



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



# Psychological flexibility and COVID-19 burnout in Chinese college students: A moderated mediation model

Baojuan Ye<sup>a,1</sup>, Xun Chen<sup>a,1</sup>, Yanzhen Zhang<sup>b,\*,1</sup>, Qiang Yang<sup>c</sup>

<sup>a</sup> Center of Mental Health Education and Research, School of Psychology, Jiangxi Normal University, 99 Ziyang Avenue, Nanchang, 330022, China

<sup>b</sup> Department of Psychology, University of California, 900 University Ave, Riverside, CA, 92521, USA

<sup>c</sup> School of Education, Jiangxi Normal University, 99 Ziyang Avenue, Nanchang, 330022, China

## ARTICLE INFO

### Keywords:

Psychological flexibility  
 COVID-19 burnout  
 Perceived COVID-19 stress  
 Social support  
 Moderated mediation

## ABSTRACT

Few studies have examined factors that might explain or affect the relationship between psychological flexibility and university students' COVID-19 burnout. The present study tested a moderated mediation model with perceived COVID-19 stress as the mediator and social support, a moderator, among 2377 Chinese college students. After controlling for gender, age, family location, and year of study (freshmen, sophomores, juniors, seniors), psychological flexibility was significantly associated with COVID-19 burnout, and this link was mediated by perceived COVID-19 stress. Social support buffered the adverse effects of perceived COVID-19 stress on psychological flexibility, as well as the correlation between perceived COVID-19 stress and burnout.

## 1. Introduction

### 1.1. Psychological flexibility and COVID-19 burnout

According to statistics published by the World Health Organization (World Health Organization, 2021), globally, as of September 7, 2021, there have been 221,134,742 confirmed cases of COVID-19 and 4,574,089 deaths. Continuously influenced by the risk of the pandemic of COVID-19, people around the world have the potential to experience tremendous burnout due to some changes in daily life, such as uncertainty related to the COVID-19 and the duration of staying at home (Yildirim & Solmaz, 2020).

Burnout is a prolonged state of emotional, physical, and mental exhaustion (Malach-Pines, 2005; Schaufeli & Enzmann, 1998). Under this definition, COVID-19 burnout can refer to a prolonged state of emotional, physical, and mental exhaustion caused by the COVID-19 pandemic. Different than Maslach et al. (2001)'s definition of burnout, which is limited to the work environment, our definition of COVID-19 burnout looks at the exhaustion of general public (Yildirim & Solmaz, 2020). Researches have showed that burnout is positively associated with distress symptoms, such as depression, anxiety, stress during the COVID-19 pandemic (Alkhamees et al., 2021; Sung et al., 2020; Talae

et al., 2020). Considering these adverse effects, a better understanding of the protective factors and related mechanisms for COVID-19 burnout is thus necessary to enlighten prevention and intervention efforts. Of the factors restraining the emergence of COVID-19 burnout, psychological flexibility has been one of the examined protective factors. Therefore, in this study, we focus on the pathway from psychological flexibility to COVID-19 burnout and the potential mechanisms underlying this pathway.

Psychological flexibility refers to the ability to accept one's present situation (even the challenging situation) without avoidance and adhere to or change one's behaviors to pursue long-term goals and values according to what the situation affords (Bond et al., 2011). Psychological flexibility, an essential cornerstone of mental health assessment, is the core aim of Acceptance and Commitment Therapy (ACT) intervention (Hayes et al., 2006; Kashdan & Rottenberg, 2010). According to the ACT theory, inflexible verbal networks often lead people to misrepresent the literal meaning of private events (e.g., thoughts, memories, emotions, and bodily sensations) as a correct representation of realities. Once unwanted private events are understood to be toxic, the pattern of control, repression, and avoidance thinking or behavior will appear and instead reinforce the functional importance of these events (Hayes et al., 2004, 2006, 2012), resulting in a significant consumption of

\* Corresponding author.

E-mail addresses: [yebaojuan0806@163.com](mailto:yebaojuan0806@163.com) (B. Ye), [cx97psychodream@163.com](mailto:cx97psychodream@163.com) (X. Chen), [zyz122@gmail.com](mailto:zyz122@gmail.com) (Y. Zhang), [davidyang12345@163.com](mailto:davidyang12345@163.com) (Q. Yang).

<sup>1</sup> Baojuan Ye, Xun Chen, and Yanzhen Zhang share the first authorship.

<https://doi.org/10.1016/j.jcbs.2022.04.003>

Received 14 September 2021; Received in revised form 10 March 2022; Accepted 14 April 2022

Available online 18 April 2022

2212-1447/© 2022 Association for Contextual Behavioral Science. Published by Elsevier Inc. All rights reserved.

psychological resources (Lloyd et al., 2013). Conversely, psychological flexibility promotes individuals to contact environmental contingencies without inordinate restrictions of verbal processes, live in present, consider self as context, accept objective existence of negative personal experiences, and put more mental resources into action to achieve values and goals (Hayes et al., 2004, 2006, 2012). Exhaustion (lack of energy or depletion of psychological resources) and withdrawal (lack of goals and values) are common traits in people with burnout (Demerouti et al., 2001). For this reason, psychological flexibility may act as a protective role of burnout and this relationship has been found in several studies in various work contexts. These studies showed that psychological flexibility negatively relates to burnout (Lloyd et al., 2013; Noone & Hastings, 2011; Ortiz-Fune et al., 2020).

The theory of ACT and earlier studies have pinpointed that psychological flexibility is negatively associated with burnout. To our knowledge, no studies have explored the relationship between psychological flexibility and COVID-19 burnout. Besides, it is greatly unexplored what mediates the relationship between psychological flexibility and COVID-19 burnout and what influences the direction or strength of this association. Thus, investigating mediating and moderating mechanisms is very necessary.

### 1.2. Perceived COVID-19 stress as a mediator

We define perceived COVID-19 stress as the degree to which individuals find that life in the COVID-19 pandemic is unpredictable, uncontrollable, or overloaded (that is stressful), according to Cohen's definition of perceived stress (Cohen et al., 1983). Perceived COVID-19 stress may act as a mediator in the relationship between psychological flexibility and COVID-19 burnout. In other words, psychological flexibility may be beneficial in reducing perceived COVID-19 stress, which in turn reduces the risk of COVID-19 burnout.

To better understand this indirect relationship, we drew upon Smith's (1986) model and Kelley et al.'s (1999) model of stress and burnout. Smith's model suggests that imbalance between demands and resources results in a stressful situation and people respond to it by creating a psychological reality through cognitive appraisal. Consequently, corresponding physiological and behavioral responses will emerge. Burnout, within this model, is the consequence of this chronic stress process. Kelley et al. (1999) simplified this stress-burnout process based on Smith's model. Cognitive appraisal, as the central part of the stress process, plays a significant role in the development of burnout according to Kelley et al.'s (1999) model. Therefore, perceived stress, the state outcome of cognitive appraisal (Lazarus, 1990; Spada et al., 2008), will give rise to experiencing burnout. This negative association with perceived stress and burnout has been proved in earlier studies (Gustafsson & Skoog, 2012; Rey et al., 2016; Tashman et al., 2010).

Furthermore, Smith's (1986) model also suggests that personality variables can influence this stress process which may cause burnout. Kelley and her colleagues further showed that personal/situational variables predicted levels of perceived stress, which in turn predicted burnout (Kelley et al., 1999; Kelley & Gill, 1993). Psychological flexibility, an individual characteristic (Lloyd et al., 2013), may act as a considerable personal variable. According to the theory of ACT, psychological flexibility may affect perceived stress in that it helps individuals understand that the stressor is just a stressor per se without the need to attach excessive literal meaning to it (Bond, 2004), accept this stressful situation to reconfigure mental resources to strike a balance with fluctuating situation demands (Kashdan & Rottenberg, 2010) and focus on meeting values (Hayes et al., 2012) rather than attaching unreasonable personal meaning to aversive stressors. As a result, misappraisal and irrational beliefs of stressors will decrease (Smith, 1986) and people will perceive less stress. Earlier studies have explored the negative relationship between psychological flexibility and perceived stress (Brinkborg et al., 2011; Dahl et al., 2004; Kent et al., 2019; Wersebe et al., 2018).

Incorporating this process within the context of the COVID-19 pandemic, college students might not possess enough internal resources provided by psychological flexibility to reduce unexpected demands that require psychological and physiological costs (Demerouti et al., 2001), and would then perceive COVID-19-related stress by focusing on the negative meanings of these stressors obsessively when they confronted COVID-19 related stressors, such as financial difficulties, travel warnings and bans, social isolation, and health concerns (Cao, Gong, et al., 2020; Son et al., 2020). If such negative appraisals of COVID-19 stressors keep going, the psychological and physiological burnout related to COVID-19 will arise. Studies have illustrated the positive relationship between perceived COVID-19 stress and COVID-19 burnout (Yildirim et al., 2021; Yildirim & Solmaz, 2020). Consequently, it is theoretically and empirically reasonable to deduce the mediating role of perceived COVID-19 stress on the relationship between psychological flexibility and COVID-19 burnout. To our knowledge, no prior research to date has explored this indirect relationship.

### 1.3. Social support as the moderator

Although psychological flexibility, one personal variable, may be related to COVID-19 burnout through perceived COVID-19 stress in line with Smith's (1986) model and Kelley et al.'s (1999) model, the role of situational variables has not been considered. Their models have showed that situational factors can influence perceived stress or burnout directly but ignored potential reciprocity of personal and situational variables on perceived stress and interaction of stress and situational variables on burnout. To remedy this deficiency, we assumed that social support would play a moderating role in the indirect relationship above in conjunction with the protective-enhancing and stress-buffering hypotheses. Social support refers to the individuals' experience of being surrounded with love and care, being respected, and valued, and having a social network with mutual commitments (Cobb, 1976). In addition to providing emotional and tangible aid to people (Freedy & Hobfoll, 1994), social support, as a major external resource, is beneficial to mental health (Auerbach et al., 2011; Taylor, 2011; Uchino, 2006).

First, as the protective-enhancing hypothesis (Fergus & Zimmerman, 2005) suggests, social support (a protective factor) may enhance the effect of psychological flexibility (another promotive factor) in reducing the development of some pathological outcomes. Concretely, perceived adequate support may redefine the possible adverse effects incurred by a stressful situation (Cohen & Wills, 1985). And this process may be beneficial for psychological flexibility to change the evaluation of stressors, which in turn prevent this particular situation from being appraised as stressful. Moreover, earlier studies have supported that social support, a protective factor, has an inverse relationship with perceived stress in various contexts which include the COVID-19 pandemic (Ozer et al., 2021), HIV stigma (Lopez et al., 2012), prostate cancer (Zhou et al., 2010), and employment (Wells, 1982). Therefore, it is reasonable to guess that the protective effect of psychological flexibility on perceived COVID-19 stress is greater in the students with high social support compared to students with low social support. No study, as far as we know, has explored the moderating role of social support in psychological flexibility and perceived COVID-19 stress. Second, according to the stress-buffering hypothesis (Cohen & Wills, 1985), social support may intervene between the perception of stress and the threshold of physiological outcomes by restraining maladjusted responses or facilitating adjustive counter-response toward pressure (Cohen & Wills, 1985). In other words, the effect of perceived stress on adverse outcomes (e.g., distress symptoms) is weaker among those with high levels of support, which has been evaluated in many kinds of research (Cranford, 2004; Lau et al., 2014; Raffaelli et al., 2013; Takizawa et al., 2006; Zhang et al., 2015). Analogously, social support may mitigate individuals' burnout (one type of negative outcome) after perceiving stress. Therefore, we suppose that adequate social support could buffer the negative impact of perceived COVID-19 stress on

COVID-19 burnout.

### 1.4. The present study

Although previous studies have proved the significant correlation between psychological flexibility and burnout, no studies investigated the relationship between psychological flexibility and COVID-19 burnout among Chinese college students. What has also not been discussed is the underlying mechanism of how psychological flexibility correlates with COVID-19 burnout. Taken from previous studies and theories, this study has four hypotheses, and we constructed a moderated mediation model (shown in Fig. 1) to test research hypotheses.

Specifically, we proposed the following hypotheses:

**Hypothesis 1.** Psychological flexibility would be negatively correlated with Chinese college students' COVID-19 burnout.

**Hypothesis 2.** Perceived COVID-19 stress would mediate the relationship between psychological flexibility and COVID-19 burnout.

**Hypothesis 3.** Social support would enhance the protective effect of psychological flexibility against perceived COVID-19 stress.

**Hypothesis 4.** Social support would buffer the relationship between perceived COVID-19 stress and COVID-19 burnout.

## 2. Method

### 2.1. Procedure

We collected primary data on the Questionnaire Star Survey (an online data collection platform, <https://www.wjx.cn/>) by disseminating online questionnaires to participants through social media platforms, like WeChat and QQ. Participants were eligible for this study if they were enrolled college students and joined the social media groups. The research ethics committee of the first author's institution approved this study before participant recruitment. We asked for the informed consent of recruited participants before data collection. Before finishing the online questionnaires independently, participants were informed that the survey was innominate and confidential and had the freedom to discontinue their participation at any moment. Then, the web-based survey was partially adjusted and formally conducted. The data we collected did not have missing data because only completed responsive questionnaires could be recorded. After excluding unqualified samples (e.g., completed a questionnaire of 35 items less than 60 s and answered regularly), we finally collected 2377 valid questionnaires with an effective response rate of 95.12% from 2499 primary questionnaires.

### 2.2. Participants

Participants were recruited from all over China and studied different majors. Among respondents from the final sample (age range = 16–24,  $M_{age} = 19.42$ ,  $SD_{age} = 1.29$ , 53.6% female), 958 (40.3%) were first-year

students, 766 (32.2%) were sophomores, 570 (24.0%) were juniors, only 83 (3.5%) were seniors. Besides, 1499 (63.1%) respondents reported their family location which means place of residence before enrollment as rural areas compared to urban areas.

### 2.3. Measures

#### 2.3.1. Psychological flexibility

Psychological flexibility was indirectly measured using the Avoidance and Fusion Questionnaire for Youth (AFQ-Y8, Greco et al., 2008). This unidimensional scale (8-items) has been used in the Chinese sample and shows good reliability and validity (Chen et al., 2019). College students rated each item (e.g., “If my heart beats fast, there must be something wrong with me”) on a five-point scale ranging from 1 (*never true*) to 5 (*always true*). Responses were across 8 items, with higher scores representing a higher level of psychological flexibility after the reverse scoring. For the current sample, Cronbach's alpha of this scale was good ( $\alpha = 0.88$ ).

#### 2.3.2. Perceived COVID-19 stress

Perceived COVID-19 stress was measured using the Coronavirus Stress Measure (CSM, Arslan et al., 2020) adapted from the 14-item perceived stress scale (PSS, Cohen et al., 1983). This unidimensional scale includes 5 items. College students rated each item (e.g., “How often have you felt nervous and stressed because of the COVID-19 pandemic?”) on a five-point scale ranging from 0 (*never*) to 4 (*always*). Responses were across 5 items, with higher scores representing a higher level of perceived COVID-19 stress. For the current sample, Cronbach's alpha of this scale was good ( $\alpha = 0.93$ ). This scale's construct validity showed by the confirmatory factor analysis was good, RSMEA = 0.041, CFI = 0.998, TLI = 0.996, SRMR = 0.005.

#### 2.3.3. COVID-19 burnout

COVID-19 burnout was measured using the COVID-19 Burnout Scale (COVID-19-BS, Yildirim & Solmaz, 2020) adapted from the Burnout Measure-Short Version (Malach-Pines, 2005). This unidimensional scale includes 10 items. College students rated each item (e.g., “When you think about COVID-19 overall, how often do you feel tired?”) on a five-point scale ranging from 1 (*never*) to 5 (*always*). Responses were across 10 items, with higher scores representing a higher level of COVID-19 burnout. For the current sample, Cronbach's alpha of this scale was good ( $\alpha = 0.95$ ). This scale's construct validity showed by the confirmatory factor analysis was good, RSMEA = 0.074, CFI = 0.981, TLI = 0.972, SRMR = 0.021.

#### 2.3.4. Social support

Social support was measured using The Social Provisions Scale (SPS-10, Steigen & Bergh, 2019). The 10-items scale includes five dimensions: social integration (e.g., “There are people who enjoy the same social activities I do”), reassurance (e.g., “There are people who admire my talents and abilities”), attachment (e.g., “I feel a strong emotional bond

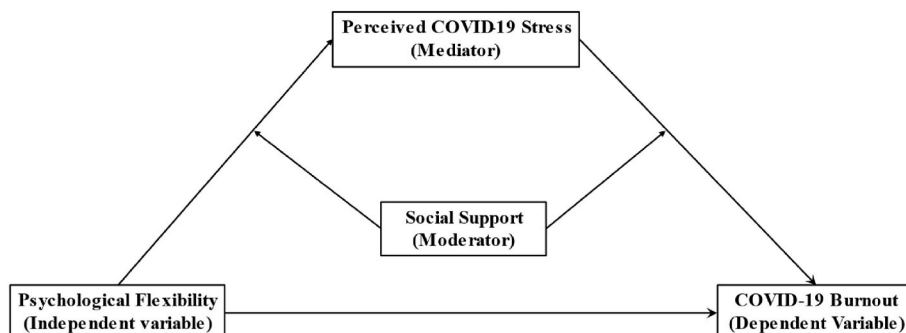


Fig. 1. The proposed moderated mediation model.

with at least one other person”), sense of reliable alliance (e.g., “There are people I can count on in an emergency”), and guidance (e.g., “There is someone I could talk to about important decisions in my life”). College students rated items on a four-point scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). Responses were across 10 items, with higher scores representing a higher level of social support. For the current sample, Cronbach’s alpha of this scale was good ( $\alpha = 0.94$ ). This scale’s construct validity indicated by the confirmatory factor analysis was good, RSMEA = 0.079, CFI = 0.985, TLI = 0.964, SRMR = 0.031.

2.4. Data analysis

Data analyses followed the following steps. First, we used MPLUS 8.3 for confirmatory factor analysis that tested the measurement model fits of scales. The CFI and TLI values ( $\geq 0.90$ ), and the RMSEA and SRMR values ( $RMSEA \leq 0.08$ ) were used to evaluate the model fit (Hu & Bentler, 1999). Then, descriptive statistics and correlations among variables were inspected, followed by a test of the negative relationship between psychological flexibility and COVID-19 burnout using linear regression of SPSS. Finally, we used Hayes (2013)s PROCESS macro-Model 4 for SPSS to test the mediating role of perceived COVID-19 stress and PROCESS macro-Model 58 to test the moderating role of social support. The bootstrap confidence intervals (CIs), using the method that the 95% confidence interval does not include zero to figure out whether an effect is significant, were presented in these PROCESS procedures (Hayes, 2013). Data calculated based on standardized scores. We considered gender, age, year of study, and family location as covariates in all analyses using SPSS 21.0.

3. Results

3.1. Preliminary analysis

Table 1 shows the means, standard deviations, and correlations among the primary variables in the study. All major variables were significantly correlated with each other. Specifically, psychological flexibility was negatively related to college students’ COVID-19 burnout ( $r = -0.36, p < .001$ ), while perceived COVID-19 stress was positively related to COVID-19 burnout ( $r = 0.72, p < .001$ ). In addition, psychological flexibility was negatively related to perceived COVID-19 stress ( $r = -0.31, p < .001$ ). Finally, social support was negatively associated with college students’ perceived COVID-19 stress ( $r = -0.20, p < .001$ ) and COVID-19 burnout ( $r = -0.29, p < .001$ ).

3.2. Perceived COVID-19 stress as a mediator

We used linear regression analysis of SPSS to test hypothesis 1 that psychological flexibility would negatively relate to COVID-19 burnout. After controlling for gender, age, family location, and year of study, psychological flexibility is significantly related to COVID-19 burnout ( $\beta = -0.36, p < .001$ , see Model 1 of Table 2). Thus, hypothesis 1 was

Table 1

Descriptive data on means, standard deviations, and correlations among study variables (N = 2377).

	M	SD	1	2	3	4	5	6	7	8
1.PF	3.28	.66	–							
2.PCS	.95	.72	–.31***	–						
3.CB	1.79	.65	–.36***	.72***	–					
4.SS	2.99	.46	.25***	–.20***	–.29***	–				
5.Gender	–	–	–.06**	.11***	.05**	.07***	–			
6.Age	19.42	1.23	–.05*	.05*	.07**	–.06**	–.03	–		
7.FL	–	.48	–.01	.04*	.05**	–.07**	–.06**	.02	–	
8.YS	1.91	.88	–.03	.07**	.09***	–.08***	.10***	.75***	.02	–

Note: PF = Psychological Flexibility. PCS = Perceived COVID-19 Stress. CB = COVID-19 Burnout. SS = Social Support. FL = Family Location. YS = Year of Study. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

supported. Then, Model 4 of the PROCESS macro (A. F. Hayes, 2013) was used to test Hypothesis 2 that perceived COVID-19 stress would mediate the relationship between psychological flexibility and COVID-19 burnout. Results showed that psychological flexibility significantly related to perceived COVID-19 stress ( $\beta = -0.32, p < .001$ , see Model 2 of Table 2) and COVID-19 burnout ( $\beta = -0.14, p < .001$ , see Model 3 of Table 2), and perceived COVID-19 stress significantly related to COVID-19 burnout ( $\beta = 0.68, p < .001$ ) by controlling for gender, age, family location and year of study. The indirect effect of psychological flexibility on COVID-19 burnout via perceived COVID-19 stress ( $\beta = -0.22, 95\% CI = [-0.24, -0.19]$ ) was significant. Thus, Hypothesis 2 was supported.

3.3. Testing for the moderation effect

We adopted the PROCESS macro (Model 58) developed by Hayes (2013) to test Hypothesis 3 and Hypothesis 4 that the indirect associations between psychological flexibility and COVID-19 burnout would be moderated by social support. Results were shown in Table 3. The interaction between psychological flexibility and social support was significant ( $\beta = -0.03, p = .04 < 0.05$ . see Model 4 of Table 3) and the interaction between perceived COVID-19 stress and social support was also significant ( $\beta = -0.12, p < .001$ . see Model 5 of Table 3). Therefore, social support moderated the whole indirect pathway, which supported Hypothesis 3 and Hypothesis 4.

To visualize the interaction pattern, the simple slope figures (Figs. 1 and 2) of predicted perceived COVID-19 stress against psychological flexibility and COVID-19 burnout against perceived COVID-19 stress under low and high ( $\pm 1$  SD from the mean) levels of social support respectively were plotted. Results suggested that psychological flexibility was significantly and negatively associated with perceived COVID-19 stress for both college students with high and low social support ( $b_{high SS} = -0.32, p < .001; b_{low SS} = -0.25, p < .001$ ), but those students with high levels of social support showed lower perceived COVID-19 stress (see Fig. 2). Notably, those students with high levels of social support were more likely to be influenced by psychological flexibility than those with low levels of social support. Similarly, high levels of perceived COVID-19 stress were significantly associated with high COVID-19 burnout for college students with both low and high levels of social support ( $b_{high SS} = 0.53, p < .001; b_{low SS} = 0.78, p < .001$ ), but the levels of COVID-19 burnout were higher for those students with low social support (see Fig. 3). In another word, students with low social support more easily experienced burnout when inevitably face further waves of the COVID-19 pandemic than those with a high level of social support.

4. Discussion

4.1. General discussion

Since the COVID-19 epidemic recurs from time to time in local areas



**Table 2**  
The mediation effect of psychological flexibility on COVID-19 burnout (N = 2377).

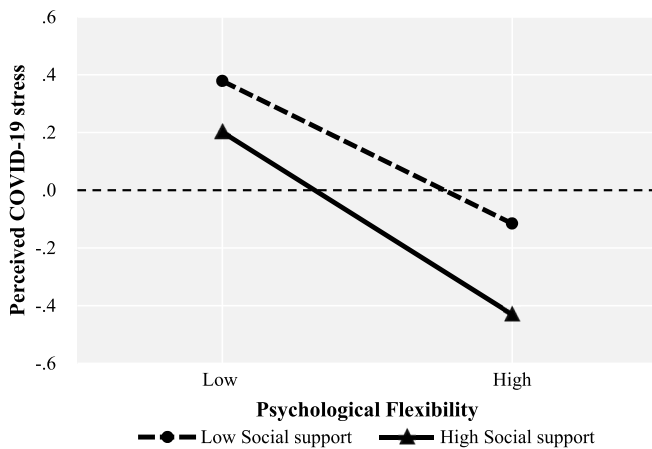
Predictors	Model 1 (CB)			Model 2 (PCS)			Model 3 (CB)		
	B	t	95%CI	β	T	95%CI	β	t	95%CI
Gender	.14	3.56***	[.06, .22]	.26	6.50***	[.18, .33]	-.04	-1.24	[-.09, .02]
Age	.001	-.03	[-.05, .05]	.0002	.01	[-.05, .05]	.001	.03	[-.03, .03]
FL	.11	2.74**	[.03, .18]	.09	2.33	[.01, .17]	.05	1.57	[-.01, .10]
YS	.08	2.47*	[.02, .15]	.05	1.41	[-.02, .11]	.05	2.06*	[.002, .10]
PF	-.36	-18.84***	[-.40, -.32]	-.32	-16.43***	[-.36, -.28]	-.14	-9.85***	[-.17, -.12]
PCS							.68	45.99***	[.65, .71]
R <sup>2</sup>	.14			.12			.55		
F	78.59***			63.65***			476.42***		

Note. PF = Psychological Flexibility. PCS = Perceived COVID-19 Stress. CB = COVID-19 Burnout. FL = Family Location. YS = Year of Study. \*p < .05, \*\*p < .01, \*\*\*p < .001.

**Table 3**  
The moderation effect of social support (N = 2377).

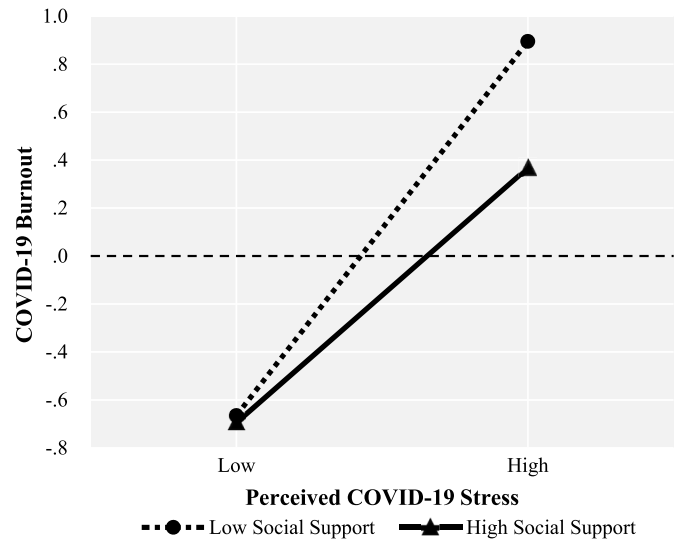
Predictors	Model 4 (PCS)			Model 5 (CB)		
	B	T	95%CI	β	T	95%CI
Gender	.27	6.90***	[.19, .35]	.01	.46	[-.04, .07]
Age	.002	.07	[-.05, .05]	.005	.29	[-.03, .04]
FL	.07	1.87	[-.004, .15]	.03	1.01	[-.03, .08]
YS	.03	1.02	[-.03, .10]	.03	1.24	[-.02, .07]
PF	-.28	-	[-.32, .15]	-.13	-	[-.16, .11]
SS	-.13	-6.24***	[-.16, -.09]		9.28***	[-.11, -.10]
PF × SS	-.03	-2.04*	[-.07, -.001]			
PCS				.66	45.58***	[.63, .68]
SS				-.14	-	[-.17, -.11]
PCS × SS				-.12	-9.50***	[-.15, -.10]
R <sup>2</sup>	.14			.58		
F	53.16***			403.51***		

Note. PF = Psychological Flexibility. PCS = Perceived COVID-19 Stress. CB = COVID-19 Burnout. SS = Social Support. FL = Family Location. YS = Year of Study. \*p < .05, \*\*p < .01, \*\*\*p < .001.



**Fig. 2.** Interaction effect of psychological flexibility and social support on perceived COVID-19 stress.

and is still serious abroad as the variant continues to spread rapidly, college students in China suffer from much distress (e.g., burnout from the severe pandemic and strict control). To reduce the adverse effect of



**Fig. 3.** Interaction effect of perceived COVID-19 stress and social support on COVID-19 burnout.

COVID-19 burnout, this study paid attention to the relationship between psychological flexibility and COVID-19 burnout among Chinese college students and explored its underlying mediating and moderating mechanisms.

Smith's (1986) model and Kelley et al.'s (1999) model of stress and burnout provide a framework for mediating models in the present study. Personal variables can act as antecedents of the stress-burnout process, that is, personal variables can affect burnout directly or indirectly by influencing stress perception. In this context, this study explained why and how psychological flexibility affects perceived stress and burnout by introducing the theory of ACT. Our findings also confirmed that perceived COVID-19 stress, one of the possible explanatory factors, mediates the association between psychological flexibility and COVID-19 burnout in a sample of Chinese college students. To our knowledge, this is the first study to focus on the COVID-19 burnout phenomenon of Chinese college students and the first to investigate the mediating role of perceived COVID-19 stress in the association of psychological flexibility and COVID-19 burnout.

Specifically, our findings suggest that psychological flexibility may alter the irrational appraisal of students' stressors related to the COVID-19 pandemic, which in turn decreases perceived COVID-19 stress. College students experienced a wide assortment of stressors during the epidemic, including quarantines of cities with infected cases and succeeding social isolation, stigmas of the epidemic, inconvenience of daily life, travel bans, prolonged duration and uncertainty of epidemic, study maladjustment of distant learning method (e.g. live interactive class on third-party platforms, such as WeChat and Dingding video conferencing,

Yan et al., 2021), and poor family financial situation (Cao et al., 2020; Li et al., 2020; Ye et al., 2020). The availability of information related to these stressors through multiple online channels (Li et al., 2020) would lead college students to pay too much attention to the literal meaning of these messages. However, operating within ACT theory (Hayes, 2016; Hayes et al., 2006, 2012), psychological flexibility can allow students to avoid assigning too much literal meaning to these stressors conveyed by online information (e.g., adjusting their mind without getting stuck in the psychological rigor of associating words like “COVID-19” and “lockdown” with adverse outcomes) and accept the status quo of the strict epidemic in a positive and defenseless manner (e.g., actively respond to government regulations on epidemic prevention). More importantly, it can motivate students to focus on the choice of their life values and how to achieve them rather than obeying the demands of the rigid self and the external environment. For example, psychologically flexible students will concern their social responsibilities in the context of COVID-19 prevention and control rather than spending much energy on suppressing the worry caused by fear of infection. Then, they may experience less COVID-19 burnout in the absence of the protracted perception of significant COVID-19-related stress resulting from the assessment of demands, resources, and consequences of the stressful situation during the pandemic. Arslan et al. (2020) used the same scale as the present study to measure perceived COVID-19 stress and indirectly supported the negative relationship between psychological flexibility and perceived COVID-19 stress. Besides, this finding that perceived COVID-19 stress was positively associated with COVID-19 burnout is also consistent with Smith (1986)s view and studies using the same scales to measure perceived stress and burnout (Yildirim et al., 2021; Yildirim & Solmaz, 2020). Therefore, perceived COVID-19 stress could serve as a “bridge” linking psychological flexibility to COVID-19 burnout of college students.

Furthermore, the remaining direct and negative relation between psychological flexibility and COVID-19 burnout proposes that psychological flexibility may function as a direct factor that reduces COVID-19 burnout of college students. In light of this finding, it is therefore quite plausible that students with psychological flexibility can accept the stressful situation of the epidemic thus have more energy to pursue values and act, so they can reduce exhaustion and avoid withdrawal. This “goal-related context sensitivity” feature of psychological flexibility may help individuals keep their goals and values and forestall COVID-19 burnout (Bond et al., 2008).

The finding that social support moderated the indirect pathway to psychological flexibility and burnout confirmed the protective-enhancing and stress-buffering hypotheses and bridged the gap of ignoring potential interaction of personal and situational variables in Smith’s (1986) model and Kelley et al.’s (1999) model. First, the negative relationship between psychological flexibility and perceived COVID-19 stress was stronger for college students who had high (vs. low) levels of social support. In other words, the interaction effect suggests that psychological flexibility can be combined with social support to better mitigate perceiving COVID-19 stress better and this result was consistent with the protective-enhancing hypothesis. A similar protective-enhancing pattern has also been reported in previous research. For instance, the positive association between social support and life satisfaction was substantially stronger among undergraduates with higher global self-esteem (Kong et al., 2013). Second, college students with high (vs. low) social support had a weaker positive prediction effect from perceived COVID-19 stress to COVID-19 burnout. Similar to Li and Zhang (2019)s findings, as students with high social support are more likely to share their burden when they perceive higher levels of stress from COVID-19, this may alleviate COVID-19 burnout. In contrast, students with low social support were more likely to bear the burden of perceived stress, which thus aggravated COVID-19 burnout. This result corresponds with the stress-buffering model (Cassel, 1976; Cohen & Wills, 1985), which indicates that social support may be protective for mental health problems after suffering life stress. Lack of social support

during stressful events may increase the risk for complexities and conundrums in mental health.

#### 4.2. Implications

It is worth noting that our findings have important practical implications. First, this study broadened the scope of the application of Smith’s (1986) model and Kelley et al.’s (1999) model of stress and burnout, which were only applicable to sports industry practitioners (e.g., coaches and athletes). Second, from the standpoint of ACT theory, protective-enhancing, and stress-buffering hypothesis, we improved the shortcomings of Smith’s model and Kelley et al.’s model in the application of stress and burnout associated with the epidemic and enriched the development of their models. Third, the results demonstrated that Coronavirus Stress Measure (Arslan et al., 2020) and COVID-19 Burnout Scale (Yildirim & Solmaz, 2020) are reliable, unidimensional, and economical measurement tools with satisfactory internal consistency reliability assessed with Cronbach’s alpha. Future research can apply these two scales to populations of different occupational and cultural backgrounds. Forth, our findings suggest that psychological flexibility is a significant preventive factor for perceived COVID-19-related stress and burnout in Chinese college students. Therefore, it is important to promote psychological flexibility for students in areas of high risk of infection through Acceptance and Commitment Therapy. Finally, since social support is beneficial in alleviating perceived COVID-19 stress and burnout, the government and education bureau may provide more social support to college students to meet their psychological needs, such as, expanding social connection and providing mutual support from online social groups, establishing a complete online health education system, and advancing online counseling and telehealth (Xiao et al., 2020). Fifth, considering the protective-enhancing role of social support and psychological flexibility in reducing perceived COVID-19 stress, it is important to provide appropriate social support in addition to promoting students’ psychological flexibility in interventions to manage COVID-19-related stress. Future studies can examine this pattern in other contexts.

#### 4.3. Limitations and future direction

The limitations of this study should be admitted. First, without longitudinal data or experimental manipulation, the cross-sectional approach cannot validate temporal change or allow causal conclusions across research variables. Future studies can utilize longitudinal studies to better examine our moderated mediation model. Nevertheless, cross-sectional analysis can still predict causal relations based on well-established theories and empirical research (Shrout, 2011). Second, analysis of results based solely on self-report data may result in the possible effects of common method bias. In order to verify the severity of the potential bias, we performed an unrotated exploratory factor analysis of all variables using Harman’s single-factor test (Podsakoff et al., 2003). The results showed that there were 4 factors with characteristic roots greater than 1, and the variance explained by the first factor was much less than the critical value of 40%.” In addition, the possible overlap between the independent variables (psychological flexibility, perceived COVID-19 stress, and social support) may bring about the problem of multicollinearity which could be detected by the tolerance or the variance inflation factor (VIF). The results showed that the VIF of each independent variable was all less than 1.16 (< 5) and there was no multicollinearity problem (O’Brien, 2007). Future studies can collect data with multiple informants and multiple methods (Einarsen et al., 2018; Zhu et al., 2019). Third, despite the large sample size, this study was conducted in a sample of Chinese college students reasonably homogeneous in culture. Future studies should extend the findings in different cultural contexts. Fourth, the finding that the mean score of perceived COVID-19 stress was low meant that most Chinese university students perceived low levels of stress. What needs to be further tested in

future studies is whether the relationships between the variables found in our study will be stronger in groups with higher perceived stress. Fifth, we ignored the potential confounders, such as anxiety. Future studies may consider potential confounders like anxiety while studying the relationship between variables.

## 5. Conclusion

In conclusion, this research sought to explore the underlying mechanisms influencing COVID-19 burnout among Chinese college students. The findings indicate a negative relationship between psychological flexibility and COVID-19 burnout of Chinese college students. Moreover, there is a mediating role of perceived COVID-19 stress in this relationship. Additionally, social support moderated the whole indirect relationship (psychological flexibility → perceived COVID-19 stress → COVID-19 burnout). These findings provide a theoretical model or insight to understand how psychological flexibility will influence the mental health of university students. In addition, these findings may be examined in other groups and future research can apply this moderated mediation model to a variety of work or learning contexts, not just limited to the epidemic context.

## Author contributions

Baojuan Ye and Yanzhen Zhang contributed to the manuscript by theoretical framing, design the study, and coordinating the models conceptualized. Xun Chen collected the data and analyzed the data. Qiang Yang conceptualized the models. All authors wrote and revised the manuscript for important intellectual content and approved the final version for publication.

## Funding

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

## Data availability statement

The main data of this article will be made available by the authors.

## Ethics statement

The studies involving human participants were reviewed and approved by the Research Ethics Committee of the Jiangxi Normal University of China.

## Declaration of competing interest

The authors declare no conflict of interest.

## Acknowledgements

Thanks to all the participants and volunteers who provided support for this study.

## References

- Alkhamees, A. A., Assiri, H., Alharbi, H. Y., Nasser, A., & Alkhamees, M. A. (2021). Burnout and depression among psychiatry residents during COVID-19 pandemic. *Human Resources for Health*, 19(1), 1–9. <https://doi.org/10.1186/s12960-021-00584-1>
- Arslan, G., Yildirim, M., Tanhan, A., Buluş, M., & Allen, K.-A. (2020). Coronavirus stress, optimism-pessimism, psychological inflexibility, and psychological health: Psychometric properties of the Coronavirus Stress Measure. *International Journal of Mental Health and Addiction*, 1–17. <https://doi.org/10.1007/s11469-020-00337-6>
- Auerbach, R. P., Bigda-Peyton, J. S., Eberhart, N. K., Webb, C. A., & Ho, M.-H. R. (2011). Conceptualizing the prospective relationship between social support, stress, and depressive symptoms among adolescents. *Journal of Abnormal Child Psychology*, 39(4), 475–487. <https://doi.org/10.1007/s10802-010-9479-x>
- Bond, F. W. (2004). ACT for stress. In S. C. Hayes, & K. D. Strosahl (Eds.), *A practical guide to acceptance and commitment therapy* (pp. 275–293). Springer US. [https://doi.org/10.1007/978-0-387-23369-7\\_11](https://doi.org/10.1007/978-0-387-23369-7_11).
- Bond, F. W., Flaxman, P. E., & Bunce, D. (2008). The influence of psychological flexibility on work redesign: Mediated moderation of a work reorganization intervention. *Journal of Applied Psychology*, 93(3), 645–654. <https://doi.org/10.1037/0021-9010.93.3.645>
- Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., Waltz, T., & Zettle, R. D. (2011). Preliminary psychometric properties of the acceptance and action questionnaire – II: A revised measure of psychological inflexibility and experiential avoidance. *Behavior Therapy*, 42(4), 676–688. <https://doi.org/10.1016/j.beth.2011.03.007>
- Brinkborg, H., Michanek, J., Hesser, H., & Berglund, G. (2011). Acceptance and commitment therapy for the treatment of stress among social workers: A randomized controlled trial. *Behaviour Research and Therapy*, 49(6–7), 389–398. <https://doi.org/10.1016/j.brat.2011.03.009>
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, 287, 112934. <https://doi.org/10.1016/j.psychres.2020.112934>
- Cao, X., Gong, M., Yu, L., & Dai, B. (2020). Exploring the mechanism of social media addiction: An empirical study from WeChat users. *Internet Research*, 30(4), 1305–1328. <https://doi.org/10.1108/INTR-08-2019-0347>
- Chen, Y., Zhao, Y., Duan, Y., Bai, X., Wang, S., & Zhu, Z. (2019). Validity and reliability of the Chinese version of the avoidance and fusion questionnaire for Youth (AFQ-Y8). *Chinese Journal of Clinical Psychology*, 27(6), 1192–1195+1114. <https://doi.org/10.16128/j.cnki.1005-3611.2019.06.023>
- Cobb, S. (1976). Social support as a moderator of life stress. *Psychosomatic Medicine*, 38(5), 300–314. <https://doi.org/10.1097/00006842-197609000-00003>
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24(4), 385–396. <https://doi.org/10.2307/2136404>
- Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, 98(2), 310–357. <https://doi.org/10.1037/0033-2909.98.2.310>
- Cranford, J. A. (2004). Stress-buffering or stress-exacerbation? Social support and social undermining as moderators of the relationship between perceived stress and depressive symptoms among married people. *Personal Relationships*, 11(1), 23–40. <https://doi.org/10.1111/j.1475-6811.2004.00069.x>
- Dahl, J., Wilson, K. G., & Nilsson, A. (2004). Acceptance and commitment therapy and the treatment of persons at risk for long-term disability resulting from stress and pain symptoms: A preliminary randomized trial. *Behavior Therapy*, 35(4), 785–801. [https://doi.org/10.1016/S0005-7894\(04\)80020-0](https://doi.org/10.1016/S0005-7894(04)80020-0)
- Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, 86(3), 499–512. <https://doi.org/10.1037/0021-9010.86.3.499>
- Einarsen, S., Skogstad, A., Rørvik, E., Lande, Å. B., & Nielsen, M. B. (2018). Climate for conflict management, exposure to workplace bullying and work engagement: A moderated mediation analysis. *International Journal of Human Resource Management*, 29(3), 549–570. <https://doi.org/10.1080/09585192.2016.1164216>
- Fergus, S., & Zimmerman, M. A. (2005). Adolescent resilience: A framework for understanding healthy development in the face of risk. *Annual Review of Public Health*, 26(1), 399–419. <https://doi.org/10.1146/annurev.publhealth.26.021304.144357>
- Freedy, J. R., & Hobfoll, S. E. (1994). Stress inoculation for reduction of burnout: A conservation of resources approach. *Anxiety, Stress & Coping*, 6(4), 311–325. <https://doi.org/10.1080/10615809408248805>
- Greco, L. A., Lambert, W., & Baer, R. A. (2008). Psychological inflexibility in childhood and adolescence: Development and evaluation of the avoidance and fusion questionnaire for Youth. *Psychological Assessment*, 20(2), 93–102. <https://doi.org/10.1037/1040-3590.20.2.93>
- Gustafsson, H., & Skoog, T. (2012). The mediational role of perceived stress in the relation between optimism and burnout in competitive athletes. *Anxiety, Stress & Coping*, 25(2), 183–199. <https://doi.org/10.1080/10615806.2011.594045>
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press.
- Hayes, S. C. (2016). Acceptance and commitment therapy, relational frame theory, and the third wave of behavioral and cognitive therapies. *Behavior Therapy*, 47(6), 869–885. <https://doi.org/10.1016/j.beth.2016.11.006>
- Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behaviour Research and Therapy*, 44(1), 1–25. <https://doi.org/10.1016/j.brat.2005.06.006>
- Hayes, S. C., Pistorello, J., & Levin, M. E. (2012). Acceptance and Commitment Therapy as a unified model of behavior change. *The Counseling Psychologist*, 40(7), 976–1002. <https://doi.org/10.1177/0011000012460836>
- Hayes, S. C., Strosahl, K. D., Bunting, K., Twohig, M., & Wilson, K. G. (2004). What is acceptance and commitment therapy? In S. C. Hayes, & K. D. Strosahl (Eds.), *A practical guide to acceptance and commitment therapy* (pp. 3–29). Springer US. [https://doi.org/10.1007/978-0-387-23369-7\\_1](https://doi.org/10.1007/978-0-387-23369-7_1).
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- Kashdan, T. B., & Rottenberg, J. (2010). Psychological flexibility as a fundamental aspect of health. *Clinical Psychology Review*, 30(7), 865–878. <https://doi.org/10.1016/j.cpr.2010.03.001>



- Kelley, B. C., Eklund, R. C., & Ritter-Taylor, M. (1999). Stress and burnout among collegiate tennis coaches. *Journal of Sport & Exercise Psychology*, 21(2), 113–130. <https://doi.org/10.1123/jsep.21.2.113>
- Kelley, B. C., & Gill, D. L. (1993). An examination of personal/situational variables, stress appraisal, and burnout in collegiate teacher-coaches. *Research Quarterly for Exercise & Sport*, 64(1), 94–102. <https://doi.org/10.1080/02701367.1993.10608783>
- Kent, W., Hochard, K. D., & Hulbert-Williams, N. J. (2019). Perceived stress and professional quality of life in nursing staff: How important is psychological flexibility? *Journal of Contextual Behavioral Science*, 14, 11–19. <https://doi.org/10.1016/j.jcbs.2019.08.004>
- Kong, F., Zhao, J., & You, X. (2013). Self-esteem as mediator and moderator of the relationship between social support and subjective well-being among Chinese university students. *Social Indicators Research*, 112(1), 151–161. <https://doi.org/10.1007/s11205-012-0044-6>
- Lau, Y., Wong, D. F. K., Wang, Y., Kwong, D. H. K., & Wang, Y. (2014). The Roles of social support in helping Chinese women with antenatal depressive and anxiety symptoms cope with perceived stress. *Archives of Psychiatric Nursing*, 28(5), 305–313. <https://doi.org/10.1016/j.apnu.2014.05.009>
- Lazarus, R. S. (1990). Theory-based stress measurement. *Psychological Inquiry*, 1(1), 3–13. [https://doi.org/10.1207/s15327965pli0101\\_1](https://doi.org/10.1207/s15327965pli0101_1)
- Li, H. Y., Cao, H., Leung, D. Y. P., & Mak, Y. W. (2020). The psychological impacts of a COVID-19 outbreak on college students in China: A longitudinal study. *International Journal of Environmental Research and Public Health*, 17(11), 3933. <https://doi.org/10.3390/ijerph17113933>
- Li, Y., & Zhang, R. C. (2019). Kindergarten teachers' work stress and work-related well-being: A moderated mediation model. *Social Behavior and Personality: International Journal*, 47(11), 1–11. <https://doi.org/10.2224/sbp.8409>
- Lloyd, J., Bond, F. W., & Flaxman, P. E. (2013). The value of psychological flexibility: Examining psychological mechanisms underpinning a cognitive behavioral therapy intervention for burnout. *Work & Stress*, 27(2), 181–199. <https://doi.org/10.1080/02678373.2013.782157>
- Lopez, C. R., Antoni, M. H., Fekete, E. M., & Penedo, F. J. (2012). Ethnic identity and perceived stress in HIV+ Minority Women: The role of coping self-efficacy and social support. *International Journal of Behavioral Medicine*, 19(1), 23–28. <https://doi.org/10.1007/s12529-010-9121-x>
- Malach-Pines, A. (2005). The Burnout Measure, short version. *International Journal of Stress Management*, 12(1), 78–88. <https://doi.org/10.1037/1072-5245.12.1.78>
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, 52, 397–422. <https://doi.org/10.1146/annurev.psych.52.1.397>
- Noone, S. J., & Hastings, R. P. (2011). Values and psychological acceptance as correlates of burnout in support staff working with adults with intellectual disabilities. *Journal of Mental Health Research in Intellectual Disabilities*, 4(2), 79–89. <https://doi.org/10.1080/19315864.2011.582230>
- O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality and Quantity*, 41(5), 673–690. <https://doi.org/10.1007/s11335-006-9018-6>
- Ortiz-Fune, C., Kanter, J. W., & Arias, M. F. (2020). Burnout in mental health professionals: The roles of psychological flexibility, awareness, courage, and love. *Clinica y Salud*, 31(2), 85–90. <https://doi.org/10.5093/clysa2020a8>
- Ozer, O., Okan, O., Budak, F., & Ozmen, S. (2021). Does social support affect perceived stress? A research during the COVID-19 pandemic in Turkey. *Journal of Human Behavior in the Social Environment*, 31(1–4), 134–144. <https://doi.org/10.1080/10911359.2020.1854141>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903. <https://doi.org/10.1037/0021-9010.88.5.879>
- Raffaelli, M., Andrade, F. C. D., Wiley, A. R., Sanchez-Armass, O., Edwards, L. L., & Aradillas-Garcia, C. (2013). Stress, social support, and depression: A test of the stress-buffering hypothesis in a Mexican sample. *Journal of Research on Adolescence*, 23(2), 283–289. <https://doi.org/10.1111/jora.12006>
- Rey, L., Extremera, N., & Pena, M. (2016). Emotional competence relating to perceived stress and burnout in Spanish teachers: A mediator model. *PeerJ*, 4, Article e2087. <https://doi.org/10.7717/peerj.2087>
- Schaufeli, W., & Enzmann, D. (1998). *The burnout companion to study and practice: A critical analysis*. CRC press.
- Shrout, P. E. (2011). Commentary: Mediation analysis, causal process, and cross-sectional data. *Multivariate Behavioral Research*, 46(5), 852–860. <https://doi.org/10.1080/00273171.2011.606718>
- Smith, R. E. (1986). Toward a cognitive-affective model of athletic burnout. *Journal of Sport & Exercise Psychology*, 8(1), 36–50. <https://doi.org/10.1123/jsp.8.1.36>
- Son, C., Hegde, S., Smith, A., Wang, X., & Sasangohao, F. (2020). Effects of COVID-19 on college students' mental health in the United States: Interview survey study. *Journal of Medical Internet Research*, 22(9), Article e21279. <https://doi.org/10.2196/21279>
- Spada, M. M., Nikčević, A. V., Moneta, G. B., & Wells, A. (2008). Metacognition, perceived stress, and negative emotion. *Personality and Individual Differences*, 44(5), 1172–1181. <https://doi.org/10.1016/j.paid.2007.11.010>
- Steigen, A. M., & Bergh, D. (2019). The Social Provisions Scale: Psychometric properties of the SPS-10 among participants in nature-based services. *Disability & Rehabilitation*, 41(14), 1690–1698. <https://doi.org/10.1080/09638288.2018.1434689>
- Sung, C. W., Chen, C. H., Fan, C. Y., Su, F. Y., Chang, J. H., Hung, C. C., Fu, C. M., Wong, L., Pei Chuan Huang, E., & Lee, T. S. H. (2020). Burnout in medical staffs during a coronavirus disease (COVID-19) pandemic. <https://doi.org/10.2139/ssrn.3594567>. (Accessed 1 May 2020)
- Takizawa, T., Kondo, T., Sakihara, S., Ariizumi, M., Watanabe, N., & Oyama, H. (2006). Stress buffering effects of social support on depressive symptoms in middle age: Reciprocity and community mental health. *Psychiatry and Clinical Neurosciences*, 60(6), 652–661. <https://doi.org/10.1111/j.1440-1819.2006.01579.x>
- Talaei, N., Varahram, M., Jamaati, H., Salimi, A., Attarchi, M., Kazempour Dizaji, M., Sadr, M., Hassani, S., Farzanegan, B., Monjazebi, F., & Seyedmehdi, S. M. (2020). Stress and burnout in health care workers during COVID-19 pandemic: Validation of a questionnaire. *Journal of Public Health-Heidelberg*, 1–6. <https://doi.org/10.1007/s10389-020-01313-z>
- Tashman, L. S., Tenenbaum, G., & Eklund, R. (2010). The effect of perceived stress on the relationship between perfectionism and burnout in coaches. *Anxiety, Stress & Coping*, 23(2), 195–212. <https://doi.org/10.1080/10615800802629922>
- Taylor, S. E. (2011). Social support: A review. In *The Oxford handbook of health psychology* (pp. 189–214). Oxford University Press.
- Uchino, B. N. (2006). Social support and health: A review of physiological processes potentially underlying links to disease outcomes. *Journal of Behavioral Medicine*, 29(4), 377–387. <https://doi.org/10.1007/s10865-006-9056-5>
- Wells, J. A. (1982). Objective job conditions, social support and perceived stress among blue collar workers. *Journal of Organizational Behavior*, 3(1), 79–94. <https://doi.org/10.1002/job.4030030107>
- Wersebe, H., Lieb, R., Meyer, A. H., Mische, M., Mikoteit, T., Imboden, C., Hoyer, J., Bader, K., Hatzinger, M., & Gloster, A. T. (2018). Well-being in major depression and social phobia with and without comorbidity. *International Journal of Clinical and Health Psychology*, 18(3), 201–208. <https://doi.org/10.1016/j.ijchp.2018.06.004>
- World Health Organization. (2021). *WHO coronavirus (COVID-19) dashboard*. <http://covid19.who.int>. (Accessed 7 September 2021).
- Xiao, H., Zhang, Y., Kong, D., Li, S., & Yang, N. (2020). Social capital and sleep quality in individuals who self-isolated for 14 days during the Coronavirus Disease 2019 (COVID-19) outbreak in January 2020 in China. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research*, 26, Article e923921. <https://doi.org/10.12659/MSM.923921>
- Yan, L., Whitelock-Wainwright, A., Guan, Q., Wen, G., Gasevic, D., & Chen, G. (2021). Students' experience of online learning during the COVID-19 pandemic: A province-wide survey study. *British Journal of Educational Technology*, 52(5), 2038–2057. <https://doi.org/10.1111/bjet.13102>
- Ye, Z., Yang, X., Zeng, C., Wang, Y., Shen, Z., Li, X., & Lin, D. (2020). Resilience, social support, and coping as mediators between COVID-19-related stressful experiences and acute stress disorder among college students in China. *Applied Psychology: Health and Well-Being*, 12(4), 1074–1094. <https://doi.org/10.1111/aphw.12211>
- Yildirim, M., Cicek, I., & Sanli, M. E. (2021). Coronavirus stress and COVID-19 burnout among healthcare staffs: The mediating role of optimism and social connectedness. *Current Psychology*, 1–9. <https://doi.org/10.1007/s12144-021-01781-w>
- Yildirim, M., & Solmaz, F. (2020). COVID-19 burnout, COVID-19 stress and resilience: Initial psychometric properties of COVID-19 Burnout Scale. *Death Studies*, 1–9. <https://doi.org/10.1080/07481187.2020.1818885>
- Zhang, B., Yan, X., Zhao, F., & Yuan, F. (2015). The relationship between perceived stress and adolescent depression: The roles of social support and gender. *Social Indicators Research*, 123(2), 501–518. <https://doi.org/10.1007/s11205-014-0739-y>
- Zhou, E. S., Penedo, F. J., Lewis, J. E., Rasheed, M., Traeger, L., Lechner, S., Soloway, M., Kava, B. R., & Antoni, M. H. (2010). Perceived stress mediates the effects of social support on health-related quality of life among men treated for localized prostate cancer. *Journal of Psychosomatic Research*, 69(6), 587–590. <https://doi.org/10.1016/j.jpsychores.2010.04.019>
- Zhu, J., Chen, Y., & Zhang, W. (2019). Association between family economic hardship and university students' risky alcohol use: Mediating and moderating roles of perceived discrimination and impulsivity. *Personality and Individual Differences*, 141, 1–6. <https://doi.org/10.1016/j.paid.2018.12.005>