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Cultivating Resilience During the COVID-19 Pandemic: A Socioecological Perspective

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COVID-19, resilience, behavioral science, social capital, socioecological psychology

Abstract

The coronavirus disease 2019 (COVID-19) pandemic poses wide-ranging impacts on the physical and mental health of people around the world, increasing attention from both researchers and practitioners on the topic of resilience. In this article, we review previous research on resilience from the past several decades, focusing on how to cultivate resilience during emerging situations such as the COVID-19 pandemic at the individual, organizational, community, and national levels from a socioecological perspective. Although previous research has greatly enriched our understanding of the conceptualization, predicting factors, processes, and consequences of resilience from a variety of disciplines and levels, future research is needed to gain a deeper and comprehensive understanding of resilience, including developing an integrative and interdisciplinary framework for cultivating resilience, developing an understanding of resilience from a life span perspective, and developing scalable and cost-effective interventions for enhancing resilience and improving pandemic preparedness.

Erratum >

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INTRODUCTION

Infodemic: a portmanteau of information and epidemic; when information, especially wrong or unverified information, spreads quickly and widely, much like a disease does during an epidemic

The coronavirus disease 2019 (COVID-19) pandemic has been the most severe public health emergency in the twenty-first century (Jia & Yang 2020). As of September 3, 2021, the COVID-19 pandemic has infected more than 217 million people and caused more than 4.51 million deaths globally. The COVID-19 pandemic not only has posed a big threat to public health safety but also has brought unprecedented challenges to economic and social development around the world. For example, the increasing number of infected patients has burdened healthcare systems in both developed and developing countries, especially among low- and middle-income countries where there was a shortage of healthcare resources before the outbreak of COVID-19 (Akande & Akande 2020, Barnard 2020). Moreover, the COVID-19 pandemic has enormously disrupted people's everyday lives in terms of economics, sociality, health, and psychology, among other aspects (Jacobides et al. 2020, Jia 2021). Different from previous pandemics that happened before the information age, COVID-19 is the first pandemic to be viewed as an infodemic, in which misinformation, conspiracy theories, and rumors about COVID-19 spread quickly through social media (e.g., Facebook, Twitter, WeChat, Weibo) and induced and amplified panic and emotional distress among the general public (Hao & Basu 2020). For example, studies conducted shortly

after the outbreak of COVID-19 have revealed that exposure to COVID-19-related health messages on social media was significantly associated with the prevalence of depression and anxiety symptoms among people in China during the early stage of COVID-19 (Gao et al. 2020, M. Liu et al. 2020).

In particular, COVID-19 has induced wide-ranging impacts on the mental health and well-being of high-risk populations, including infected patients and patients with suspected infection; frontline healthcare workers; people quarantining at home; and vulnerable groups such as older adults (age 65 and older), children and adolescents, patients with chronic diseases, and people with disabilities and mental health issues (García-Fernández et al. 2020, Holmes et al. 2020, S. Liu et al. 2020, R.C. O'Connor et al. 2021, Tan et al. 2020, Zhang et al. 2020a). Although the general public are at a relatively lower risk of infection, widely applied containment measures such as quarantine and social distancing have also significantly affected their mental health (Barzilay et al. 2020, Brooks et al. 2020, Daly et al. 2020, Ghebreyesus 2020, Lai et al. 2020, D.B. O'Connor et al. 2020, Preti et al. 2020, Prime et al. 2020, Qiu et al. 2020, Song et al. 2020, Tian et al. 2020, Vindegaard & Benros 2020, Vinkers et al. 2020). In response to these wide-ranging impacts of COVID-19 on the mental health of people around the world, the director of the World Health Organization (WHO), Dr. Tedros Adhanom Ghebreyesus (2020), advocated addressing mental health needs as an integral part of the response to COVID-19 in all affected countries and regions. Scholars of relevant specialties, such as mental health, psychiatry, counseling and clinical psychology, and public health, have also advocated the provision of timely mental health services for both at-risk groups and the general public (Chen & Bonanno 2020, Holmes et al. 2020, Labrague 2021, S. Liu et al. 2020, D.B. O'Connor et al. 2020, Zhang 2020, Zhang et al. 2020a, Zhou 2020).

Despite the aforementioned negative impacts on people's health and everyday lives, societies have rebounded in the midst of the pandemic. For example, communities and societies around the world have initiated prosocial and collaborative efforts (e.g., voluntary services to help older adults and other vulnerable groups) to help contain the transmission of COVID-19 (Broomell et al. 2020, Campos-Mercade et al. 2020). In China alone, more than 42,000 healthcare professionals from all over the country volunteered to help contain COVID-19 in Wuhan and other major cities in Hubei during January–April 2020. China has also sent teams of healthcare experts to help other countries improve their emergency healthcare services and infection control practices for containing COVID-19. In addition, healthcare professionals working in hospitals have remotely shared with their peers around the world (e.g., via teleconferencing and remote coordination) their experiences in providing high-quality healthcare services to severely ill COVID-19 patients.

All such efforts contribute to positive psychological changes, also termed posttraumatic growth (PTG) or, more broadly, resilience, which is defined as both a personal characteristic and a dynamic process in response to stressful or challenging situations (Bonanno 2004, Chen & Bonanno 2020, Fletcher & Sarkar 2013, Panter-Brick 2014). PTG denotes the ability to recover and grow after experiencing traumatic events or stressful challenges (Ong et al. 2006, Tugade & Fredrickson 2004, Tugade et al. 2004); resilience is the dynamic process by which people adapt and move forward after experiencing major challenges or setbacks. The American Psychological Association (Palmiter et al. 2012) defined resilience as "the process of adapting well in the face of adversity, trauma, tragedy, threats, or even significant sources of threat." Although the COVID-19 pandemic and the relevant containment measures constitute a longstanding source of stress for many people around the world, which may have acute and chronic downstream consequences for people's physical and mental health (D.B. O'Connor et al. 2021), previous research has suggested that resilience is usually the normative and modal response to traumatic experiences (Bonanno et al. 2011, Chen & Bonanno 2020, PeConga et al. 2020).

Posttraumatic growth (PTG): positive changes experienced as a result of the struggle with a major life crisis or a traumatic event

Resilience: the process of adapting well in the face of adversity, trauma, tragedy, threats, or even significant sources of threat

Socioecological psychology: an area within psychology that investigates the cognitive, emotional, and behavioral adaptation of humans to physical, interpersonal, economic, and political environments

Previous research on mental and psychological health has documented multilevel factors (e.g., individual, family, organizational, community, and national levels) that influence the manifestation, development, and maintenance of resilience (Bryant 2015, Chen & Bonanno 2020, Duchek 2020, Masten 2015, Zhou 2020), as well as multimodal, sometimes even unexpected, pathways to building resilience (Bonanno 2004) after experiencing traumatic events (e.g., natural disasters, violence, severe illness) (Ho et al. 2004, Tedeschi & Calhoun 1996, Zhang et al. 2020b). Research conducted during the COVID-19 pandemic has indeed demonstrated that people experience positive changes such as PTG and enhanced meaning of life during COVID-19 (Chen et al. 2021, Pietrzak et al. 2021, Shechter et al. 2020, Stallard et al. 2021). However, little research has been conducted to understand the factors that may increase resilience among people experiencing pandemics, including COVID-19. In this review, we provide an overview of the research on cultivating resilience at multiple levels and from interdisciplinary perspectives, which could be critical for enhancing recovery and growth for those severely affected by the COVID-19 pandemic (Rosenberg 2020, Veer et al. 2020, Vinkers et al. 2020, Wang et al. 2021). We hope this review inspires and facilitates more interdisciplinary and systematic work on cultivating resilience across multiple levels and diverse perspectives, especially in the face of public health crises and collective challenges such as the COVID-19 pandemic.

EMBRACING A SOCIOECOLOGICAL MODEL OF RESILIENCE

The accumulated research on the factors that may influence health behaviors and healthy living has led to an increasing consensus that people's engagement in health behaviors and their health status are usually determined by multilevel factors, including intrapersonal, interpersonal, organizational, and community-level factors, and public health policies (for reviews, see Glanz & Bishop 2010, Glass & McAtee 2006, Panter-Brick 2014). In psychology, Oishi and colleagues (Oishi 2014, Oishi et al. 2019, Uskul & Oishi 2020) pioneered the research on the influence of socioecological factors on psychological processes and launched socioecological psychology by elucidating through an integrative and holistic approach the underlying mechanisms that link macro-level environments (e.g., physical, economic, sociopolitical) and meso-level factors (e.g., organizational processes) and micro-level psychological processes (e.g., personality, cognition, emotion, behavior). Socioecological psychology contributes to the mission of psychological sciences to understand the human mind and behavior from an objectivist perspective (Oishi 2014). It also enriches comprehensive demonstration of the impacts of environments on human affect, cognition, and behavior by connecting physical, interpersonal, economic, and political level factors, and illuminates the psychological mechanisms underlying the links between multilevel environmental factors and the human mind and behavior (Oishi 2014). Furthermore, socioecological psychology also attempts to elucidate how particular psychological processes induce niche construction of the socioecological environments in which human beings reside (Oishi 2014, Uskul & Oishi 2020). Given that health behaviors and health are usually influenced by multilevel determinants, such as individual engagement in health behaviors (e.g., physical activity), interpersonal environment (e.g., health behaviors among family, friends, and neighbors), community surroundings (e.g., safety of outdoor activities, accessibility of health facilities), and economic (e.g., income inequality) and political (e.g., political climate, welfare system, laws) environments, the socioecological perspective informs the development of comprehensive interventions for improving public health. During the past several decades, public health researchers have been actively advocating the application and implementation of the socioecological model in health interventions to increase their effectiveness and socioecological validity for improving people's health (Glanz & Bishop 2010, Glass & McAtee 2006, Golden & Earp 2012, Golden et al. 2015, Reupert 2017).

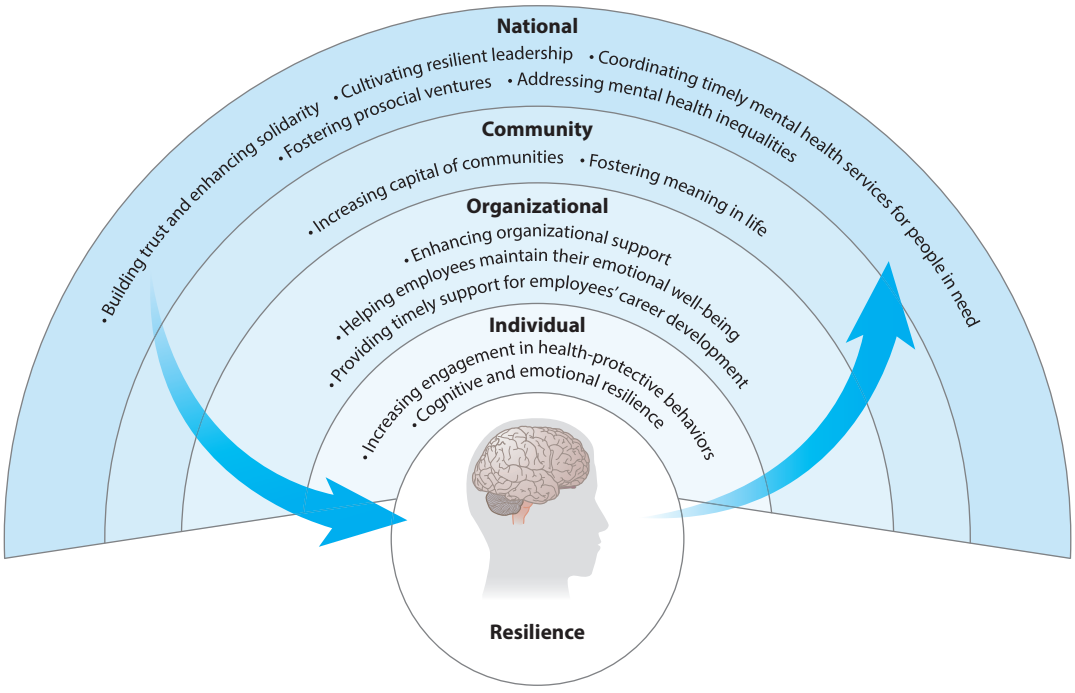

Figure 1

Strategies for cultivating resilience across the individual, organizational, community, and national levels from the socioecological perspective.

Inspired by the socioecological perspective on health, we review and outline strategies for cultivating resilience both during and after the COVID-19 pandemic across individual, organizational, community, and national levels based on current research on resilience (Bonanno 2004; Cai 2020; Zautra et al. 2008a,b) and propose future directions for research on cultivating resilience in response to global challenges of emerging infectious diseases and on enhancing pandemic preparedness in the future (**Figure 1**). We believe that by examining the influence of both near and distal predictors of resilience and delineating the multilevel environmental contingencies of resilience from an interdisciplinary perspective, we can inform researchers and practitioners to work collaboratively on developing comprehensive interventions to foster resilience both during and after the COVID-19 pandemic.

INDIVIDUAL-LEVEL STRATEGIES

Increasing Engagement in Health-Protective Behaviors

Previous research highlights the importance of health-protective behaviors in response to pandemics of infectious diseases. Given the high infection rates of COVID-19 and that it may take much longer than expected to reach herd immunity through population-wide vaccination, engaging in health-protective behaviors, including wearing face masks while going out, washing hands effectively with sanitizers or soap more frequently, and social distancing in public places, is pivotal for reducing the transmission of the virus and containing the COVID-19 pandemic (Betsch 2020, Bourassa et al. 2020, West et al. 2020, Zhang 2020). However, there have been great disparities in the adoption of these health-protective behaviors. The following individual-level factors have

substantially affected the level of engagement in health-protective behaviors: prosociality, risk perception of the pandemic, perceived effectiveness of the recommended containing strategies, self-efficacy of engaging in health-protective behaviors, implicit theories of health, consideration of future consequences, psychological resilience, and emotional experiences during the pandemic (Abdelrahman 2020, Broomell et al. 2020, Campos-Mercade et al. 2020, Luceño-Moreno et al. 2020, Zhang & Kou 2021, Zhang et al. 2021). Such disparities in the uptake of health-protective behaviors have not only posed big threats to people's physical health but have also made them vulnerable to emotional distress. Besides, the intention–behavior gap is a big challenge for promoting health behavior changes (Sheeran & Webb 2016). What make matters worse is that partisan bias has colored people's beliefs about COVID-19 and has reduced engagement in health-protective behaviors (Barrios & Hochberg 2020).

Intention–behavior gap: the phenomenon that people often fail to behave in a way they would like to despite existing, strong intentions

To combat these challenges, behavioral scientists advocated the application of behavioral sciences–based strategies to enhance proactive engagement in health-protective behaviors for reducing the risk for infection (Betsch 2020, Michie et al. 2020, West et al. 2020, Zhang 2020, Zhang & Zhang 2020). For example, behavioral scientists gave advice based on the behavioral change wheel (BCW), developed by Michie and colleagues (2011, 2014), to increase engagement in health-protective behaviors and public adherence to containment measures initiated by governments and local communities (Michie et al. 2020, West et al. 2020). According to the BCW (Michie et al. 2011, 2014), three conditions are necessary for behavioral change to happen: (*a*) capability, (*b*) opportunity, and (*c*) motivation, as exemplified by the capability, opportunity, motivation, and behavior model (Michie et al. 2020, West et al. 2020). Specifically, Michie and colleagues gave tailored advice to promote recommended behavior change during the COVID-19 pandemic (e.g., practice developing the required skills for behavior change, establish routines and habits, make the behavior change as easy as possible). Behavioral scientists also actively engaged in the efforts to support pandemic responses by distilling relevant research findings on research topics such as navigating threats, social and cultural influence on engagement in health-protective behaviors, moral decision making, effective leadership, and stress and coping (D.B. O'Connor et al. 2020, Van Bavel et al. 2020). For example, a field study conducted in hospitals in Norway found that nudges emphasizing that using hand sanitizer is a local social norm could greatly increase compliance with hand hygiene recommendations among hospital visitors during COVID-19 (Mobekk & Stokke 2020). Research conducted by Lu and colleagues (2021) on mask use found that cultural differences in collectivism were a significant predictor of mask use both within the United States and around the world. Research from the social and behavioral sciences has indicated that behavior change has implications for closing the disparities in engagement in health-protective behaviors across regions or countries with different cultural values, containment policies, and resource availability.

Cognitive and Emotional Resilience

Research conducted during the pandemic also highlighted the importance of cognitive and emotional factors in facilitating the development of resilience. For example, a large-scale survey on resilience conducted in Europe demonstrated that positive appraisal style was a significant predictor of resilience and that it mediated the relationship between perceived social support and resilience among Europeans (Veer et al. 2020). A systematic review of quantitative studies of the mental health status of healthcare workers found that coping skills, psychological resilience, and social support were protective factors of mental health (Labrague 2021). A recent large-scale online intervention study conducted during the pandemic among more than 25,000 participants from 55 countries has provided preliminary evidence that a brief intervention on adaptive reappraisal as an

emotion regulation strategy could increase experiences of positive emotions and decrease experiences of negative emotions (Wang et al. 2021). These results highlight the potential of increasing experiences of positive emotions through brief interventions to increase resilience and reduce mental health symptoms in the face of emerging public health crises, including COVID-19. Another online-registered experiment found that prosocial behaviors, such as purchasing COVID-19–related items for someone else, increased the experience of positive affect, meaningfulness, empathy, and social connectedness (Varma et al. 2020). In Japan, initiatives have been implemented to maintain emotional connections and enhance experiences of positive emotions through virtual social interactions (e.g., playing the game *Animal Crossing: New Horizons*, in which people can go to each other's house to engage in virtual social interactions; Yamaguchi et al. 2020).

Broaden-and-build theory of positive emotions: proposes that positive emotions broaden one's thought-action repertoire and, over time, build skills and resources

According to the broaden-and-build theory of positive emotions (Fredrickson 2004) and the upward spiral theory of lifestyle change (Fredrickson 2013), positive emotions can broaden our cognitive repertoire, enrich our psychological resources, and promote adherence to healthy living. Therefore, the enhanced experience of positive emotions during COVID-19 is likely to be beneficial for both personal and public mental health. Experiences of positive emotions also promote engagement in healthy lifestyles (e.g., healthy eating, physical activity) in everyday life and, specifically, engagement in health-protective behaviors during COVID-19, which may in turn improve physiological and psychological immune systems and build resilience among people (Van Cappellen et al. 2018). Individuals and mental health professionals are encouraged to utilize the tools (e.g., expressing gratitude, displaying self-compassion, using one's character strengths, initiating and maintaining positive interpersonal relationships) developed by positive psychologists to buffer the traumatic impacts of COVID-19, bolster people's mental health during COVID-19, and build capacities for maintaining future mental health (Niemiec 2020, Waters et al. 2021). From the perspective of positive psychology, focusing one's attention on positive aspects and maintaining positive emotional experiences through virtual or in-person high-quality interpersonal connections could be promising mental healthcare strategies to build resilience among individuals, families, and communities (Chen & Bonanno 2020, Waters et al. 2021, Yamaguchi et al. 2020).

ORGANIZATIONAL LEVEL STRATEGIES

Enhancing Organizational Support During COVID-19

Organizational support is pivotal to facilitating resilience among employees during the COVID-19 pandemic. Employees around the world have faced enormous pressure due to lost job opportunities, reduced income, and heightened job insecurity caused by adoption of restrictive measures (e.g., social distancing, quarantine) to control the spread of COVID-19 and the economic recessions that have ensued. To confront the uncertainty and insecurity induced by the pandemic, organizations have initiated measures to enhance or, at least, preserve employees' trust as they deal with work–life challenges by allowing employees to work remotely, treating employees fairly in organizational decision making, and empowering employees by recognizing their contributions to managing the impacts of the pandemic (Gillespie et al. 2020). In response to the emergent containment measures for infection control, organizations (or employers) should provide flexible working arrangements and organizational support (both formal and informal) to help their employees cope with challenging situations and improve their work performance and well-being. A systematic review by Labrague (2021) highlighted the importance of providing timely and comprehensive organizational support (e.g., provision of sufficient personal protective equipment to prevent infection) to improve and preserve the mental health and psychological well-being of healthcare workers. Effective leadership is also vital to creating and maintaining a safe and

resilient work environment to safeguard the mental health and psychological well-being of employees (Labrague 2021). With insights from evidence-based organizational research on boundary management, Perrigino & Raveendhran (2020) proposed an assess-create-support framework to help managers understand their employees' needs, create and mobilize organizational resources, and provide individualized and tailored support for their employees to effectively balance work–life demands and work more productively from home.

Servant leadership: a leadership philosophy in which the main goal of the leader is to serve

Taking Initiatives to Help Employees Maintain Their Emotional Well-Being

Organizations can also take initiatives to improve employees' emotional well-being during the pandemic. The continuously increasing number of infections and deaths caused by COVID-19 around the world induced mortality salience among those exposed to the pandemic, as well as anxiety among employees, which could be detrimental for employees' job engagement and their motivation to engage in prosocial behaviors within their organizations and communities (Hu et al. 2020). Research conducted in China and the United States among employees from a variety of industries has found that the endorsement of servant leadership by managers could mitigate negative impacts of mortality salience and anxiety induced by COVID-19 on job engagement and prosocial behavior (Hu et al. 2020). Encouraging more organizational leaders to adopt a servant leadership philosophy could be one promising strategy to help and empower employees to adapt positively during COVID-19. Organizations can also help their employees manage loneliness during COVID-19 by facilitating virtual social interactions; supporting employees' voluntary work; encouraging employees to create and pursue shared goals; and resuming organizational rituals to help employees support each other and contribute to the containment of COVID-19 in their local communities, organizations, and countries (Nault et al. 2020, Vinkers et al. 2020). Organizational strategies that help employees improve their coping skills and enhance psychological resilience could also help them better deal with the impacts of COVID-19 on mental health (Labrague 2021). In a systematic review of 31 quantitative studies conducted during the first stage of the COVID-19 pandemic on psychological resilience, coping behaviors, and social support among healthcare workers, Labrague (2021) found that resilience, positive coping behaviors, and social support were associated with better mental and psychological health outcomes (e.g., lower levels of traumatic stress, psychological distress, stress, symptoms of anxiety and depression). These results have implications for developing evidence-based interventions to improve mental health and psychological well-being of healthcare workers. For example, hospital administrators could take measures to increase the accessibility and affordability of mental health services for healthcare workers during the COVID-19 pandemic.

Providing Timely Support for Employees' Career Development

Containment measures (e.g., social distancing, quarantine) for combating COVID-19 have greatly reduced face-to-face interactions in organizations and have hindered opportunities for employees to learn from each other. This is especially challenging for healthcare professionals, because implementing best practices in patient treatment and infection control requires healthcare professionals to continuously learn from each other to avoid costly mistakes. Myers (2020) advised governments and hospitals on how to create opportunities for healthcare professionals around the world to learn to adapt to and share best practices for fighting COVID-19. Organizations can also take initiatives to highlight situational cues, which could embody work meaningfulness to help employees maintain a high level of occupational calling during this challenging time, as observed among nurses working in intensive care units during the pandemic (Zhu et al. 2020).

Kalaitzaki and colleagues (2020) advocated the adoption of a salutogenic framework for mobilizing personal assets and available resources to help healthcare professionals maintain an optimal level of health and well-being and rebound despite the experience of substantial mental health stress during COVID-19. When layoffs are deemed necessary by companies and other organizations to deal with financial setbacks due to COVID-19, the decisions and messages about layoffs should be delivered tentatively and justly with respect and care to buffer the negative impacts on employees' mental health and to safeguard their well-being (Bilotta et al. 2020). Organizations can also mobilize available resources (e.g., job search assistance) to support laid-off employees as they search for new jobs, reducing the effects of financial setbacks on employees' mental health and well-being.

Social capital: a set of shared values that allow individuals to work together to effectively achieve a common purpose

COMMUNITY-LEVEL STRATEGIES

Increasing Social Capital of Communities

Social capital, such as social support, is vital to enhancing resilience. Communities can take measures to foster resilience among their residents by promoting prosocial behaviors in local neighborhoods and communities and strengthening community social support (Luo et al. 2021, Yu et al. 2021). Research on happiness and well-being in times of crisis has suggested that communities and nations with better social capital (e.g., higher levels of social trust) responded to crises more effectively and buffered the negative impacts of economic crises on people's subjective well-being more successfully (Delle Fave 2014, Helliwell et al. 2014). People living in communities and nations where there is an established level of trust are more likely to engage in prosocial behaviors to help each other achieve a higher level of resilience during a time of crisis (Helliwell et al. 2014). When engagement in prosocial behaviors is the social norm, this could create an upward spiral for people to support each other during difficult times and could improve mental health among people, including both beneficiaries and benefactors (Levine et al. 2008, Schwartz et al. 2003, Weinstein & Ryan 2010). Experiences of COVID-19 can also inspire community residents to take initiatives to help each other cope proactively and adaptively during the pandemic.

People with a disproportionately high risk for COVID-19 infection, including frontline healthcare workers, infected patients and patients with suspected infection, children, older adults, and people with chronic respiratory diseases and mental illness, have had difficulty dealing with the unprecedented impacts of the pandemic on their physical and mental health. For example, frontline healthcare workers experienced a high level of mental distress due to high infection risk, shortage of health-protective equipment, separation from families, and long working hours (Dai et al. 2020, Lai et al. 2020, Tan et al. 2020). Inspired by the mission of protecting the health of the people, hundreds of thousands of Chinese healthcare workers have sacrificed their Spring Festival holiday plans to fully participate in the collective efforts to contain COVID-19 despite the risk for infection. Such examples have inspired more senior high school students in China to attend medical school after graduation in 2020 (Qu et al. 2020). Prosocial behaviors were observed around the world during the COVID-19 pandemic (Van Brown 2020). For example, in the United Kingdom more than 3 million people voluntarily participated in more than 4,000 mutual aid groups to help those in need (Butler 2020). Psychological scientists also advocated the cultivation of a "we" mindset during the pandemic to increase adherence to containment measures and to build mutual aid groups (D.B. O'Connor et al. 2020). Recognizing the importance of sociocultural factors in influencing the transmission of viruses among communities, social scientists have recommended the adoption of a community-based sociocultural network approach to understand and combat COVID-19 (Hannigan et al. 2020). Community-level strategies for promoting proactive engagement in health-protective behaviors and building reciprocal support for those

experiencing difficulties during COVID-19 are a precious opportunity for strengthening social capital and enhancing solidarity in the face of adversity.

Reserve capacity model (RCM): a framework for understanding the mechanisms that underlie the relationships between poverty/low socioeconomic status and poor health

Fostering Meaning in Life

Community initiatives can foster meaning in life among residents to enhance resilience during COVID-19. In a review on the Black–White paradox in health, especially in mental health, Keyes (2009) found that in the United States black people, despite experiencing social inequalities and discrimination, displayed a higher level of flourishing than their white counterparts. Potential factors that may promote mental resilience among black people include a greater concern for generativity, more frequent religious attendance, and an ability to construct meaning in life in the face of adversity (Keyes 2009). A similar paradox is also observed among Hispanics living in the United States, who usually show better health outcomes than non-Hispanic whites, despite disadvantages such as immigration and acculturation stress, poor educational and occupational opportunities, and discrimination (Gallo et al. 2009). This Hispanic paradox in health outcomes could be explained by the reserve capacity model (RCM), proposed by Gallo and colleagues (2009) as a framework for delineating the protective role of positive cultural factors (e.g., familism, religiousness, supportive social resources). Recent research in health psychology also found that meaning in life was positively associated with engagement in health behaviors (Brassai et al. 2015, Hooker & Masters 2016, Rush et al. 2019, Zhang 2019) and better physical and mental health (Hart et al. 2006, Hill et al. 2019, Iani et al. 2020). This line of research has demonstrated that meaning of life is a protective factor for mental health and a promising positive psychological resource for maintaining a healthy lifestyle during challenging times. A survey of healthcare workers in New York also found that 61% reported an increased sense of meaning and purpose since the COVID-19 outbreak (Shechter et al. 2020). Future research is needed to provide empirical evidence of understanding the community-level and cultural level factors (e.g., spiritual beliefs, community support) that promote resilience and its underlying mechanisms and pathways, especially during challenging times such as the COVID-19 pandemic.

NATIONAL LEVEL STRATEGIES

Building Trust and Enhancing Solidarity

A public health emergency (e.g., COVID-19) tests whether a national government can handle a crisis timely and effectively. A longitudinal survey of people's social emotions during COVID-19 in China found that negative social emotions arose during the early stage of the pandemic and then declined gradually as daily infected cases phased down in response to strict and effective containment measures (Wang 2020). Also, a large-scale survey conducted across 58 countries, with more than 100,000 participants, from late March to early April 2020 revealed that perceived insufficiency of government response was associated with a higher level of emotional distress (e.g., worry and depressive symptoms) among the general public (Fetzer et al. 2020). This survey also found that stringent restrictions by the government to contain COVID-19 reduced the perceived insufficiency of government and public response, enhanced people's trust of the government, and in turn improved people's mental health (e.g., a lower level of depressive symptoms).

Some studies also highlighted the importance of timely and decisive government responses in managing the wide-ranging impacts of the emerging pandemic on the physical and mental health of people around the world (Fan et al. 2020). For example, Prime Minister Boris Johnson of the United Kingdom announced a national lockdown on the evening of March 23, 2020, after which people's perceptions of the appropriateness of government and public response increased compared with their perceptions before the lockdown (Fetzer et al. 2020). In addition, people

trusted the government more after the lockdown and had a more accurate perception of their fellow citizens' attitudes toward stringent containment measures, which is critical for coordinating collective actions to contain COVID-19 (Fetzer et al. 2020). In an analysis of cultural variations in the effectiveness of containing COVID-19, Gelfand and colleagues (2021) found that government efficiency and cultural tightness were two significant predictors of COVID-19 infection and mortality rates across different countries. Timely containment measures also reduced people's worries about the pandemic and lowered depressive symptoms among the public, thus improving mental health (Fetzer et al. 2020, Zhang et al. 2020a). In Germany, behavioral scientists initiated the COVID-19 Snapshot Monitoring program to provide reliable and representative access to the public responses to COVID-19 and found that the mandatory policy on mask wearing was perceived by the public as fair, socially responsible, and more effective at curbing the transmission of airborne viruses (Betsch 2020, Betsch et al. 2020). These practices also highlight the value of incorporating social and behavioral sciences into national management strategies for public health crises (Michie et al. 2020, West et al. 2020, Zhang 2020).

Resilient leadership: a new way of seeing, thinking, and leading that helps leaders navigate the hidden dynamics of organizations more effectively

Cultivating Resilient Leadership

A resilient leadership is the key to containing COVID-19 (Giustiniano et al. 2020). In China, President Xi Jinping advocated that all levels of government should prioritize safeguarding the health of the people. The Chinese government has taken the lead in implementing the strictest containment measures for controlling the pandemic (Cai & Ye 2020). Since January 11, 2020, the National Health Committee of China has issued a daily report on the status of the COVID-19 pandemic in China. On January 23, 2020, when the lockdown policy was implemented in Wuhan to prevent the spread of COVID-19 to other regions of China, both the central and local governments initiated first-level public health emergency responses. The governments have also taken different kinds of measures (e.g., national campaigns, community engagement) to encourage the public to participate in health-protective behaviors, including wearing face masks while going out, washing hands more frequently and effectively, avoiding public gatherings, and avoiding travel to high-risk areas. These reactive measures, of course, are important for initiating and promoting emergent management strategies during this public health crisis. However, both reactive responses and proactive measures are needed to contain COVID-19 and foster resilience among people around the world. In the face of the enormous political challenges in initiating stringent containment strategies for controlling COVID-19, President Xi advocated all countries to work together to create a community of shared future for human health. African countries, which generally have the weakest healthcare systems in the world, have followed the strong leadership of South Africa's president, Cyril Ramaphosa, who has promoted collective action among African countries and enhanced collective resilience across the African Union (Barnard 2020). However, in some developed countries, for example, the United States, leaders have tried to politicize the pandemic and have chosen to ignore or even denigrate experts from leading public health institutions, such as the Centers for Disease Control and Prevention, the National Institutes of Health, and the US Food and Drug Administration, all of which could have helped better improve infection control and contain the pandemic (according to the editors of the *New England Journal of Medicine*; NEJM 2020). A large-scale survey conducted in the United States also found that political differences were the factors that had most consistently influenced Americans' engagement in health-protective behaviors and their support of political measures in response to COVID-19 (Gadarian et al. 2021). Therefore, some scholars have advocated that public health messages should transcend political divides to inspire and enhance public support and engagement in prosocial health behaviors (Gadarian et al. 2021).

Coordinating Timely Mental Health Services for People in Need

Given the severity and continuation of the COVID-19 pandemic, measures should be taken to monitor, understand, and mitigate both acute and chronic impacts of the pandemic on the mental health of people around the world (Holmes et al. 2020). Examples from China suggest that timely mental health services are important to mitigate the negative impacts on people's mental health (S. Liu et al. 2020, Zhang et al. 2020a). Shortly after the outbreak of COVID-19, the Chinese government initiated timely mental health services among the public, especially among infected patients and patients with suspected infection, frontline healthcare workers, and vulnerable populations (National Health Commission of China 2020a,b). For example, the National Health Commission of China (2020a,b) released in late January 2020 guidelines for providing emergent psychological crisis interventions and in early February 2020 guidelines for establishing and maintaining psychological assistance hotlines. In response to these guidelines, online mental health screenings and surveillance surveys were initiated around China for healthcare professionals, patients infected with COVID-19, students, and the general population; psychological assistance hotlines were established and online psychological counseling services were provided 24 hours a day, 7 days a week, by mental health professionals from mental health centers at hospitals, universities, and professional societies (S. Liu et al. 2020, Zhang et al. 2020a). The no-contact, free psychological consultations provided by the Chinese government have increased the accessibility of mental health resources for those in need and have played a key role in relieving emotional distress among the general public (Dan 2020). These timely measures are the first of their kind in China after an infectious disease pandemic and have greatly contributed to the containment of the pandemic in China (Zhang et al. 2020a). The Canadian government offered similar mental health support to its residents and provided easy-to-implement tips for fostering resilience (Government of Yukon 2020). Mental health professionals in the United States also advocated for reimbursement for the use of telehealth services in order to increase accessibility of mental health services, especially for older adults (Lepkowsky 2020). Professional organizations such as the American Psychological Association, British Psychological Society, and Chinese Psychological Society also initiated programs to help those in need and made mental health resources accessible to the general public. By working collaboratively, professional organizations, mental health professionals, and national governments can coordinate available resources and distribute them efficiently and in a timely manner to meet the needs of different groups of people.

Fostering Prosocial Ventures

Management research has found that, even during difficult times such as after natural disasters, prosocial ventures, especially those established by locals, can mobilize available resources to help relieve suffering and build resilience in multiple ways (Williams & Shepherd 2016). Since the outbreak of COVID-19 in China, community-based voluntary activities initiated by locals, nonprofit organizations, and social ventures have greatly contributed to the fight against COVID-19 by coproducing emergent services in alliance with government organizations (Miao et al. 2021). In countries such as the United Kingdom and the United States, a variety of prosocial ventures were established by local community members to help vulnerable populations during the pandemic. People also voluntarily joined mutual aid groups to help those in need (Butler 2020, Van Brown 2020). Prosocial ventures like these provide opportunities for people to show empathy and compassion for others and to build an upward social spiral of positive acts and emotions. These prosocial ventures greatly mitigated the negative impacts of the COVID-19 pandemic on many people's lives, especially vulnerable populations.

Addressing Mental Health Inequalities

As the COVID-19 pandemic continues to progress, a growing concern is that it might widen preexisting inequalities in physical and mental health around the world (Mishra et al. 2021, D.B. O'Connor et al. 2020). For example, research based on multiple longitudinal surveys conducted in the United Kingdom found that those with prepandemic mental health issues were more likely to experience healthcare disruptions (e.g., delays in accessing medication), economic disruptions (e.g., loss of income and unemployment), and clusters of disruptions across domains (Di Gessa et al. 2021). Another line of research using the UK Household Longitudinal Study to compare socioeconomic inequality among those experiencing psychological distress during the first wave of the COVID-19 pandemic found that the mental health impacts of COVID-19 are unequally distributed: Preexisting inequalities in chronic health conditions, housing conditions, and neighborhood characteristics increasingly contributed to socioeconomic inequalities in psychological distress (Davillas & Jones 2021). Given the prepandemic inequalities in mental health services around the world (Chui et al. 2021, Lawrence & Kisely 2010, Ngui et al. 2010, Public Health England 2018), the continuation of the COVID-19 pandemic and associated containment measures, including lockdown, social distancing, and self-isolation, might exacerbate prepandemic inequalities in physical and mental health among vulnerable groups, especially those living in areas deprived of employment opportunities, healthcare, or affordable housing (Davillas & Jones 2021, Di Gessa et al. 2021, D.B. O'Connor et al. 2020).

Inequalities in mental health services and other relevant domains are likely a pressing challenge for countries to cultivate resilience during and after COVID-19. Coordinated efforts to build resilience, other than taking measures to increase the accessibility of mental health services for the general public, should pay special attention to address the needs of vulnerable groups across domains (e.g., physical health, mental health, economic hardships, social support). For example, although initiatives for digital mental health services greatly increase the accessibility of mental health resources, specific arrangements should be implemented to address the barriers to access faced by vulnerable groups. The research of Bonanno and colleagues (2007) after the 9/11 terrorist attack in New York revealed that demographics (e.g., gender, chronic diseases), resources (e.g., income level, social support), and experiences of life stress (e.g., prior or recent stressful events) were significant predictors of resilience and that strategies targeting changeable risk factors across multiple levels are needed to foster resilience. Because people with preexisting mental health issues are more likely to experience disruptions in multiple domains (Di Gessa et al. 2021), comprehensive support programs should be carried out to address disparities in mental health and other relevant domains. Charities (e.g., Center for Mental Health in the United Kingdom) and professional organizations (e.g., American Psychological Association, Chinese Psychological Society) have already appealed to governments to address racial and ethnic disparities in mental health status and mental health care. Governments can also coordinate resources to train qualified mental health professionals to provide culturally and linguistically competent services to racial and ethnic minorities, to increase the availability of culturally appropriate services, and to fund research to gain a deeper understanding of the predictors of resilience among racial and ethnic minorities and develop culturally sensitive interventions to cultivate resilience among them.

FUTURE DIRECTIONS

As research on resilience has accumulated during the past few decades, there is an increasing consensus that an integrative approach, which includes affective, psychological, and social processes across intrapersonal, interpersonal, organizational, community, and national levels and from the

life span and transgenerational perspectives, is needed to draw a complete picture of resilience (Ong et al. 2009, Zautra et al. 2008b). Similar to a multilevel and holistic approach, which is needed for understanding the determinants, facilitators, underlying mechanisms, and consequences of resilience, a holistic, multimodal, and interdisciplinary perspective is needed to develop culturally sensitive, population-targeted, locally implementable, scalable, and sustainable interventions to foster resilience among both the general population and vulnerable groups during and after COVID-19. Below, we highlight some priorities for future research on cultivating resilience in response to pandemics of emerging infectious diseases.

Understanding the Long-Term Downstream Consequences of and Developing Adaptive and Flexible Responses to the COVID-19 Pandemic

With more than 217 million infections and more than 4.51 million deaths around the world, the impacts of the COVID-19 pandemic are unprecedented and widespread, encompassing economic, health, psychological, and social domains and crossing all ages, genders, races, and ethnicities (Holmes et al. 2020, D.B. O'Connor et al. 2020). As the COVID-19 pandemic continues to spread in many countries due to new variants of the SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2) virus and higher transmission rates, continuous efforts and resources must be deployed to fully understand the far-reaching downstream consequences of the pandemic and associated containment strategies. Specifically, more research is needed to capture the long-term impacts of the pandemic on people's physical and mental health, economic status, interpersonal and intergroup relationships, and social inequalities and cohesion. As the stress induced by the COVID-19 pandemic is likely to vary depending on the stage of the pandemic, the perceived risk of infection, the severity of the pandemic in one's community or country, the experience of economic and health disruptions, and one's health status, people's responses to the pandemic should also be adaptive and flexible. More research is also needed on how to develop and cultivate regulatory flexibility, as proposed by Bonanno & Burton (2013), in response to traumatic events, including being sensitive to the sociocultural contexts in which one lives, developing a diverse repertoire of regulatory strategies both during and after the COVID-19 pandemic, being responsive to feedback, and monitoring and modifying regulatory strategies accordingly in individual and collective efforts to cope with the stress induced by COVID-19 and its associated disruptions to people's everyday lives.

Developing an Integrative, Multilevel, and Multidisciplinary Framework for Fostering Resilience

Although research on resilience has increased during the past few decades, there remains a lack of consensus on the conceptualization and measurement of resilience and an integrative framework for understanding multilevel factors that may influence the development and maintenance of resilience during challenging times (Bonanno et al. 2007, Luthar et al. 2000). With the advancement of research on resilience in psychology, mental health, and psychiatry, individual-level predictors (e.g., demographics, coping styles) of resilience are relatively well understood; however, research on resilience at the family, organizational, community, national, or population level is relatively rare (Bonanno et al. 2007, 2010; D.B. O'Connor et al. 2020). Given that researchers from multiple disciplines, including developmental psychology (Luthar et al. 2000), personality psychology (Ong et al. 2009), clinical psychology and mental health (Bonanno 2004, Holmes et al. 2020, Tedeschi & Calhoun 1996, Zautra et al. 2008b), community development (Zautra et al. 2008a), and business and management (Williams & Shepherd 2016), have provided insights into the factors that may enhance or impede resilience, an integrative and multidisciplinary framework

for cultivating resilience is needed in future research to accommodate findings on resilience from different levels and fields (Holmes et al. 2020, Kola et al. 2021, D.B. O'Connor et al. 2020) and also to provide opportunities for cross-fertilization among different lines of research on resilience. Such a framework for understanding resilience would also help us gain a deeper and more comprehensive understanding of the underlying mechanisms of resilience. Advances in this direction will have implications for informing the development and implementation of integrative and multidisciplinary evidence-based public health practices to foster resilience in families, organizations, and communities around the world.

Taking a Life Span Perspective on Cultivating Resilience

As the COVID-19 pandemic is likely to coexist with human beings for a long time, as well as have long-lasting and widespread impacts on individual mental health, family functioning, and socioeconomic recovery, we need to take a life span perspective on cultivating resilience. Many people who have lost their jobs during the pandemic now face enormous economic hardship. Such economic hardship has not only short-term psychological consequences, such as increasing levels of emotional distress, but also long-term impact on interpersonal relationships, parenting behaviors, family functioning, and intergenerational implications for the mental health of future generations (Donnellan et al. 2009, Prime et al. 2020). Therefore, there is an urgent need to mitigate the negative impacts of COVID-19 among people at different developmental stages (e.g., children and adolescents, middle-aged adults, older adults) to improve adjustment and foster resilience. Future research using longitudinal study designs would be valuable to test more broadly the adaptive functions of positive psychology–based interventions (e.g., positive emotions, character strengths) during COVID-19 on the basis of the broaden-and-build theory developed by Fredrickson (2004, 2013) and the advancement of positive psychology (Waters et al. 2021). Future research is also needed to explore how lifestyle changes induced by COVID-19 may be related to different sociodemographic characteristics (e.g., gender, age, race, ethnicity, health status). For example, researchers advocated protecting the health of older adults by integrating a life course model into societies' responses and communities' rebuilding efforts both during and after the pandemic (Jowell et al. 2020).

Developing Scalable and Cost-Effective Interventions for Increasing Resilience

There is a growing need for scalable and cost-effective interventions that enhance people's resilience, especially during emerging situations and challenging times. Given that the target populations of resilience-enhancing interventions are likely to vary across developmental stages and sociocultural backgrounds and that the pathways to resilience are usually multimodal, a systematic approach is needed to develop precise interventions at all levels, from individual, organizational, and community levels to national and global levels (Kola et al. 2021). Although some small-scale resilience-enhancing interventions have been developed and evaluated across different cultural backgrounds (Leve et al. 2009, Wolchik et al. 2009, Zautra et al. 2008b), future efforts should coordinate insights from different perspectives and disciplines to increase the synergistic effects of multilevel mechanistically driven intervention programs. As the impacts of the COVID-19 pandemic on people's physical and mental health continue to unfold, ecological momentary assessment techniques could help researchers understand the processes underlying resilience at the individual level and when, where, and under what context resilience is demonstrated (Shiffman et al. 2008). With advantages for data collection, realism, experimental control, adaptability, and mobility, virtual reality could also be used as a research tool to develop and evaluate strategies for cultivating resilience among people with different demographic and psychological characteristics in a variety of

social environments (Martingano & Persky 2021). Further improvements to technological tools such as ecological momentary assessment, virtual reality, and digital technologies for providing remote mental health services would be promising for increasing ease of use and service availability, reducing cost, and improving efficiency and efficacy of resilience interventions. Of course, efforts should also be made to reduce existing disparities in accessing services for cultivating resilience.

CONCLUSIONS

During the past several decades, research on resilience has increased attention from scholars across many research areas, including developmental psychology, personality psychology, clinical psychology, positive psychology, community development, organizational management, and public health. Findings from different disciplines have enriched our understanding of the definition, influential factors, and consequences of resilience across multiple levels. However, with the widespread impact of pandemics on people's physical and mental health, as well as the new impact of infodemics, there is an urgent call for more in-depth research to enhance resilience among people, especially through the use of cross-disciplinary approaches to understand complex underlying mechanisms of resilience and advanced technologies to develop scalable and effective interventions. For example, there is an increasing demand for developing resilience interventions tailored to a target population, context, and sociocultural background. To achieve this goal, we must take an interdisciplinary perspective on resilience development and take initiatives to improve resilience across multiple levels using a systematic approach. Coordinated efforts are not only essential for dealing with emerging challenges (e.g., the COVID-19 pandemic) in the short term but also pivotal for increasing pandemic preparedness, improving psychological well-being, and promoting social harmony in the long term.

SUMMARY POINTS

1. Although the COVID-19 pandemic has widely affected people's physical and mental health around the world, past research indicates that resilience would likely be the modal response among the majority of the population.
2. As resilience is predicted by multiple levels of predictors, from individual and organizational levels to community and national levels, the socioecological perspective is informative for developing and implementing comprehensive interventions to cultivate resilience among people during and after the COVID-19 pandemic.
3. Individual-level strategies to build resilience include increasing engagement in and adherence to health-protective behaviors and harnessing the power of behavioral sciences–based practices to promote behavior change and cognitive and emotional resilience through positive psychology–based interventions during the COVID-19 pandemic.
4. Organizational level strategies to cultivate resilience include mobilizing organizational resources to enhance organizational support, taking initiatives to improve and maintain employee well-being, and providing timely support for employees' career development.
5. Strengthening social capital, enhancing solidarity, and fostering meaning in life from a sociocultural perspective are community-level strategies for building resilience.
6. National level strategies to foster resilience include building trust and enhancing solidarity, cultivating resilience leadership, providing timely mental health services to those in need, fostering prosocial ventures, and addressing mental health inequalities in the responses to COVID-19.

FUTURE ISSUES

1. With the accumulation of research on resilience during the past few decades, there is an increasing need for an integrative approach, which includes affective, psychological, and social processes across intrapersonal, interpersonal, organizational, community, and national levels and from the life span and transgenerational perspectives, to draw a more complete picture of resilience.
2. More research is needed to further understand both the short-term and the long-term downstream consequences of the COVID-19 pandemic on mental health and to develop adaptive and flexible responses to COVID-19.
3. As the impacts of the COVID-19 pandemic continue to unfold, future research should take a life span perspective to mitigate the negative impacts of COVID-19 among people at different developmental stages to improve adjustment and foster resilience.
4. With the advancement of research on resilience from relevant disciplines, a holistic, multilevel, and interdisciplinary perspective is needed to develop culturally sensitive, population-targeted, locally implementable, cost-effective, scalable, and sustainable interventions to foster resilience among both the general population and vulnerable groups during and after COVID-19.
5. Future research should also take advantage of the advancements in digital technologies to develop, deliver, and evaluate strategies for cultivating resilience among people with different demographic and psychological characteristics in a variety of social environments.

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