



# Does Mindfulness Moderate the Link of Worry About COVID-19 With Adjustment? An Actor-Partner Interdependence Model Approach

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Accepted: 17 December 2021 / Published online: 29 January 2022

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## Abstract

**Objectives** COVID-19 constitutes an unprecedented mental health challenge to the world. At this critical time, it is important to identify factors that may boost individuals' well-being or render individuals more resistant to the negative impact of COVID-19-related stressors. The goals of this study were to examine whether individuals' and their partners' worry about COVID-19 were linked to individuals' psychological, social, and cognitive adjustment and test individuals' and their partners' mindfulness as possible moderators.

**Methods** Cross-sectional, dyadic data were collected from 211 Chinese couples with kindergarten-aged children living in Hong Kong, China, during its fourth major outbreak of COVID-19 (between December 2020 and January 2021). Using paper-and-pencil questionnaires, fathers and mothers independently reported their worry about COVID-19, mindfulness, depressive symptoms, social difficulties, and cognitive problems.

**Results** Actor-Partner-Interdependence Models revealed that, controlling for individuals' gender and education levels, individuals' worry about COVID-19 and mindfulness were positively and negatively associated with their own depressive symptoms, social difficulties, and cognitive problems, respectively. The worry of individuals' partners was also positively associated with individuals' depressive symptoms and social difficulties. These associations, however, were only significant when the partners had low but not high levels of mindfulness.

**Conclusions** Our study highlighted the importance of studying the potential benefits of mindfulness at not only the individual but also the dyadic level.

**Keywords** Adjustment · Dyadic data · Mindfulness · Resilience · Worry about COVID-19

COVID-19 constitutes an unprecedented mental health challenge to the world. In the face of this disease, many individuals report feeling depressed, isolated, and helpless (Kumar & Nayar, 2021). The social impact of COVID-19, including intermittent lockdown, continued suspension of school and business, and other economic uncertainties, poses additional risks to the adjustment of individuals (Park et al., 2021). Therefore, it is important to identify ways to

boost individuals' well-being and promote their resilience at this time of crisis.

Theories of stress and adversity (Blair & Raver, 2016) highlight that individuals' adjustment may suffer in the face of risk factors, such as premature birth, dysfunctional parent–child relationships, family poverty, and neighborhood violence. In contrast, theories of strength and resilience (Masten, 2013) highlight that some individuals appear to be relatively unaffected by risk factors, possibly because they possess a *promotive* factor (i.e., a predictor of a positive outcome measure, regardless of the level of risk, typically evidenced by a significant main effect model) or a *protective* factor (i.e., a predictor of a positive outcome measure, particularly when the level of risk is high, typically evidenced by a significant interaction effect model). Mindfulness is characterized by being attentive to and aware of the present moment experience, having an intention to achieve such high levels of attention and awareness, and acting in observing

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and non-judgmental manners (Baer et al., 2006; Shapiro et al., 2006). Prior research has documented positive associations of mindfulness with many positive outcome measures, including lower psychological distress, higher social well-being, and better cognitive functioning (Chiesa et al., 2011; De Vibe et al., 2012). Prior research has also shown that the impact of risk factors, such as parenting stress, and difficult child temperament, may vary as function of individuals' mindfulness (Calvete et al., 2021; Cortazar & Calvete, 2019). Therefore, since COVID-19 was first identified in December 2019 and declared a pandemic in March 2020, researchers have been examining the potential benefits of individuals' mindfulness to their own adjustment.

For example, based on cross-sectional data collected from two samples of North American adults, Dillard and Meier (2021) found that mindfulness was associated negatively with depression, stress, and anxiety and positively with constructive coping strategies, such as planning, seeking support, and reframing. Moreover, in a sample of Italian adults, Conversano et al. (2020) found that mindfulness was concurrently associated with fewer psychological symptoms, including somatization, depression, anxiety, hostility, paranoid ideation, and sleep problems. In fact, there is evidence suggesting that worry about COVID-19 may decrease individuals' mindfulness, which in turn may contribute to individuals' maladjustment: In a sample of Italian university students, Belen (2021) found that mindfulness mediated the cross-sectional associations of fear of COVID-19 with depression and anxiety. Moreover, in a sample of Turkish adults, Saricali et al. (2020) found that mindfulness mediated the cross-sectional association of fear of COVID-19 with hopelessness. Finally, in a national sample of adults from the USA, Park et al. (2021) found that mindfulness mediated the longitudinal associations of COVID-19-related stress with psychological well-being and general distress. Taken together, these studies demonstrated that individuals' mindfulness may operate as a promotive factor during the pandemic.

Researchers have also been examining whether mindfulness may operate as a protective factor against COVID-19-related stressors. For example, in a sample of predominantly Dutch and Belgium adults, Vos et al. (2021) examined the cross-sectional associations of worry about COVID-19 with depression, stress, and anxiety and tested mindfulness as a moderator. Their results indicated that worry about COVID-19 was associated with depression and stress, regardless of adults' levels of mindfulness, but worry about COVID-19 was only associated with anxiety for adults with low but not high mindfulness. On the other hand, in a sample of Pakistani adults, Majeed et al. (2020) used cross-sectional data to examine the interrelationships among social media, fear of COVID-19, depression, and mindfulness. Their results indicated that social media use was more strongly

linked to fear of COVID-19 for less mindful adults. Moreover, the indirect impact of social media use on depression via fear of COVID-19 was only significant for adults with low but not high mindfulness. Finally, Zheng et al. (2020) used daily diary data to examine the interrelationships among stress related to COVID-19, sleep hours, work engagement, and mindfulness. Their results indicated that COVID-19-related stress was only associated with fewer sleep hours on the following day for adults with low but not high mindfulness. Also, the indirect impact of COVID-19-related stress on work engagement via sleep hours was only significant for adults with low but not high mindfulness.

According to a theory of crossover (Westman, 2016), when a partner in a close dyadic relationship is stressed, especially due to something external to the relationship, such as job demands and work pressures, the adjustment of the other partner is often adversely affected—a process referred to as stress crossover. Therefore, when a partner is worried about COVID-19, the other partner may also experience an elevated level of stress via empathetic reactions or spuriousness. Importantly, the crossover process can be moderated by different personal characteristics. For example, certain personality traits, such as negative affect and sense of control, may exacerbate or alleviate the crossover of stress from one partner to the other. Mindfulness may be one of these characteristics, as a more mindful partner may more effectively cope with the stressor and thus feel less threatened in the first place. Moreover, a more mindful partner may more consciously differentiate the stressor from the relationship and thus protect the other partner from being affected.

A small body of work—based exclusively on data collected before the arrival of COVID-19—has examined the mindfulness of individuals' partners' mindfulness as a promotive factor, that is, whether the mindfulness of individuals' partners may be linked to individuals' adjustment. For example, in a sample of Dutch adults, Kappen et al. (2018) found that mindfulness reported by individuals' partners was concurrently associated with higher levels of perceived acceptance and relationship satisfaction reported by individuals. Also, in a sample of Chinese adults, Zheng et al. (2020) found that mindfulness reported by individuals' spouses was longitudinally associated with higher positive affect and lower negative affect reported by individuals. This may not be surprising, as a mindful partner tends to be more empathetic, supportive, and compassionate, which in turn may improve the relationship quality and the adjustment of the other partner (Karremans et al., 2017).

Other researchers have used Actor-Partner Interdependence Models (APIMs) to examine whether individuals' and their partners' mindfulness may be linked to individuals' adjustment. APIMs are statistical models designed to examine the dynamics within a close dyadic relationship (Campbell & Stanton, 2015; Garcia et al., 2015). Given that the

two partners often affect the characteristics and adjustment of each other, APIMs simultaneously examine the associations of individuals' characteristics (i.e., the actor effect) as well as their partners' characteristics (i.e., the partner effect) with individuals' adjustment. As data provided by the two partners in a close relationship can be correlated, APIMs correct potential estimation bias by taking into account the data interdependence at the dyadic level.

Studies using APIMs to examine the impact of mindfulness have produced relatively inconsistent results. For example, Williams and Cano (2014) found that individuals' and their partners' mindfulness were uniquely linked to individuals' perceptions of partner responsiveness (but not marital satisfaction) among couples with chronic pain from the USA. Moreover, among couples with multiple sclerosis from the USA, Pakenham and Samios (2013) found that individuals' acceptance was linked negatively to their own depression and anxiety and positively to their own positive affect and life satisfaction, although their partners' acceptance was associated with none of these outcome measures. On the other hand, Zhou et al. (2020) found that individuals' mindfulness was positively linked to their own perceptions of relationship satisfaction among couples of university students from China. However, only men, but not women, with more mindful partners experienced higher levels of relationship satisfaction. Similarly, Barnes et al. (2007) found that individuals' mindfulness was linked negatively to their own anxiety, anger, and hostility and positively to their own love and commitment among couples of university students from the USA. However, only men, but not women, with more mindful partners reported feeling less angry and less hostile.

To our best knowledge, no studies have tested the interplay between any stressors and the mindfulness of individuals' partners in understanding individuals' adjustment. In other words, no studies have examined the mindfulness of individuals' partners as a protective factor, such as against COVID-19-related stressors. APIMs can be flexibly set up to test for such moderation. The basic model may include the actor's and the partner's worry about COVID-19 and mindfulness. The moderator is "mixed," as the actor and the partner can have different levels of mindfulness (Campbell & Stanton, 2015; Garcia et al., 2015). By adding the interaction between the actor's worry and the actor's mindfulness and the interaction between the partner's worry and the partner's mindfulness into the model, the model can simultaneously test the interplay between worry and mindfulness at both the actor and the partner levels. The partner effects of worry and mindfulness may be particularly salient in a Chinese community: As Chinese culture is highly collectivistic, Chinese people tend to define their identities with their roles in a larger group and with their relationships with someone else (Triandis & Gelfand, 2012).

Expanding on prior work, the present study used APIMs to examine whether individuals' and their partners' worry about COVID-19 were linked to individuals' psychological, social, and cognitive adjustment and whether individuals' and their partners' mindfulness moderated these links. We hypothesized that individuals' and their partners' worry about COVID-19 would be positively associated with individuals' depressive symptoms, social difficulties, and cognitive problems and that these associations would be less pronounced for more mindful individuals and for individuals with more mindful partners. We controlled for individuals' gender and education, as these factors have been linked to both mindfulness and adjustment (Chiesa et al., 2011; De Vibe et al., 2012).

## Method

### Participants

Participants were 211 couples with children studying in four kindergartens in Hong Kong, China. In an attempt to recruit participants with diverse socioeconomic backgrounds, we used a stratified sampling approach. First, based on the median monthly household incomes (Census & Statistics Department, 2019), we divided the 18 geographic districts of Hong Kong into high-, middle-, and low-socioeconomic strata. Then, using information publicly available on the government websites, we randomly called kindergartens until one from each of the three strata agreed to participate. As the kindergarten from the low-socioeconomic stratum had a small student body, we recruited one additional kindergarten from that stratum to ensure a more balanced number of couples from each stratum.

The age of parents varied. Two percent, 63%, 32%, and 2% of fathers were aged between 21 and 30 years, 31 and 40 years, 41 and 50 years, and 51 years and above, respectively, and 12%, 65%, and 22% of mothers were aged between 21 and 30 years, 31 and 40 years, and 41 and 50 years, respectively. Most fathers and mothers were in their 30s, reflecting the median age of men (32 years) and women (30 years) at their first marriage in the population (Census & Statistics Department, 2019). Moreover, 1%, 41%, 15%, and 44% of fathers and 1%, 39%, 17%, and 43% of mothers had completed elementary school only, high school only, higher diploma or associate degree programmes only, and degree programmes or above, respectively. Considering that 36% of all individuals aged between 30 and 39 years had completed college degree programs or above in Hong Kong (Census & Statistics Department, 2019), participants were better educated than their same-age peers in Hong Kong. Therefore, our sample might be of higher socioeconomic status.

## Procedures

At the time when the study was conducted (between December 2020 and January 2021), Hong Kong was hit by the fourth major outbreak of COVID-19. As clusters of cases with unknown sources of infection were identified, all schools had to suspend face-to-face teaching. In addition to online learning materials, most kindergartens prepared weekly take-home packages, packages that contained notices, games, and worksheets, to support the development of children and maintain communication with parents. Through these packages, we sent invitation letters, consent forms, and paper-and-pencil questionnaires to 467 families from the four kindergartens, inviting both fathers and mothers to participate in the present study. Fathers and mothers independently rated their own worry about COVID-19, mindfulness, and psychological, social, and cognitive adjustment. Of the 467 families, 211 families returned signed consent forms and completed both father and mother questionnaires, resulting in a response rate of 45%. Of the data provided by these 211 couples, only 1% were missing. According to Whisman and McClelland (2005), about 200 couples (i.e., 400 people) are needed to obtain sufficient power ( $> 0.80$ ) for detecting small to medium effect sizes in dyadic research. Therefore, we did not attempt to recruit additional families once we had collected data from the 211 couples. As compensation, each parent received a supermarket coupon of HK\$50 (about US\$6).

## Measures

All variables were assessed by using validated measures. As recommended by Foster and Martinez (1995), two translators independently forward and backward translated the English items into Chinese. A third translator then joined in, discussing the discrepancies and finalizing the items as a group. Negatively worded items had been reversely coded before ratings were averaged, such that higher scores indicated higher levels of the constructs.

*COVID-19-related worry* was assessed using an 8-item measure (Boyraz et al., 2020). On a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*), fathers and mothers rated their fear of infection, feelings of insecurity, and loss of control over the situation (e.g., “I suspect whether I have been infected or not,” “I feel very unsafe about myself,” and “I feel that I have lost control of life”). In this study, McDonald’s omegas were 0.91 and 0.90 for fathers and mothers, respectively.

*Mindfulness* was assessed using the 10-item Cognitive and Affective Mindfulness Scale-Revised (Feldman et al., 2007)—one of the shortest measures of mindfulness commonly used in the field (Goodman et al., 2017). On a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly*

*Agree*), fathers and mothers rated their ability to attend to the present moment experience and accept their inner thoughts and feelings (e.g., “I am able to pay close attention to one thing for a long period of time,” “It is easy for me to keep track of my thoughts and feelings,” and “I am able to accept the thoughts and feelings I have”). The reliability and validity of the measure had been evidenced in multiple studies based on Hong Kong samples (Chan & Lam, 2017; Sun et al., 2020). In this study, McDonald’s omegas were 0.88 and 0.87 for fathers and mothers, respectively.

*Depressive symptoms* were assessed using the 10-item Center for Epidemiology Studies Depression Scale—Short Form (Andresen et al., 1994). On a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*), fathers and mothers rated their depressive symptoms (e.g., “I have trouble keeping my mind on what I was doing,” “I feel that everything was an effort,” and “I feel depressed”). In this study, McDonald’s omegas were 0.88 and 0.89 for fathers and mothers, respectively.

*Social difficulties* were assessed using the 8-item Social Functioning Questionnaire (Tyrer et al., 2005). On a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*), fathers and mothers rated their difficulties in maintaining close relationships (e.g., “I have difficulty in getting and keeping close relationships,” “I feel lonely and isolated from other people,” and “I get on well with my family and other relatives”). In this study, McDonald’s omegas were 0.77 and 0.76 for fathers and mothers, respectively.

*Cognitive problems* were assessed using the 12-item Insight into Cognition-Self-Report (Medalia et al., 2008). On a 5-point scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*), fathers and mothers rated their perceived problems in attention (e.g., “I have difficulty listening and paying attention,” “I am easily distracted from tasks by background noises or activities”), executive functioning (e.g., “I have difficulty initiating and completing tasks,” “I have difficulty thinking through possible solutions to problems”), and memory (e.g., “I have difficulty remembering information like names, directions, and/or dates,” “I intend to do things but often forget (e.g., forget to return phone calls, get things from a store, and keep appointments)”). Although the measure had been originally developed for individuals with schizophrenia, it was also used in studies based on individuals without any mental disorder (Li et al., 2018; Sun et al., 2020). In this study, McDonald’s omegas were 0.94 and 0.93 for fathers and mothers, respectively.

*Demographic information*, including age, gender, and education levels, was collected from fathers and mothers. On a 5-point scale ranging from 1 (*20 Years or Below*) to 5 (*51 years or Above*), fathers and mothers rated their age. Also, on a 5-point scale ranging from 1 (*No Formal Education*) to 5 (*Degree Programmes or Above*), fathers and mothers rated their education levels.



## Data Analyses

We conducted our analyses in two steps. First, we examined the correlations among the actor's and the partner's worry about COVID-19, mindfulness, depressive symptoms, social difficulties, and cognitive problems, separately for fathers and mothers. Second, we combined the data from fathers and mothers and estimated an APIM for each of the three outcome variables. Following the suggestions of Campbell and Stanton (2015), we used multilevel modeling to accommodate the interdependence of our data (as the two parents were nested within a dyad). Also, following the suggestions of Garcia et al. (2014), we included in each model the actor's gender and education levels (i.e., the covariates), the actor's and the partner's worry about COVID-19 and mindfulness (i.e., the main effect terms), and the multiplicative terms between the actor's worry and the actor's mindfulness and between the partner's worry and the partner's mindfulness (i.e., the interaction effect terms). For ease of interpretation, before the multiplicative terms were computed, the actor's and the partner's mindfulness had been standardized. We probed the patterns of significant interactions by estimating the associations of worry with depressive symptoms, social difficulties, and cognitive problems, separately for high versus low levels (1 *SD* above and below the mean) of the actor's or the partner's mindfulness (Aiken & West, 1991). We dropped nonsignificant interactions from the final models, however, as including nonsignificant interactions increases standard errors. We conducted the analyses using the statistical software SAS Academic OnDemand for Academics.

## Results

Table 1 shows the correlations among the actor's and the partner's worry about COVID-19, mindfulness, depressive symptoms, social difficulties, and cognitive problems. Overall, the actor's worry about COVID-19 and mindfulness were correlated positively and negatively with the actor's measures of maladjustment, respectively. The correlations were moderate to strong in strength (Cohen, 1992). The partner's worry and mindfulness were also correlated positively and negatively with the actor's measures of maladjustment, respectively. The correlations were modest to strong in strength (Cohen, 1992), however.

Preliminary analyses indicated no issue concerning multicollinearity (tolerance ranging from 0.73 to 1.00 and variance inflation ranging from 1.00 to 1.37). Also, the 1% missing data were missing completely at random (Little's MCAR test  $X^2(19) = 18.90, n.s.$ ). The Full Information Maximum Likelihood procedures—one of the most effective methods to reduce estimation bias due to missing data in multilevel models (Larsen, 2011)—were invoked to accommodate these missing data.

Table 2 shows the unstandardized coefficients, standard errors, and confidence intervals of the APIMs. Results indicated that the actor's worry was linked positively to depressive symptoms ( $B = 0.20, SE = 0.03, p < 0.01$ ), social difficulties ( $B = 0.12, SE = 0.03, p < 0.01$ ), and cognitive problems ( $B = 0.20, SE = 0.04, p < 0.01$ ), whereas the actor's mindfulness was linked negatively to depressive symptoms ( $B = -0.54, SE = 0.04, p < 0.01$ ), social difficulties ( $B = -0.47, SE = 0.04, p < 0.01$ ), and cognitive problems ( $B = -0.74, SE = 0.05, p < 0.01$ ). The interaction between the actor's worry and the actor's mindfulness, however, was not significant for the actor's depressive symptoms ( $B = 0.08$ ,

**Table 1** Correlations among the actor's and partner's worry about COVID-19, mindfulness, depressive symptoms, social difficulties, and cognitive problems

	1	2	3	4	5	6	7	8	9	10
Actor worry about COVID-19	-	-.19**	.38**	.32**	.31**	.46**	-.05	.29**	.19**	.22**
Actor mindfulness	-.27**	-	-.59**	-.61**	-.60**	-.08	.35**	-.31**	-.30**	-.26**
Actor depressive symptoms	.44**	-.49**	-	.71**	.68**	.25**	-.20**	.47**	.39**	.36**
Actor social difficulties	.36**	-.52**	.74**	-	.57**	.22**	-.27**	.46**	.54**	.37**
Actor cognitive problems	.40**	-.60**	.68**	.62**	-	.09	-.14*	.38**	.35**	.31**
Partner worry about COVID-19	.46**	-.05	.29**	.20**	.22**	-	-.27**	.44**	.36**	.40**
Partner mindfulness	-.08	.35**	-.31**	-.30**	-.26**	-.19**	-	-.49**	-.52**	-.60**
Partner depressive symptoms	.25**	-.20**	.47**	.39**	.36**	.38**	-.59**	-	.74**	.68**
Partner social difficulties	.22**	-.27**	.46**	.54**	.37**	.32**	-.61**	.71**	-	.62**
Partner cognitive problems	.09	-.14*	.38**	.35**	.31**	.31**	-.60**	.68**	.57**	-

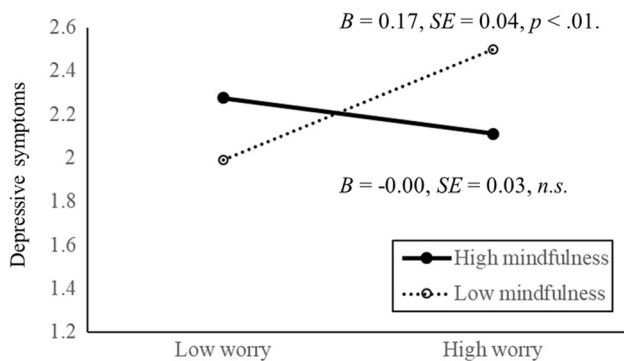
Correlations for fathers and mothers are presented below and above the diagonal, respectively

\* $p < .05$ . \*\* $p < .01$

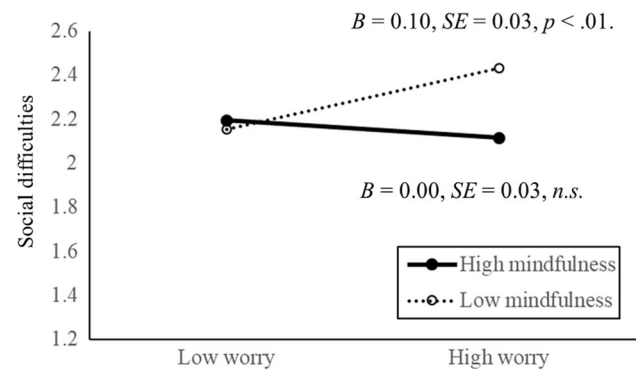
**Table 2** Unstandardized coefficients (*B*), standard errors (*SE*), and confidence intervals (*CI*) of actor-partner interdependence models

	Depressive symptoms			Social difficulties			Cognitive problems		
	<i>B</i>	<i>SE</i>	<i>CI</i>	<i>B</i>	<i>SE</i>	<i>CI</i>	<i>B</i>	<i>SE</i>	<i>CI</i>
Control variables									
Actor gender	-.14**	.04	[-.21, -.07]	-.10**	.03	[-.21, -.07]	-.01	.04	[-.10, .07]
Actor education	.02	.03	[-.03, .08]	-.02	.02	[-.06, .03]	.01	.03	[-.05, .07]
Actor effects									
Actor worry	.20**	.03	[.13, .26]	.12**	.03	[.07, .18]	.20**	.04	[.12, .27]
Actor mindfulness	-.54**	.04	[-.62, -.45]	-.47**	.04	[-.54, -.39]	-.74**	.05	[-.84, -.63]
Partner effects									
Partner worry	.09**	.03	[.03, .15]	.05	.03	[-.00, .10]	.02	.04	[-.05, .09]
Partner mindfulness	-.02	.04	[-.11, .06]	-.07	.04	[-.14, .01]	.03	.05	[-.07, .13]
Partner worry × Partner mindfulness	-.17**	.05	[-.26, -.08]	-.09*	.04	[-.17, -.01]	-	-	-

\* $p < .05$ . \*\* $p < .01$



**Fig. 1** Associations of the partner's worry about COVID-19 with the actor's depressive symptoms by the partner's levels of mindfulness



**Fig. 2** Associations of the partner's worry about COVID-19 with the actor's social difficulties by the partner's levels of mindfulness

$SE = 0.05$ ,  $n.s.$ ), social difficulties ( $B = 0.04$ ,  $SE = 0.04$ ,  $n.s.$ ), or cognitive problems ( $B = -0.06$ ,  $SE = 0.06$ ,  $n.s.$ ). Meanwhile, the interaction between the partner's worry and the partner's mindfulness was significant for the actor's depressive symptoms ( $B = -0.17$ ,  $SE = 0.05$ ,  $p < 0.01$ ) and social difficulties ( $B = -0.09$ ,  $SE = 0.04$ ,  $p < 0.05$ ). As shown in Figs. 1 and 2, the partner's worry was linked positively to the actor's depressive symptoms ( $B = 0.17$ ,  $SE = 0.04$ ,  $p < 0.01$ ) and social difficulties ( $B = 0.10$ ,  $SE = 0.03$ ,  $p < 0.05$ ), when the partner had low levels of mindfulness. The links of the partner's worry with the actor's depressive symptoms ( $B = -0.00$ ,  $SE = 0.03$ ,  $n.s.$ ) and social difficulties ( $B = 0.00$ ,  $SE = 0.03$ ,  $n.s.$ ) were not significant when the partner had high levels of mindfulness, however. The interaction between the partner's worry and the partner's mindfulness was nonetheless nonsignificant for the actor's cognitive problems ( $B = -0.11$ ,  $SE = 0.06$ ,  $n.s.$ ). Overall, the APIMs explained 34%, 31%, and 40% of variance in depressive symptoms, social difficulties, and cognitive problems, respectively, indicating large effect sizes (Cohen, 1992).

## Discussion

With the emergence of its new variants, COVID-19 is likely to continue to affect our lives and well-being for months, if not years (Duong, 2021). At this critical time, it is important to identify promotive factors that may promote individuals' well-being in general and to identify protective factors that may help individuals deal with COVID-19-related stressors in particular. Prior work suggests that these factors may include the mindfulness of individuals (Blair & Raver, 2016; Masten, 2013) as well as their partners (Westman, 2016). In fact, our APIMs revealed that individuals' worry about COVID-19 and mindfulness were associated positively and negatively with their own depressive symptoms, social difficulties, and cognitive problems, respectively. On the other hand, the worry of individuals' partners was associated positively with individuals' depressive symptoms and social

difficulties, *when the partners had low but not high levels of mindfulness*. As we elaborate below, these results highlighted the importance of studying the potential benefits of mindfulness at not only the individual but also the dyadic level.

### Individuals' Mindfulness and Their Own Adjustment During the COVID-19 Pandemic

Consistent with theories of stress and adversity positing that individuals' adjustment may suffer in the face of stress (Blair & Raver, 2016), our findings supported our hypothesis that individuals' worry about COVID-19 would be positively associated with their depressive symptoms, social difficulties, and cognitive problems. However, such associations did not vary as a function of individuals' mindfulness, providing little support to our hypothesis that the worry-adjustment associations would be less pronounced for more mindful individuals.

In previous studies, individuals' mindfulness moderated the association of their social media use with their fear of COVID-19 (Majeed et al., 2020) and the association of their COVID-19-related stress with their sleep hours (Zheng et al., 2020). However, in our study, individuals' mindfulness did not moderate the association of their worry about COVID-19 with their depressive symptoms, social difficulties, or cognitive problems. One possible explanation is that the interplay between individuals' worry and mindfulness is outcome-specific, relevant to some outcome measures but not others. Indeed, in Vos et al.'s (2021) study, individual's mindfulness moderated the association of their worry about COVID-19 with their anxiety (which is more future-oriented), but not with their depression or stress (which are more present-oriented). Alternatively, the operation of individuals' mindfulness may be risk-specific. Individuals' mindfulness may interact with some risk factors, such as parenting stress and difficult child temperament (Calvete et al., 2021; Cortazar & Calvete, 2019), which are more common and may be tackled using more conventional methods, but not others, such as worry about COVID-19, which is more novel and may remain perplexing to many of us (Duong, 2021). As researchers are just beginning to examine how COVID-19-related stressors, adjustment, and mindfulness are related to one another, our results should be treated as hypothesis generating. Additional research should examine how different kinds of stressors and individuals' mindfulness may jointly explain different aspects of well-being.

Prior studies had linked mindfulness to fewer psychological symptoms and more positive coping during the pandemic (Conversano et al., 2020; Dillard & Meier, 2021). Our study extended this work by documenting negative associations of mindfulness with two additional measures of maladjustment—social difficulties and cognitive problems.

Consistent with theories of strength and resilience positing that some individuals may be less affected by risk factors (Masten, 2013), individuals' mindfulness might operate as a promotive factor during the COVID-19 pandemic. Considered together with studies published before the arrival of COVID-19, studies that have linked mindfulness to lower psychological distress, higher social well-being, and better cognitive functioning (Chiesa et al., 2011; De Vibe et al., 2012), existing literature suggests that mindfulness may be a generic positive factor predictive of a wide range of adjustment measures (Keng et al., 2011; Tomlinson et al., 2018).

### Partners' Mindfulness and Individuals' Adjustment During the COVID-19 Pandemic

Expanding on a small number of studies that had linked the mindfulness of individuals' partners to individuals' psychological adjustment and relational satisfaction before the arrival of COVID-19 (Williams & Cano, 2014; Zhou et al., 2020), our study examined whether the mindfulness of individuals' partners might operate as a protective factor for individuals during the pandemic. In keeping with the views that a stressed partner may adversely affect the adjustment of the other partner in a close dyadic relationship but that the mindfulness of the stressed partner may reduce this crossover of stress (Karremans et al., 2017; Westman, 2016), our findings supported our hypotheses that the worry about COVID-19 of individuals' partner would be positively associated with individuals' depressive symptoms and social difficulties and that such associations would be less pronounced for individuals with more mindful partners. Noteworthy, as we linked the partner's reports of worry and mindfulness to the actor's reports of adjustment, our findings on the partner effect of mindfulness addressed some common method bias and were thus more trustworthy (Podsakoff et al., 2012). Moreover, as we included both the actor's and the partner's mindfulness in the same model, our findings could not be attributed to "self-socialization," that is, more mindful individuals tending to seek more mindful partners and simultaneously exhibiting better adjustment—a major alternative explanation to rule out when examining the impact of a voluntary relationship on an individual (Campbell & Stanton, 2015; Garcia et al., 2015).

Our findings did not support our hypothesis that the COVID-19-related worry of individuals' partners would be positively associated with individuals' cognitive problems. Nor did they support our hypothesis that such an association would be moderated by the mindfulness of individuals' partners. One possible explanation is that stress crossover may first occur in the psychological and social domains before occurring in the cognitive domain, a phenomenon that is less observable using a cross-sectional design like ours. Indeed, chronic psychological stress and prolonged social

isolation may lead to gradual declines in cognitive functioning (Cacioppo et al., 2015), underscoring the importance of using longitudinal designs to capture the immediate and long-term partner effects of stress and mindfulness on individual adjustment. Another possible explanation is that the crossover of COVID-19-related stress may be more relevant for psychological and social adjustment. When their partners are worried about a relatively novel disease, individuals may be concerned about the well-being of their partners, regardless of whether or not individuals themselves are worried about the disease. Also, given that COVID-19 is a contagious disease, individuals may also have to adjust their own social lives in order to keep their partners at peace. Taken together, more research should be directed at examining whether stress crossover due to different kinds of stressors may differentially affect different adjustment outcomes and how mindfulness may modulate such processes.

Our study had important implications. Existing literature focuses on how individuals' mindfulness may affect their own adjustment, although—as our findings suggested—the potential positive impact of mindfulness may be evident at not only the individual but also the dyadic level. Therefore, future researchers should use dyadic data to examine how the mindfulness of the two partners of a close relationship may shape each other's adjustment, in both direct and interactive ways. Future researchers should also test whether targeting the mindfulness of both partners of a close relationship may maximize the possible benefits of mindfulness-based training, via the actor and partner effects of mindfulness, during the COVID-19 pandemic and beyond.

### Limitations and Future Research

This study was not without limitations. First, although we had used a stratified sampling approach to recruit families, our sample appeared to be of higher socioeconomic status, as reflected by the education levels of our participants. Moreover, due to ethical constraints, we were not able to collect any information from or about the non-participating families, which might or might not reduce the representativeness of our sample. Generalization of our findings to the Hong Kong population should be made with caution. Relatedly, our sample included heterosexual couples with at least one child. As we did not collect any information on the total number of children in the family, replication of our findings is needed with families with different numbers of children. Replication of our findings is also needed with homosexual and non-childrearing couples. More generally, despite continued advocacy for research being drawn from more diverse samples, some 85% of all psychological science has been based on participants who are “WEIRD” (i.e., Western, educated, industrialized, rich, and democratic)—participants who constitute less than 15% of the world's

population (Henrich et al., 2010). Therefore, an important direction for future research is to examine the implications of mindfulness for individual adjustment in different cultural, socioeconomic, and political contexts. One interesting hypothesis to test, for example, is whether the partner effect of mindfulness is really stronger in a collectivistic culture like Chinese culture than in an individualistic culture like the culture of the USA.

Second, our reliance on cross-sectional data placed constraints on our ability to draw conclusive inferences about causal relationships. Future researchers should use longitudinal data to disentangle the temporal order of the association of worry about COVID-19 with individual adjustment. Future researchers should also use longitudinal data to examine the potentially reciprocal relationship between worry about COVID-19 and mindfulness. Worry involves agitating for a future possibly tainted by COVID-19 (Boyratz et al., 2020), whereas mindfulness involves focusing on the present moment experience (Baer et al., 2006; Shapiro et al., 2006). Not surprisingly, these two variables were negatively correlated in our and others' studies (Belen et al., 2021; Saricali et al., 2020). However, whether individuals' worry may reduce their mindfulness (Parke et al., 2021)—or vice versa—awaits further investigations, especially those using panel data and cross-lagged models.

Third, we assessed individuals' own mindfulness and adjustment using self-report questionnaires, meaning that our findings—particularly those on the actor effect of mindfulness—might be affected by common method variance, that is, spurious correlations arising from such measurement errors as response styles, social desirability, and priming effects rather than true correlations between constructs being measured (Podsakoff et al., 2012). In fact, some items used to measure mindfulness (e.g., “I am able to focus on the present moment”) were quite similar to those used to measure cognitive problems in attention (e.g., “I have trouble listening and paying attention”). This did not necessarily mean, however, that mindfulness and cognitive problems were conceptualized as identical constructs in our study: Our measure of mindfulness tapped into not only being attentive to the present moment experience, but also being accepting of the inner thoughts and feelings (Feldman et al., 2007). Also, our measure of cognitive problems tapped into difficulties in not only attention, but also executive functioning and memory (Medalia et al., 2008). That said, to reduce common method bias and to improve measurement validities, further studies should retest our hypotheses using data collected with multiple methods (e.g., questionnaires, behavioral observation, neurophysiological assessment) from multiple informants (e.g., self-reports, spousal reports, clinical judgment). Finally, we did not measure whether participants or their relatives or close friends had been infected with COVID-19, a factor that might have affected participants' worry about the



disease. Neither did we measure whether participants had been practicing mindfulness regularly, a factor that might have affected participants' mindfulness. Investigators should measure these factors as control variables and rule out these factors as alternative explanations in future research.

**Acknowledgements** We thank the participating kindergartens and families for their time and insights about mindfulness and adjustment, especially during the COVID-19 pandemic.

**Author Contribution** CBL developed the research question, analyzed the data, and wrote and revised the paper. LCS collected and managed the data and collaborated in the writing and revision of the paper. KKHC assisted with the revision of the paper. All authors approved the final version of the paper for publication.

**Funding** This study was supported by a grant by The Education University of Hong Kong to Chun Bun Lam (RG19/2020-2021R).

**Data Availability** The data and measures of this study are available from the corresponding author upon reasonable request.

## Declarations

**Ethics Approval** The procedures of this study were approved by the Institutional Review Board of The Education University of Hong Kong and were performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

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

**Conflict of Interest** The authors declare no competing interests.

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