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## COVID-19 burnout, COVID-19 stress and resilience: Initial psychometric properties of COVID-19 Burnout Scale

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### ABSTRACT

This study validated a 10-item COVID-19 Burnout Scale (COVID-19-BS) to measure burnout associated with COVID-19. Participants were 402 Turkish adults (76.4% female; Mean<sub>age</sub> = 27.37 ± 8.90). Factor analytic approach yielded a one-factor solution, with high internal consistency reliability. Mediation analysis showed that COVID-19 stress predicted resilience and COVID-19 burnout. Resilience predicted COVID-19 burnout. The relationship between COVID-19 burnout and COVID-19 stress was partially mediated by resilience. Findings suggest that the COVID-19-BS is a psychometrically sound scale to measure burnout related to COVID-19. Findings also elucidate our understanding of the role of resilience in the relationship between stress and burnout related to COVID-19.

COVID-19 has exponentially spread across all continents in a matter of months (Yıldırım et al., 2020). According to statistics published by World Health Organization (World Health Organization, 2020), globally, as of August 4, 2020, there have been more than 18,142,000 confirmed cases of COVID-19 and more than 691,000 deaths, affecting 212 countries and territories. With a high rate of infection and deaths, COVID-19 can lead to many psychological problems including stress, anxiety, depression, fear (Arslan, Yıldırım, Tanhan, et al., 2020) and possibly burnout. To prevent such psychological problems, it is important to understand the factors that are associated with individuals' experience of stress and burnout during the COVID-19 pandemic. In particular, understanding the role of character strengths like resilience in explaining the underlying mechanism between stress and burnout could also be important.

Recent research has shown that people quarantined experienced various psychological problems such as stress, fear, and frustrations (Brooks et al., 2020). Thus far, uncertainty continues concerning when and how the virus will end despite the ease of COVID-19 measures like wearing a face mask in public places and keeping social distancing. Thus, uncertainty related to the COVID-19 and the duration of staying at home has caused significant changes in our daily life routines. Such changes in daily life caused by

COVID-19 have the potential to increase the levels of stress, anxiety, burnout, fear, and frustration (Arslan, Yıldırım, Tanhan, et al., 2020; Talaei et al., 2020). Stressful life situations have significant adverse effects on the mental health and psychological functioning of a person and lead to psychological problems such as anxiety, mental confusion, social deprivation, and depression (Yıldırım & Arslan, 2020).

The Transactional Model of Stress (Lazarus & Folkman, 1984) defined stress as “constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of a person” (p. 141). According to the model, people respond to the same stressor differently due to individual differences including social, emotional, and psychological factors. COVID-19 has adversely affected the psychological health of individuals by leading to stress, anxiety, panic disorders, and behavioral problems (Yıldırım & Arslan, 2020). A study conducted on the general public in China reported that the prevalence rates of psychological distress like stress and anxiety are substantially high (more than 25%) during COVID-19 pandemic (Qiu et al., 2020). Excessive stress can result in a wide range of psychosocial and mental health problems such as anxiety, affective disorders, and burnout, and understanding how COVID-19 pandemic leads to one's reactions to

stressful situations (and vice versa) can be important to develop effective and meaningful interventions (Marčinko et al., 2020). Despite the detrimental impacts of stress on psychological health, individual differences in psychological strengths can reduce the negative effects of stress on psychological health (Ryan & Deci, 2001).

The construct of burnout is defined as a psychological syndrome caused by a prolonged response to interpersonal stressors, mainly on the job (Maslach & Leiter, 2016). It includes three main dimensions: emotional exhaustion, depersonalization (or cynicism), and reduced personal accomplishment (or inefficacy dimension) (Maslach & Jackson, 1981; Maslach & Leiter, 2016). The emotional exhaustion dimension refers to wearing out, loss of energy, debilitation, depletion, and fatigue. The depersonalization dimension refers to negative attitudes toward clients, irritability, withdrawal, and loss of idealism. The reduced personal accomplishment dimension refers to decreased productivity or capability, poor morale, and an inability to cope with stressors (Maslach & Leiter, 2016). This multidimensional model of burnout highlights the importance of individual stress experience within a social context and involves the one's conception of both self and others (Maslach & Leiter, 2016).

Literature typically demonstrates that individual characteristics and contextual factors are closely related to the development of burnout (Maslach & Leiter, 2016). Within the wider literature, burnout has been found to be associated with a wide range of health, mental health, and well-being indicators such as increased anxiety, depression, sleep problems, alcohol consumption, impaired memory, and neck and back pain (Peterson et al., 2008). Burnout is also related to lower motivation and productivity (Dugani et al., 2018), job dissatisfaction (Maslach et al., 2001), and future sick leave and mental and behavioral disorders (Toppinen-Tanner et al., 2005).

Studies on burnout related to COVID-19 have been mainly conducted on healthcare professionals. A study of healthcare professionals showed a significant positive relationship between stress and burnout (Morgantini et al., 2020). Another study investigating the relationship between burnout, anxiety, and stress disorders during COVID-19 pandemic indicated that doctors and nurses experienced high levels of mental health problems including burnout (Sung et al., 2020). Bradley and Chahar (2020) suggested the importance of taking healthcare professionals' mental health into account during the pandemic to boost productivity and reduce burnout derived from pandemic related

stress and uncertainty. By employing a different sample, Griffith (2020) highlighted the role of parental burnout on child maltreatment during periods of disasters. He suggested that parents who experience parental-related stress or parental burnout are more likely to involve in child maltreatment, child neglect, and child abuse during COVID-19 pandemic. Despite all this evidence, research on COVID-19 related burnout among the general public is limited.

Resilience is defined as the process of adapting well in the face of stress, adversity, trauma, tragedy, and threats (American Psychological Association, 2014). Also, resilience refers to the "ability to bounce back" quickly from stressful situations, and flexible adaptation to a new situation (Tugade & Fredrickson, 2004). Resilience can be considered as a personal strength that can contribute to the positive functioning and optimal development and prevent negative emotions, thoughts, and behaviors.

Studies about resilience have shown that resilience is negatively associated with indicators of mental ill-being, including negative affect, depression, and anxiety, and positively associated with indicators of mental health, including positive affect, life satisfaction, subjective well-being, and flourishing (Hu et al., 2020; Yildirim, 2019). Some studies have shown that resilience served as a mediator between stress and burnout, meaning that resilience can mitigate the detrimental effect of stress on burnout (Hao et al., 2015). Resilience can reduce the adverse effects of stress factors on mental health and promote positive mental health in difficult times such as pandemic. In a study conducted by Arslan, Yildirim, and Wong (2020), resilience was examined as a mediator in the relationship between positive affect, negative affect, and psychological health during COVID-19 pandemic. They found that resilience reduced the effect of negative affect and increased the effect of positive affect on psychological health. In addition, resilience played as a significant mediator between COVID-19 related fear, perceived risk, stress, anxiety, and depression (Yildirim et al., 2020).

Maintaining positive mental health is as crucial as maintaining physical health during pandemic. Given the possibility of adverse outcomes of COVID-19 on people's psychological health, it is important to study psychological factors affecting mental health of individuals such as depression, stress, and anxiety (Arslan, Yildirim, Tanhan, et al., 2020; Qiu et al., 2020; Yildirim et al., 2020), fear (Ahorsu et al., 2020) and burnout (Hu et al., 2020). In this regard, the assessment of the impact of COVID-19 on psychological

health of individuals becomes a prominent topic to study during pandemic. To achieve this, there is a need to have pandemic-specific reliable and valid assessment tools. Due to the long-lasting nature of the virus, people can suffer from COVID-19 related burnout to a great extent. However, there are no adequately available scales that directly reflect the experience of burnout during the pandemic. Indeed, Talaei et al. (2020) attempted to assess pandemic specific burnout by adapting items from the Copenhagen Burnout Inventory (Kristensen et al., 2005). However, this scale has been validated within the context of hospital on nurses. It would be fruitful to have a scale which can be easily administered on the general public. Thus, in this study we validated the COVID-19 Burnout Scale adapted from the Malach-Pines's (2005) Burnout Measure-Short Version (BMS).

Thus, the purpose of this study was to investigate the mediating effect of resilience on the relationship between COVID-19 stress and burnout. We first examined the psychometric properties of the COVID-19 Burnout Scale (COVID-19-BS) which was adapted from the BMS (Malach-Pines, 2005). We expected that COVID-19-BS would have a one-factor solution with good internal consistency reliability. We then addressed the following hypotheses: COVID-19 stress would have a direct effect on resilience and COVID-19 burnout; resilience would have a direct effect on COVID-19 burnout; and resilience would mediate the relationship between COVID-19 stress and burnout.

## Method

### Participants

Employing a convenience sample and an online survey, 402 participants (23.6% male and 76.4% female; age ranged from 18 to 68 with a mean age of 27.37 years, SD = 8.90) were drawn from the general public in Turkey. They mainly belonged to average socioeconomic status (69.2%) and had high levels of education with 76.6% holding university degrees. Of the participants, 72.4% were single with no history of chronic disease. Among all participants, only one participant reported confirmed history of COVID-19, while 4.2% of them reported that at least one person from their family members have been confirmed with COVID-19 (see Table 1).

### Measures

#### COVID-19 Burnout Scale (COVID-19-BS)

The COVID-19-BS consists of 10 items and was adapted from the Burnout Measure-Short Version

**Table 1.** Characteristics of the sample ( $N = 402$ ).

| Variable                               | Group                 | <i>n</i> | %    |
|--|-----------------------|----------|------|
| Gender                                 | Male                  | 95       | 23.6 |
|  | Female                | 307      | 76.4 |
| Socioeconomic level                    | Below average         | 56       | 13.9 |
|  | Average               | 278      | 69.2 |
|  | Above average         | 68       | 16.9 |
| Highest level of education completed   | High school and below | 26       | 6.5  |
|  | University graduate   | 308      | 76.6 |
| Marital status                         | Postgraduate          | 68       | 16.9 |
|  | Single                | 291      | 72.4 |
|  | Married               | 105      | 26.1 |
|  | Widowed/divorced      | 6        | 1.5  |
| Having chronic diseases                | Yes                   | 40       | 10.0 |
|  | No                    | 362      | 90.0 |
| Confirmed with COVID-19                | Yes                   | 401      | 99.8 |
|  | No                    | 1        | 0.2  |
| Family members confirmed with COVID-19 | Yes                   | 17       | 4.2  |
|  | No                    | 385      | 95.8 |

(Malach-Pines, 2005). To adapt the COVID-19-BS, we primarily modified the wording of original items such as replacing “your work” with “COVID-19” and response format. A sample item is “When you think about COVID-19 overall, how often do you feel hopeless?” Each item is rated on a 5-point Likert scale of 1 (never) to 5 (always). A total score can be calculated by summing all 10 items and such that scores can range from 10 to 50. Higher score indicates higher levels of burnout related with COVID-19.

#### Coronavirus Stress Measure (CSM)

The CSM includes 5 items that assess COVID-19 related stress (Arslan, Yildirim, Tanhan, et al., 2020). Each item is rated on a 5-point Likert scale from 0 (never) to 4 (very often). A sample item is “In the last month due to coronavirus, how often have you felt that you were unable to control the important things in your life?” A total score can be calculated by reverse scoring 2 items and then summing all 5 items and such that scores can vary between 0 and 20, with higher scores on the total CSM showing greater stress related to COVID-19. In this study, Cronbach's alpha was .71.

#### Brief Resilience Scale (BRS)

The BRS consists of 6 items assessing the ability to bounce back (Smith et al., 2008). Each item is rated on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). A sample item is “I tend to bounce back quickly after hard times.” The overall BRS score is estimated by reverse scoring three items and then adding all 6 items and such that scores can range from 6 to 30, with higher scores on the BRS indicating greater resilience. The scale shows good psychometric properties in Turkish language (Doğan, 2015; Yildirim, 2019). In this study, Cronbach's alpha was .84.

## Procedure

A secure software was used to develop an online version of the questionnaires that was prompted by the second researcher on social media. Participants were also contacted by email and text and voice messaging apps (e.g., WhatsApp) asking them for their involvement. Those who expressed their interests were provided a link explaining what was involved in the study. If participants agreed, they were invited to read and accept an informed consent form presented at the first page of online survey. They were not allowed to access the questionnaires until informed consent was provided. The inclusion criteria were to be above 18 years old, understand the Turkish language, and have access to internet using their electronic devices. All participants voluntarily took part in the survey. This study was approved by the Institutional Review Board of Ağrı İbrahim Çeçen University.

## Data analysis

Data were randomly split into two subsamples of approximately equal size to test the structure of the COVID-19-BS. Item analysis was carried out to provide evidence of reliability estimates. Exploratory factor analysis (EFA) was performed on the first subsample ( $n=204$ ) to identify the underlying factor structure of the COVID-19-BS. CFA was then run to ascertain whether the factor structure emerged from the EFA replicated on the second subsample ( $n=198$ ). Subsequent analyses were performed on overall sample ( $N=402$ ). Correlations between the measured variables were explored using Pearson product-moment test. PROCESS macro (Hayes, 2018) using model 4 was executed to examine the hypothesized mediation model. The mediation findings were reported using standardized regression coefficients ( $\beta$ ) and squared multiple correlations ( $R^2$ ), with conventional effect sizes:  $.01-.059$  = small,  $.06-.139$  = moderate and  $\geq .14$  = large (Cohen, 1988). Furthermore, a bootstrapping procedure with 5,000 bootstrap samples was conducted to estimate indirect effect using 95% confidence intervals (Preacher & Hayes, 2008). All analyses were run using SPSS and AMOS versions 25 for Windows.

## Results

### Psychometric analyses

Descriptive statistics (i.e., mean, standard deviation), corrected item total correlation, and internal

consistency reliability were estimated for each item in the COVID-19-BS across the two subsamples (see Table 2). Results showed that the scores of all items were mainly above the mean across the subsamples. Item-total correlation ranged between  $.58$  and  $.85$  in the first subsample and between  $.60$  and  $.82$  in the second subsample. All correlation coefficients were statistically significant at  $p < 0.01$  level. The reliability of the COVID-19-BS was assessed using Cronbach's  $\alpha$  as a measure of internal consistency and was  $.92$ .

Kaiser-Meyer-Olkin (KMO) and Bartlett's Sphericity tests showed that data were suitable for factor analysis (KMO = 0.93; Barlett Sphericity,  $\chi^2$  [df = 45] = 1283.29;  $p < 0.001$ ). Using the first subscale ( $n=204$ ), an EFA was conducted by maximum likelihood with a promax rotation method. The EFA showed that only one eigenvalue was greater than 1.00. The extracted factor accounted for 59.39% of the total variance with an eigenvalue of 5.94. As presented in Table 2, the analysis yielded a very strong factor loadings ranging from 0.58 (item 9) to 0.88 (item 6).

We performed a CFA to determine whether the single factor model obtained from EFA was confirmed in the second subsample ( $n=198$ ). The resulting goodness-of-fit statistics suggested that a one-factor solution provided a poor fit to the data, ( $\chi^2$  [df = 35] = 167.92,  $p < .01$ , CIMIN/DF = 4.80, NFI = 0.87, CFI = 0.90, RMSEA = 0.14, and SRMR = .06). Based on the modification indices, we drew covariance between item 2-3, item 6-7, and item 3-10. Following this procedure, the model significantly improved by indicating a good fit to the data, ( $\chi^2$  [df = 32] = 89.71,  $p < .01$ , CIMIN/DF = 2.80, NFI = 0.94, CFI = 0.96, RMSEA = 0.10, and SRMR = .05). Results yielded high factor loadings between the items and their respective factor (see Table 2). Based on the results of EFA and CFA, we concluded that a one-factor model was appropriate for the scale. Table 2 presents the results of the one-factor EFA and CFA.

Prior to testing the mediation analysis, we performed a correlation analysis to explore the relationships between the variables. Findings from the Pearson correlation analysis (see Table 3) indicated that COVID-19-BS was positively related with COVID-19 stress ( $r = .71$ ,  $p < .001$ ) and negatively related with resilience ( $r = -.56$ ,  $p < .001$ ), with a large effect size. COVID-19 stress was also negatively correlated with resilience ( $r = -.54$ ,  $p < .001$ ), with a large effect size.

The mediation model was then carried out to examine the direct and indirect association between the variables. The results showed that COVID-19



**Table 2.** Descriptive statistics, reliability, and factor loadings of the COVID-19-BS.

| Item   | Subsample 1 (n = 204) |      |      |      |              | Subsample 2 (n = 198) |      |      |      |              |
|--|-----------------------|------|------|------|--------------|-----------------------|------|------|------|--------------|
|  | M                     | SD   | IC   | CD   | EFA loadings | M                     | SD   | IC   | CD   | CFA loadings |
| When you think about COVID-19 overall, how often do you feel tired?                    | 3.17                  | 1.11 | 0.59 | 0.92 | 0.60         | 3.20                  | 1.13 | 0.66 | 0.92 | 0.67         |
| When you think about COVID-19 overall, how often do you feel disappointed with people? | 3.08                  | 1.12 | 0.69 | 0.91 | 0.74         | 2.99                  | 1.10 | 0.71 | 0.92 | 0.73         |
| When you think about COVID-19 overall, how often do you feel hopeless?                 | 3.01                  | 1.16 | 0.81 | 0.91 | 0.85         | 2.99                  | 1.12 | 0.73 | 0.91 | 0.76         |
| When you think about COVID-19 overall, how often do you feel trapped?                  | 3.25                  | 1.21 | 0.75 | 0.91 | 0.81         | 3.18                  | 1.12 | 0.75 | 0.91 | 0.83         |
| When you think about COVID-19 overall, how often do you feel helpless?                 | 3.01                  | 1.17 | 0.78 | 0.91 | 0.84         | 2.96                  | 1.09 | 0.81 | 0.91 | 0.88         |
| When you think about COVID-19 overall, how often do you feel depressed?                | 2.83                  | 1.20 | 0.85 | 0.91 | 0.88         | 2.70                  | 1.13 | 0.82 | 0.91 | 0.87         |
| When you think about COVID-19 overall, how often do you feel physically weak/sickly?   | 2.50                  | 1.17 | 0.67 | 0.92 | 0.67         | 2.47                  | 1.16 | 0.73 | 0.92 | 0.73         |
| When you think about COVID-19 overall, how often do you feel worthless/like a failure? | 2.33                  | 1.20 | 0.66 | 0.92 | 0.67         | 2.25                  | 1.12 | 0.67 | 0.92 | 0.67         |
| When you think about COVID-19 overall, how often do you feel difficulties sleeping?    | 2.52                  | 1.31 | 0.58 | 0.92 | 0.58         | 2.57                  | 1.33 | 0.60 | 0.92 | 0.59         |
| When you think about COVID-19 overall, how often do you feel "I've had it"?            | 3.15                  | 1.27 | 0.69 | 0.91 | 0.72         | 3.04                  | 1.24 | 0.65 | 0.92 | 0.68         |

Note. IC: Corrected item-total correlation; CD: Cronbach's alpha if item deleted.

stress significantly predicted resilience ( $\beta = -.54, p < .001$ ) by explaining 29% of the variance in resilience. COVID-19 stress also had a direct and significant predictive effect on COVID-19 burnout ( $\beta = .58, p < .001$ ) and predicted COVID-19 burnout through resilience ( $\beta = -.24, p < .001$ ) significantly. COVID-19 stress and resilience together explained 55% of the variance in COVID-19 burnout, as presented in Table 4 and Figure 1. The indirect effect of COVID-19 stress on COVID-19 burnout through resilience was significant (.075–.23; 95%CI). These results provide evidence that COVID-19 stress predicts COVID-19 burnout through resilience. Resilience partially mediates the relationship between the COVID-19 stress and COVID-19 burnout. Indirect effect estimates and their 95% CI and standardized coefficients are reported in Table 4.

## Discussion

Recently, a burgeoning literature has begun to investigate the links between stress and burnout during COVID-19 pandemic. Surprisingly, to date, the investigation of the mechanism(s) underlying the relation of these two variables has remained unknown within the context of pandemic. Variables like resilience helps to explain why or how such variables relate to each other. The present study was designed to investigate the mediating role of resilience on the relationship between COVID-19 related stress and burnout in a sample of Turkish adults during the COVID-19 pandemic. The results showed that resilience played a key role in transmitting the influence of stress onto burnout during pandemic.

This article first examined the psychometric properties of the COVID-19-BS, derived from the BMS (Malach-Pines, 2005), that was validated for the screening and assessing burnout caused by a long exposure to emotionally demanding situations during the COVID-19 pandemic. The results of this study showed that the 10-item of the COVID-19-BS identified by EEA and CFA provided very good to excellent information on the construct of burnout (see Table 2), with factor loadings ranging from .58 to .88. The scale also had a very high internal consistency assessed with the Cronbach's  $\alpha$  reliability. This finding is consistent with the original version of the scale suggesting a global factor structure for the scale (Malach-Pines, 2005).

The present study showed that higher COVID-19 related stress was associated with decreased ability to bounce back quickly in difficult times where changes,

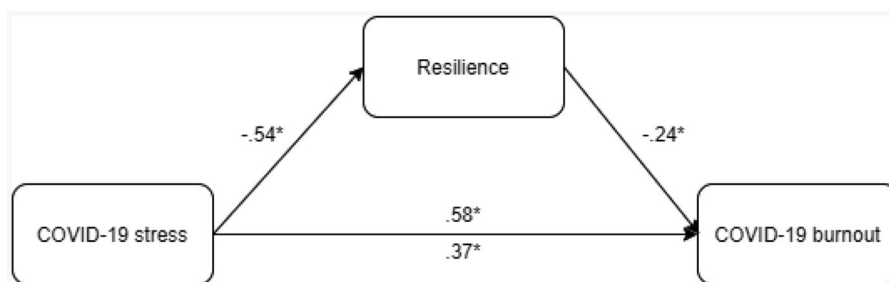
**Table 3.** Descriptive Statistics and correlation analysis ( $N = 402$ ).

| Variable            | Mean  | SD   | Skewness | Kurtosis | $\alpha$ | 1. | 2.    | 3.     |
|---------------------|-------|------|----------|----------|----------|----|-------|--------|
| 1. COVID-19 burnout | 28.61 | 9.01 | -0.01    | -0.52    | 0.92     | —  | .71** | -.56** |
| 2. COVID-19 stress  | 11.28 | 3.24 | -0.26    | 0.57     | 0.71     | —  | —     | -.54** |
| 3. Resilience       | 19.48 | 4.61 | -0.20    | 0.38     | 0.84     | —  | —     | —      |

**Table 4.** Unstandardized coefficients for the hypothesized mediation model.

| Antecedent          | Outcome                               |      |        |      |       |                                       |       |      |       |      |       |       |
|---------------------|---------------------------------------|------|--------|------|-------|---------------------------------------|-------|------|-------|------|-------|-------|
|                     | M (Resilience)                        |      |        |      |       | Y (COVID-19 burnout)                  |       |      |       |      |       |       |
|                     | Coeff                                 | SE   | $t$    | $p$  | 95%   |                                       | Coeff | SE   | $t$   | $p$  | 95%   |       |
| LLCI                |                                       |      |        |      | ULCI  | LLCI                                  |       |      |       |      | ULCI  |       |
| X (COVID-19 stress) | -0.77                                 | 0.06 | -12.77 | 0.00 | -0.88 | -0.65                                 | 1.61  | 0.11 | 14.47 | 0.00 | 1.39  | 1.83  |
| M (Resilience)      | —                                     | —    | —      | —    | —     | —                                     | -0.48 | 0.08 | -6.09 | 0.00 | -0.63 | -0.32 |
| Constant            | 28.11                                 | 0.70 | 39.97  | 0.00 | 26.73 | 29.50                                 | 19.74 | 2.46 | 8.03  | 0.00 | 14.90 | 24.57 |
|                     | $R^2 = .29$<br>$F = 163.07, p < 0.01$ |      |        |      |       | $R^2 = .55$<br>$F = 240.17, p < 0.01$ |       |      |       |      |       |       |

Note. SE: standard error; Coeff: unstandardized coefficient; X: independent variable; M: mediator variable; Y: outcome variable.

**Figure 1.** Structural model indicating the relationships between the measured variables of study.

setbacks, challenges, disappointments, and failures are likely to occur. This finding is consistent with the findings of Arslan, Yildirim, Tanhan, et al. (2020), who highlight that individuals with character strengths like optimism, psychological flexibility, resilience, and adaptive coping strategies have better abilities to respond to adverse situations. As hypothesized, the current study found that more COVID-19 related stress was associated with more burnout caused by COVID-19 pandemic exhaustion. Stress may lead individuals to experience higher levels of burnout. Although limited, several studies have provided evidence regarding a positive association between stress and burnout related to the current pandemic among healthcare professionals (Morgantini et al., 2020; Sung et al., 2020; Talaei et al., 2020). However, evidence from those previous studies were on healthcare workers and thus their findings may not be replicable on the general public. In fact, the relationship between stress and burnout is more complex than in a linear relationship as other evidence has shown that there may be other factors that influence the relationship between stress and burnout (Koutsimani et al., 2019).

As hypothesized, we found that resilience not only had a direct effect on burnout but also mediated the relationship between stress and burnout related to COVID-19. This suggests that stress could directly or indirectly, through lessening resilience, increase burnout symptoms during pandemic. It is likely that the more individuals experience stress, the more burnout, generated because of their lack of ability to bounce back from stressful situations, they have. Previous research has provided support for these emerging results within the wider psychology (Deldar et al., 2018). For example, in a study with over 540 civil servants, researchers have found that higher work stress significantly predicted higher burnout and that resilience served a partial mediating role in reducing the impact of stress on burnout, suggesting that stress have both a direct and an indirect effect, though resilience, on burnout (Hao et al., 2015). In that study, evidence regarding the moderating role of resilience between work stress and burnout has also been reported. Resilience has a buffering effect on development of burnout symptoms in civil servants by mitigating the adverse impacts of work stress.

Although there is some evidence on the relationship between COVID-19 related stress and burnout, which have been predominantly studied among healthcare professionals, the extant literature suffers from the evidence, which has been directly derived from the public during the pandemic. Our paper aims to study the link between COVID-19 related stress and burnout from a mediational perspective by investigating the role of resilience.

Our results showed that increased experience of stress can lead to elevated experience of burnout during pandemic, but resilience can buffer the adverse effect of stress on burnout. Therefore, by complementing earlier longitudinal and cross-sectional research, resilience may be an important variable for interventions aiming to protect individuals' mental health against COVID-19 related stress, reduce the COVID-19 burnout, and provide guidance on public health and policies. Further, there is a scarcity of well-validated measures of burnout related to COVID-19. We presented the psychometric properties of the COVID-19-BS, which is a reliable, unidimensional, and economical measure of burnout related to COVID-19 exhaustion. With the validation of the COVID-19-BS to the context of COVID-19 pandemic, it would be possible for researchers, healthcare professionals, and policy makers to develop, implement and assess the effectiveness of interventions aimed at reducing the COVID-19 exhaustion. Due to its brevity, the scale can be conveniently used in in-depth investigations alongside other measurements to be added in a package of questionnaire survey when time is limited. It could also be very useful in practice in terms of assessing the processes and changes in therapeutic sessions.

Our research is not without limitations. First, the results obtained in our study were based on self-report assessments. Future studies should use implicit measures or behavioral indicators alongside self-report questionnaires for studying the causal mechanisms which relate stress to burnout in the context of pandemic. Second, our mediation analysis was based on cross-sectional data. Thus, only correlation evidence can be obtained from the data. Mediation analyses built upon cross-sectional design can sometimes produce biased estimates (Maxwell & Cole, 2007). In future, this limitation should be addressed by conducting longitudinal research or research involving clinical intervention to fully understand a causal relation from stress to burnout through resilience in difficult times. Moreover, in our study we only considered resilience as a mediating factor in the relationship

between COVID-19 related stress and burnout. However, there may be other potential factors that can mediate the process underlying the COVID-19 stress-burnout relationship. This can be another avenue for the subsequent studies. Finally, the data in this study were collected using a non-representative sampling method. Generalization of our results to the general population is limited despite the large sample size. For example, participants mainly represent young adults although their ages ranged between 18 and 68 ( $M = 27.37 \pm 8.90$ ). In our data, adolescents, middle-aged adults, and older adults were underrepresented.

Findings from our research support use of COVID-19-BS as a short, convenient, cost-effective and unidimensional scale for the assessment of burnout related to the COVID-19 pandemic. Even though the COVID-19-BS was validated for use in the context of current pandemic, it could be easily applied to assess burnout in other possible public health crisis in future. This can be simply done by modifying the wording of the relevant items such as replacing the term "COVID-19" with a term specific to another pandemic context. This study also found evidence that supports the key role of resilience in reducing the impact of stress on the burnout in the context of COVID-19 pandemic.

### **Ethical approval**

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

### **Informed consent**

Consent was obtained from all participants included in the study.

### **Author contributions**

Conception and design of the study (MY); acquisition of data (MY, FS); analysis and reporting of data (MY); drafting the manuscript (MY).

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### **Disclosure statement**

The authors declared no conflicts of interest with respect to the research, authorship, and/or publication of this article.



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