .00]
Having a child at home	-.16	[-.29, -.03]	-.01	[-.14, .13]	.03	[-.09, .16]
Transcendence	-.48*	[-.56, -.40]	-.38*	[-.47, -.29]	.48*	[.40, .56]
Interpersonal	.05	[-.02, .12]	.08	[.01, .15]	-.06	[-.13, .01]
Openness	.13*	[.06, .21]	-.02	[-.10, .06]	.04	[-.03, .12]
Restraint	.02	[-.05, .08]	.07	[.00, .14]	.01	[-.06, .06]
R ²	.22		.13		.26	

* = $p < .001$ Note. β = beta value; CI = 95% confidence interval. Values refer to standardized variables.