



Being Hopeful and Mindful During Adversity: A Longitudinal Study on College Students' Adjustment During COVID-19

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Abstract

Objectives The current study examined whether hope and mindfulness were associated with changes in two maladjustment measures, internalizing and externalizing behaviors, during the COVID-19 pandemic and tested sense of coherence as a mediator. The salutogenic theory of health, which posits that sense of coherence is central to individuals' well-being in stressful situations and that individuals derive their sense of coherence from their generalized resistance resources (GRRs), was used to guide the analyses.

Methods On two occasions separated by about 6 months, 253 Hong Kong college students (mean age = 21.0 years at time 1; 86% of them were women) filled in online questionnaires during the COVID-19 outbreaks. Path analysis was conducted to examine the interrelationships among hope and mindfulness, sense of coherence, and internalizing and externalizing behaviors.

Results Results indicated that hope and mindfulness at time 1 were associated with internalizing and externalizing behaviors at time 2, even after controlling for confounding variables and prior levels of internalizing and externalizing behaviors. Moreover, sense of coherence at time 1 significantly mediated these associations.

Conclusions Findings pointed to the potential roles of hope, mindfulness, and sense of coherence in understanding Chinese college students' adjustment during the COVID-19 pandemic. Future research is needed to test whether sense of coherence and behavioral adjustment can be promoted through hope- and mindfulness-based intervention programs. Future research is also needed to examine the interrelationships among health-promoting assets, sense of coherence, and individual adjustment in samples of diverse cultural backgrounds.

Keywords Hope · Mindfulness · Sense of coherence, Internalizing behaviors · Externalizing behaviors · COVID-19

Amidst a global pandemic like COVID-19, college students' lives are drastically changed, their classes suspended, their internships interrupted, and their career prospects disrupted (Czeisler et al. 2020; National Review 2020). Not surprisingly, college students may show increasing signs of maladjustment. As documented in recent studies, since the start of the pandemic, college students have been exhibiting more internalizing behaviors, such as depression and anxiety, and more externalizing behaviors, such as aggression and

delinquency (Cao et al. 2020; Hamza et al. 2020; Sun et al. 2020).

Hope and mindfulness are well-studied, health-promoting assets that may reduce internalizing and externalizing behaviors and contribute to post-traumatic growth (Davidson et al. 2012; Gimpel et al. 2014; Liu et al. 2017). Similar findings have also been reported during the pandemic, despite most of them being cross-sectional. For example, Genç and Arslan (2021) found that hope was associated with subjective well-being among Turkish adults. Also, Conversano et al. (2020) found that mindfulness was linked to lower levels of depression and anxiety among Italian adults. Indeed, according to the salutogenic theory of health, some health-promoting assets, or generalized resilient resources (GRRs), may promote individuals' adjustment by first strengthening their sense of coherence, a feeling that world is comprehensible, manageable, and meaningful (Antonovsky 1979, 1987;

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Mittelmark and Bauer 2017). Both hope and mindfulness can be viewed as GRRs that might strengthen individuals' sense of coherence.

Hope is a personal quality that feeds on the synergy of two components: *agency*, or goal-directed energy, and *pathways*, or plans to meet these goals (Snyder et al. 1991). High-hope people tend to see impediments to their goals as manageable challenges. To tackle these challenges, they muster their energy (i.e., agency) and come up with different solutions (i.e., pathways) to achieve their goals. In contrast, low-hope people tend to perceive impediments as unbeatable barriers. In the face of these barriers, they feel stunted, frustrated, and demoralized and are inclined to give up (Snyder 2002). As high-hope people view things as manageable and meaningful, they are likely to be better adjusted, especially in the face of adversity (Braun-Lewensohn et al. 2017; Gallagher et al. 2020).

Consistent with such views, prior studies have suggested that hope may contribute to fewer internalizing and externalizing behaviors and better well-being in stressful situations. For example, in a sample of racially diverse college students who had experienced a school shooting, Liu et al. (2017) found that hope predicted fewer depressive symptoms and better academic and social well-being 1 year later, even after controlling for degrees of exposure to the shooting (e.g., heard of it, witnessed it, or was injured in it) and prior levels of adjustment. Moreover, in a sample of college students, Genç and Arslan (2021) found that hope was linked to subjective well-being during the COVID-19 pandemic.

Mindfulness is the tendency of bringing one's attention to the present moment and navigating through the immediate experience with acceptance, openness, and curiosity (Bishop et al. 2004; Kabat-Zinn 1990). Mindful people tend to view things in nonjudgmental and nonreactive ways and thus experience lower levels of psychological distress and higher levels of psychological well-being (Feldman et al. 2007). In fact, mindfulness has been linked to a variety of positive outcomes, including fewer depressive symptoms, lower anxiety levels, higher satisfaction with life, better emotion regulation, and better cognitive functioning (Keng et al. 2011; Tomlinson et al. 2018).

Mindfulness also appears to be an important resilient resource during such difficult times as the COVID-19 pandemic. For example, using cross-sectional data collected from Turkish college students, Yalçın et al. (2022) found that mindfulness was linked to lower depression and anxiety. Also, using data collected from German adults during the pandemic, Götmann and Bechtoldt (2021) found that mindfulness was associated with more frequent use of constructive coping strategies (e.g., problem-solving) and less frequent use of maladaptive coping strategies (e.g., blaming), which in turn were associated with better psychological well-being 2 months later. As argued by Weissbecker

et al. (2002), mindfulness may promote the well-being of individuals as the open and nonreactive nature of mindfulness may help individuals make sense of things that have happened to them.

Sense of coherence is “a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that (1) stimuli deriving from one's internal and external environments in the course of living are structured, predictable, and explicable; (2) the resources are available to one to offset the demands posed by these stimuli; and (3) these demands are challenges, worthy of investment and engagement” (Antonovsky 1987, p. 19). According to the salutogenic theory of health, sense of coherence is critical in understanding health and adjustment (Antonovsky 1979, 1987; Mittelmark and Bauer 2017). As individuals with a strong sense of coherence perceive stressful situations to be more understandable and more surmountable, they are less affected by and feel more in control of unfavorable conditions (Amirkhan and Greaves 2003). These individuals are also more able to derive meanings from and experience growth after stressful events (Ragger et al. 2019). Indeed, prior studies have linked a strong sense of coherence to positive adjustment and psychosocial growth among individuals who had experienced such adversity as childhood trauma (Fossion et al. 2014), chronic diseases (Weissbecker et al. 2002), and COVID-related stressors (Barni et al. 2020; Schäfer, et al. 2020).

A strong sense of coherence does not occur in a vacuum, but instead is built upon GRRs—characteristics that allow individuals to cope with the demands imposed by stressful events, sustain a strong sense of coherence during crises, and exhibit resilience and growth despite adversity (Antonovsky 1979, 1987; Mittelmark and Bauer 2017). GRRs can be interpersonal-relational (e.g., positive peer and family relationships), cognitive (e.g., cognitive functioning), artifactual-material (e.g., socioeconomic status), or valuative-attitudinal (e.g., self-efficacy; Davidson et al. 2012; Read et al. 2005). When individuals identify and deploy GRRs to cope with their stressors, individuals develop confidence in themselves, believing that even the operation of stressors follows some lawful patterns and that resources are available for them to deal with the stressors (Amirkhan and Greaves 2003; Super et al. 2016). In line with such views, research has documented the associations of different GRRs (e.g., emotional closeness and social support) with sense of coherence and subjective well-being (Idan et al. 2017).

Both hope and mindfulness can be viewed as valuative-attitudinal GRRs, as they are intrapersonal, attitudinal qualities that may positively affect individuals' ways of perceiving things under stressful situations (Duggleby et al. 2010; Feldman et al. 2007). Specifically, with their energy and solutions, high-hope people tend to believe that problems are manageable (Snyder et al. 1991), whereas mindful people

tend to attune to their inner feelings and accept things as they are during rough times (Bishop et al. 2004). These personal styles of thinking may help individuals build a strong sense of coherence and achieve higher well-being. Indeed, prior studies have documented positive associations linking hope or mindfulness to sense of coherence and well-being. For example, a correlational study showed that college students' hope was linked to their academic well-being and that the link was mediated by their sense of coherence (Davidson et al. 2012). Also, an intervention study showed that a mindfulness-based program increased the sense of coherence of women with chronic pain and reduced their depressive symptoms and overall stress levels (Weissbecker et al. 2002).

Though well-studied in positive psychology (Rand and Cheavens 2009; Tomlinson et al. 2018), hope and mindfulness have rarely been examined using the salutogenic framework (Antonovsky 1979, 1987; Mittelmark and Bauer 2017). Considering that the pandemic has been worsening the mental health of individuals around the globe (Pfefferbaum and North 2020), it is imperative to help young people cope with stress by identifying and strengthening their GRRs, such as hope and mindfulness, as the well-being of young people seems to be particularly vulnerable at this critical time (Czeisler et al. 2020; National Review 2020).

Guided by theory and research, the goal of the current study was to examine whether hope and mindfulness were associated with changes in **internalizing and externalizing behaviors** during the pandemic and to test sense of coherence as a mediator. We hypothesized that hope and mindfulness would be uniquely linked to decreases in **internalizing and externalizing behaviors** over time and that sense of coherence would mediate such links.

Method

Participants

Participants were students from a major public university in Hong Kong, China. At time 1, 627 students were contacted and 253 of them provided data, resulting in a response rate of 40%. At time 2, 193 students provided data, resulting in a retention rate of 76%, typical of existing longitudinal studies (Gustavson et al. 2012). At time 1, participants averaged 21.0 years in age ($SD = 2.4$) and 86% of them were women.

Procedures

We emailed information about the study, along with the link to the online questionnaire, to students who had enrolled in the university. Students who were interested gave informed consent before completing the questionnaire. Data were collected on two occasions separated

by about 6 months, time 1 (June–July 2020) and time 2 (December 2020–February 2021), which coincided respectively with the third and fourth waves of COVID-19 outbreak in Hong Kong (The Government of Hong Kong Special Administrative Region 2021a). At both timepoints, region-wide, epidemic-control measures—including compulsory mask wearing, social distancing in public places, and closure of schools and other public facilities—were imposed, although the intensity varied across the two timepoints (The Government of Hong Kong Special Administrative Region 2021b). In the university, at both timepoints, only skeleton staff members were working on campus. Moreover, dorms were closed to students and all classes were conducted online. At each timepoint, upon finishing the questionnaire, each participant received a supermarket coupon of HK\$50 (\approx US\$6). The procedures of the current study were approved by the Human Research Ethics Committee of The Education University of Hong Kong.

Measures

All English measures were translated into Chinese by a bilingual research assistant and translated back into English by another bilingual research assistant. A third bilingual researcher then checked the work, resolved the differences, and finalized the Chinese items. Ratings were averaged for each measure, and higher scores indicated higher levels of the construct.

Hope Hope was assessed with the 6-item State Hope Scale (Snyder et al. 1996). At time 1, on a 4-point scale ranging from 1 (*Definitely False*) to 4 (*Definitely True*), students rated their hopeful thinking in terms of agency and pathways (e.g., “At this time, I am meeting the goals that I have set for myself,” “There are lots of ways around any problem that I am facing now”). The Cronbach's alpha was .86 and the McDonald's omega was .86.

Mindfulness Mindfulness was assessed with the 10-item Cognitive and Affective Mindfulness Scale-Revised (Feldman et al. 2007). At time 1, using a 4-point scale ranging from 0 (*Not at All*) to 3 (*Almost Always*), students rated their mindfulness (e.g., “I can accept things I cannot change,” “I am able to accept the thoughts and feelings I have”). The Cronbach's alpha was .85 and the McDonald's omega was .84.

Sense of Coherence Sense of coherence was measured using the 13-item Sense of Coherence Scale (Antonovsky 1987). At time 1, using a 7-point scale ranging from 1 (*Very Seldom or Never*) to 7 (*Very Often*), students rated the comprehensibility (e.g., “Do you have the feeling that you are in an

unfamiliar situation and don't know what to do?"), manageability (e.g., "How often do you have feelings that you're not sure you can keep under control?"), and meaningfulness (e.g., "How often do you have the feeling that there's little meaning in the things you do in your daily life?") of life events. The Cronbach's alpha was .84 and the McDonald's omega was .84.

Internalizing and Externalizing Behaviors Internalizing and externalizing behaviors were measured using the Strengths and Difficulties Questionnaire (Goodman 1997), which included four 5-item subscales of difficulties: conduct problems (e.g., "I fight a lot. I can make other people do what I want."), hyperactivity (e.g., "I am restless, I find it hard to sit down for long."), emotional problems (e.g., "I worry a lot."), and peer problems (e.g., "I would rather be alone than with other people."). At times 1 and 2, using a 3-point scale ranging from 0 (*Not True*) to 2 (*Certainly True*), students rated their difficulties in these four aspects of adjustment in the past 6 months. We averaged the ratings on the emotional problem and peer problem items to calculate the score of internalizing behaviors and averaged the ratings on the conduct problem and hyperactivity items to calculate the score of externalizing behaviors, as these two broader measures of maladjustment are often more stable and informative than the specific subscales of difficulties, especially when studying relatively low-risk community samples (Goodman et al. 2010). The Cronbach's alphas were .73 at time 1 and .72 at time 2 for internalizing behaviors and .68 at time 1 and .66 at time 2 for externalizing behaviors. The McDonald's omegas were .73 at time 1 and .72 at time 2 for internalizing behaviors and .70 at time 1 and .67 at time 2 for externalizing behaviors.

Social Media Use Social media use was measured using one item (Merikangas, et al. 2020). At time 2, using a 5-point scale ranging from 1 (*No Social Media*) to 5 (*More Than 6 Hours*), students rated the item, "During the past two weeks, how much time per day did you spend using social media (e.g., Facebook, Instagram, Twitter, TikTok etc.)?".

Demographic Information Participants provided information on their age, gender (0 = *Female*; 1 = *Male*), and degree levels (1 = *Higher Diplomas/Associate Degrees*; 2 = *Bachelor's Degrees*; 3 = *Master's Degrees*; 4 = *Doctoral Degrees*; 5 = *Others*).

Data Analyses

We examined the descriptive statistics of and correlations among variables using SPSS 28. Meanwhile, we conducted path analysis to test the mediation model using SAS 9.3. Guided by the salutogenic theory of health

(Antonovsky 1979, 1987; Mittelmark and Bauer 2017); we tested hope and mindfulness at time 1 as the predictor variables, sense of coherence at time 1 as the mediating variable, and internalizing and externalizing behaviors at time 2 as the outcome variables. Also, to capture changes in adjustment over time, we included internalizing and externalizing behaviors at time 1 as covariates. Finally, to rule out several alternative explanations (Braun-Lewensohn et al. 2017; Gao et al. 2020; Riehm et al. 2019; Zhao and Zhou 2020), we included participants' age, gender, degree levels, and social media use as covariates as well. We used full information maximum likelihood procedures—one of the most effective methods to reduce estimation biases due to attrition (Graham 2009)—to handle our missing data.

Results

Table 1 shows the descriptive statistics of and correlations among variables. Notably, time 1 hope was associated negatively with time 2 internalizing behaviors ($r = -.35$, $p < .001$) and externalizing behaviors ($r = -.21$, $p = .00$). Similarly, time 1 mindfulness was associated negatively with time 2 internalizing behaviors ($r = -.35$, $p < .001$) and externalizing behaviors ($r = -.35$, $p < .001$). Table 2 provides an overview of the covariates.

The path model exhibited an excellent fit [$X^2(4) = 0.78$, $p = .94$; CFI = 1.00, GFI = 1.00, AGFI = 0.99, SRMR = 0.00, RMSEA = 0.00, RMSEA 90% CI = [0.00, 0.02], NNFI = 1.06]. As shown in Fig. 1, hope ($\beta = .23$, $SE = .06$, $p < .001$, 95% CI = [.12, .34]) and mindfulness ($\beta = .19$, $SE = .05$, $p < .001$, 95% CI = [.08, .29]) at time 1 were linked to sense of coherence at time 1, which in turn was associated with internalizing behaviors ($\beta = -.19$, $SE = .07$, $p = .00$, 95% CI = [-.32, -.07]) and externalizing behaviors ($\beta = -.19$, $SE = .07$, $p = .01$, 95% CI = [-.33, -.06]) at time 2. Analysis of the indirect paths indicated that sense coherence significantly mediated the associations of hope at time 1 with internalizing behaviors ($\beta = -.06$, $SE = .02$, $p = .00$, 95% CI = [-.10, -.02]) and externalizing behaviors ($\beta = -.04$, $SE = .02$, $p = .02$, 95% CI = [-.08, -.01]) at time 2 as well as the associations of mindfulness at time 1 with internalizing behaviors ($\beta = -.05$, $SE = .02$, $p = .01$, 95% CI = [-.09, -.01]) and externalizing behaviors ($\beta = -.03$, $SE = .02$, $p = .03$, 95% CI = [-.07, -.00]) at time 2 (Table 3). With respect to the covariates, age, gender, and degree levels were not related to any predictor or outcome variables, although social media use was significantly linked to hope ($\beta = -.34$, $SE = .07$, $p < .001$, 95% CI = [-.46, -.21]) and mindfulness ($\beta = -.26$, $SE = .06$, $p < .001$, 95%

Table 1 Means, standard deviations, and ranges of and correlations among variables

	<i>M</i>	<i>SD</i>	Range	1	2	3	4	5	6	7	8	9	10	11
1 Age	21.0	2.4	18.00-35.00	-										
2 Gender	—	—	0.00-1.00	.20**	-									
3 Degree	1.77	0.50	1.00-5.00	.24**	.25**	-								
4 SMU	3.18	0.88	1.00-5.00	-.01	-.15*	-.11	-							
5 T1_INT	0.76	0.34	0.00-1.80	.21**	.12	.05	.09	-						
6 T1_EXT	0.64	0.31	0.00-1.60	.15*	.20**	-.03	.23**	.51**	-					
7 Hope	2.76	0.47	1.00-4.00	-.11	-.05	.08	-.31**	-.40**	-.30**	-				
8 Mindful	2.57	0.44	1.40-4.00	-.11	-.02	.04	-.23**	-.36**	-.43**	.57**	-			
9 SOC	4.24	0.83	1.85-7.00	-.08	-.05	.13*	-.15*	-.62**	-.51**	.53**	.50**	-		
10 T2_INT	0.78	0.32	0.10-1.70	.13	.02	.03	.20**	.65**	.38**	-.35**	-.33**	-.57**	-	
11 T2_EXT	0.68	0.29	0.10-1.40	.05	.05	.04	.22**	.37**	.66**	-.21**	-.33**	-.44	.49**	-

Note: SMU, social media use; *Mindful*, mindfulness; *T1_INT* and *T2_INT*, internalizing behaviors at time 1 and time 2, respectively; *T1_EXT* and *T2_EXT*, externalizing behaviors at time 1 and time 2, respectively; *SOC*, sense of coherence; *M*, means; *SD*, standard deviations. Higher scores on internalizing and externalizing behaviors indicated more adjustment problems, whereas higher scores on hope, mindfulness, and sense of coherence indicated better health

p* < .05, *p* < .01

Table 2 Overview of covariates

	Percentages	Numbers
Age (valid <i>N</i> = 251)		
18–20 years	50%	125
21–24 years	44%	110
25 years or above	6%	16
Gender (valid <i>N</i> = 253)		
Female	86%	219
Male	14%	34
Degree levels (valid <i>N</i> = 253)		
Higher diploma	25%	65
Bachelor’s	73%	184
Master’s	1%	3
Doctoral	0%	0
Others	1%	1
Social media use (valid <i>N</i> = 192)		
No social media	2%	3
Under 1 h	17%	32
1–3 h	53%	102
4–6 h	19%	37
More than 6 h	9%	18

Note: Students were mainly from education-related programs

CI = [–.38, –.13]) at time 1 and internalizing behaviors (*β* = –.10, *SE* = .05, *p* = .04, 95% CI = [.00, .20]) at time 2.

Discussion

Individuals have been experiencing psychological problems during the COVID-19 pandemic (Pfefferbaum and North 2020). College students’ problems may be particularly

salient, due to the drastic changes to their school lives and career prospects (Czeisler et al. 2020; Cao et al. 2020; Hamza et al. 2020; National Review 2020; Sun et al. 2020). As the world is fighting a long war against COVID-19 (and its variants), it is important to not only reduce individuals’ psychological problems but also help individuals identify and deploy resilient resources to cope with stressors. Indeed, boosting the resilience of the community is now among the most urgent tasks for researchers, practitioners, and policy makers (Chen and Bonanno 2020). To this end, many potential resilient resources, including hope and mindfulness, have been investigated in an emerging line of research (Barni et al. 2020; Behan 2020; Gana 2001; Schäfer, et al. 2020; Sun et al. 2020). However, although this work had provided timely and important insights, the longitudinal associations linking these resources to individual well-being—and the possible underlying mechanism—remained underexplored, motivating our study’s focus on how hope and mindfulness were linked to college students’ changes in **internalizing and externalizing behaviors** over a 6-month period during the pandemic and whether sense of coherence mediated such links.

Hope and Mindfulness Were Associated with Individual Adjustment

Our findings indicated that both hope and mindfulness were associated with decreases in college students’ internalizing and externalizing behaviors over time. These results were also consistent with mounting evidence suggesting that hope and mindfulness may contribute to individuals’ adjustment and well-being, especially in stressful situations (Conversano et al. 2020; Sun et al. 2020). Indeed, as a resilient resource, mindfulness has been demonstrated to reduce

Fig. 1 Standardized coefficients among hope and mindfulness, sense of coherence, and internalizing and externalizing behaviors. **Note:** Mindful, mindfulness; SOC, sense of coherence; T2_INT, internalizing behaviors at time 2; T2_EXT, externalizing behaviors at time 2. Individuals' age, gender, degree levels, social media use, and internalizing and externalizing behaviors at time 1 were included as covariates. ** $p < .01$, *** $p < .001$

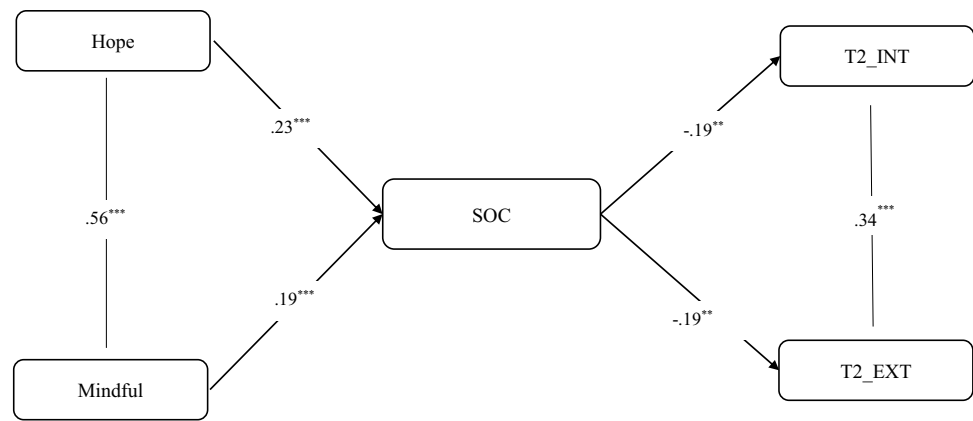


Table 3 Standardized coefficients of the indirect paths of the mediation model

	Coefficients	Standard errors	<i>t</i> -values	<i>p</i> -values	95% CIs
Hope → SOC → T2_INT	-.06	.02	-2.80	.01	[-.10, -.02]
Mindful → SOC → T2_INT	-.06	.03	-2.44	.01	[-.09, -.01]
Hope → SOC → T2_EXT	-.04	.02	-2.29	.02	[-.08, -.01]
Mindful → SOC → T2_EXT	-.04	.02	-2.13	.03	[-.07, -.00]

Note: *Mindful*, mindfulness; *SOC*, sense of coherence; *T2_INT*, internalizing behaviors at Time 2; *T2_EXT*, externalizing behaviors at time 2. Individuals' age, gender, degree levels, social media use, and internalizing and externalizing behaviors at time 1 were included as covariates

symptoms of maladjustment, such as anxiety and depression (Keng et al. 2011; Tomlinson et al. 2018), probably because heightened mindfulness helps individuals focus on the present moment and be more aware and accepting of their immediate thoughts and feelings. Not surprisingly, researchers have been advocating that mindfulness be promoted among individuals in the face of adverse conditions, ideally in forms that are accessible, low-cost, and easy to follow (Behan 2020).

Similarly, hope has been proposed as a resilient resource that may contribute to individuals' psychological well-being, physical health, and interpersonal functioning (Rand and Cheavens 2009). Though less commonly studied than mindfulness, hope has been advocated as one important resilient resource needing to be promoted during the COVID-19 pandemic (Braun-Lewensohn et al. 2021; Sun et al. 2020). However, compared to the presence of hope, the lack of it, namely, hopelessness, has received more attention from social scientists. Future studies should investigate hope as a positive construct that may help individuals stay resilient in the face of the pandemic.

Taken together with the findings of these prior researchers, our findings provided some evidence of the benefits of remaining hopeful and mindful for individual adjustment during the pandemic. That said, our two-wave, longitudinal design limited our ability to make causal inferences about the relations of hope and mindfulness with individual adjustment. Important directions for future research

include replicating our findings using three or more waves of longitudinal data and testing whether manipulating individuals' hope and mindfulness may actually increase their resilience against COVID-19-related stressors using randomized controlled designs.

Consistent with their defining characteristics (Achenbach 1991), the items we used to measure college students' internalizing and externalizing behaviors tapped onto such adjustment problems as depressive symptoms, anxious thoughts, psychosomatic reactions, peer rejection, impulsivity, restlessness, and aggressive and rule-breaking behaviors. Some of these problems, such as peer rejection, may further reduce individuals' interpersonal-relational GGRs and create additional adjustment problems (Sun et al. 2020). Notably, at time 1, about 18% and 7% of students in our sample had internalizing and externalizing behavior scores that were higher than the clinical cut-off points for the Hong Kong population, respectively (Lai et al. 2010). And, at time 2, these figures changed to about 14% and 9%, respectively, providing important insights about Hong Kong college students' emotional and behavioral experiences during the pandemic, echoing the view that young people may be particularly vulnerable at this critical time (Czeisler et al. 2020; National Review 2020). More generally, more studies are needed to examine young people's adjustment in Hong Kong as well as other regions of the world.

Sense of Coherence Emerged as a Significant Mediator

College students' sense of coherence emerged as a significant mediator of the associations of hope and mindfulness with internalizing and externalizing behaviors, even after controlling for prior levels of adjustment and other confounding variables. Specifically, hope and mindfulness were linked to a stronger sense of coherence, which in turn was linked to decreases in [internalizing and externalizing behaviors](#) over time. These findings were in line with the salutogenic theory of health postulating that the development of a strong sense of coherence is dependent on the identification, selection, and deployment of GRRs to cope with prior stressors (Antonovsky 1979, 1987; Mittelmark and Bauer 2017). In fact, previous researchers had identified numerous resilient resources, such as positive peer and family relationships, cognitive functioning, socioeconomic status, and self-efficacy, and linked them to individuals' sense of coherence (Davidson et al. 2012; Idan et al. 2017; Read et al. 2005). Like these resilient resources, hope and mindfulness may foster psychological adaptation and provide important coping resources in stressful situations (Behan 2020; Snyder 2002), allowing individuals to see things as more manageable, feel "under control" in the face of major stressors, and derive meanings from adverse experiences (Amirkhan and Greaves 2003).

Hope and mindfulness were moderately to strongly correlated in our and others' studies (Astuti et al. 2020; Lu et al. 2020; Munoz et al. 2018), but they were both uniquely linked to sense coherence and changes in [internalizing and externalizing behaviors](#). However, although multi-component interventions are not uncommon (Hendriks et al. 2020), one that enhances both hope and mindfulness is relatively rare (Thornton et al. 2014). Therefore, it remains unclear how hope may interact with mindfulness to affect individuals' well-being in interventions. The joint impact of hope and mindfulness, particularly in [hope- and mindfulness-based programs](#), such as Living with Hope Program (Dugleby et al. 2007) and Mindfulness-based Stress Reduction Program (Kabat-Zinn 1982), awaits future investigation. Additionally, to fully understand the potential benefits of hope- and mindfulness-based programs, further studies should include adjustment indices other than internalizing and externalizing behaviors, such as psychological well-being, satisfaction with life, academic functioning, and prosocial behaviors.

Sense of coherence mediated the associations of hope and mindfulness with internalizing and externalizing behaviors, highlighting its possible role in channeling the positive impact of GRRs on individual adjustment. In this sense, our study informed our understanding of the underlying mechanism that links hope and mindfulness to individual

adjustment. To examine whether the distress-alleviating impact of hope and mindfulness was due to their boost to individuals' sense of coherence, however, intervention designs should be used to measure sense of coherence and test if it actually explains the effects of the intervention on the participants.

Sense of coherence has been recognized as an important resilient factor that may help people maintain their mental health in stressful situations (Barni et al. 2020; Schäfer, et al. 2020), but sense of coherence tends to stabilize during middle adulthood (Schnyder et al. 2000; Super et al. 2016). Therefore, it may be particularly important to promote individuals' sense of coherence by strengthening their hope and mindfulness in early adulthood, when their sense of coherence remains relatively malleable. Noteworthy, our findings were based on only one Asian sample. Although sense of coherence has been proposed to be a cross-cultural concept, its utility in understanding the adjustment of Asians remains underexplored (Abu-Kaf et al. 2017). More research based on different Asian samples is needed. Cultural comparative studies that collect data from, for example, both Western and Asian samples may be especially useful for testing sense of coherence as a cross-cultural concept.

In the face of a global pandemic, many individuals feel deprived of opportunities and worried about the future, rather than mindful of the present moment and the immediate experience. Consequently, they felt lonely, depressed, and restless (Pfefferbaum and North 2020). At a time like this, it is imperative to foster the resilience of all of us, especially young people (Chen and Bonanno 2020; Czeisler et al. 2020; National Review 2020). Our findings suggested that hope and mindfulness might play a crucial role in understanding individuals' changes in adjustment and that sense of coherence might be key to understanding why some individuals stay resilient despite adverse conditions. Our findings also highlighted the importance of studying the mechanism underlying the relations of hope and mindfulness with individual well-being, which is fundamental to the development of hope- and mindfulness-based interventions. If granted with more evidence, online resources that encourage students' hopeful thinking, help them practice mindfulness, and reinforce their sense of coherence can be made accessible in the future. Meanwhile, researchers, educators, and policy makers should continue examining new ways to strengthen students' abilities to cope with stressors.

Limitations and Future Research

This study had several limitations. First, although our use of longitudinal data allowed us to examine temporal associations among GRRs, sense of coherence, and individual adjustment, our single-informant, self-report design meant that our findings might have been affected by common

method bias (Podsakoff et al. 2003). Future studies should replicate our findings using data collected from multiple informants through multiple methods. Second, we recruited participants from only one local university with a predominantly female student body. In fact, reflecting the university-wise female to male ratio (9:2), our sample was predominantly composed of women (86%). Therefore, our findings might or might not be generalizable to all college students in Hong Kong.

Third, we collected our data during the COVID-19 outbreaks, and students' adjustment remained unassessed before and after the pandemic. Therefore, future research should examine the associations of hope and mindfulness and sense of coherence with changes in individual adjustment before, during, and after the pandemic. Fourth, in our study, students' externalizing and internalizing behaviors were assessed using the Strengths and Difficulties Questionnaire (Goodman 1997). Despite its many advantages, including its brevity, popularity, and ease of administration, some of its subscales yielded relatively low levels of internal consistency in our sample—a pattern that had been documented in prior research as well (Lai et al. 2010). Further investigators should use multiple measures to assess each variable to more reliably capture the construct of interest.

Finally, GRRs can be interpersonal-relational, cognitive, artifactual-material, or valutive-attitudinal (Davidson et al. 2012; Read et al. 2005), and hope and mindfulness are not necessarily valutive-attitudinal GRRs. For example, if hope and mindfulness are measured as interpersonal-relational constructs, such as by using the External Locus of Hope Scale—Family, Peers, or a Supernatural/spiritual Being, which assesses hope “involving plans or strategies generated by other persons” (Bernardo 2010; p.945), and the Interpersonal Mindfulness Scale, which assesses “the process of mindfulness during interpersonal interactions” (Pratscher et al. 2019; p.1044), respectively, hope and mindfulness may also be viewed as interpersonal-relational GRRs. In fact, we measured hope using the External Locus of Hope Scale—Family (Bernardo 2010) as well. We conceptualized hope and mindfulness as valutive-attitudinal GRRs in this study, however, as intrapersonal qualities of such kinds can be more easily promoted by targeting individuals alone via community education and intervention programs (Lindström and Eriksson 2005). Given that hope and mindfulness can be studied as valutive-attitudinal or interpersonal-relational qualities, especially in non-Western cultures (Bernardo and Sit 2020; Pratscher et al. 2019), future research is needed to examine whether sense of coherence may mediate the relations of different types of GRRs, including intrapersonal and interpersonal mindfulness and hope, with adjustment.

Despite these limitations, our study showed that more hopeful and more mindful college students seemed to remain resilient in a global pandemic like COVID-19. Moreover, a

strong sense of coherence seemed to play a channeling role in the underlying mechanism. Our findings advanced the field by demonstrating the utility of the salutogenic framework of health in understanding changes in individuals' adjustment during the pandemic and by testing hope and mindfulness along with sense of coherence. Also, our findings pointed to potential ways that can be used to improve individuals' sense of coherence and psychological and behavioral well-being, advocating more studies that examine the potential health-promoting effects of hope, mindfulness, and sense of coherence, especially during adversity.

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Author Contribution YS assisted with the design and execution of the study, generated the research questions, analyzed data, and wrote and edited the paper. CBL assisted in the generation of research questions, data analyses, and the writing and editing of the paper. KKHC designed and executed the study and assisted with the generation of research questions and the writing and editing of the paper.

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Data Availability Data used in this study are available at the Open Science Framework (<https://osf.io/7nvy9/>).

Declarations

Ethics Approval All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The ethics approval for this study was provided by The Education University of Hong Kong.

Consent to Participate Informed consent was obtained from all participants involving in this study.

Conflict of Interest The authors declare no competing interests.

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