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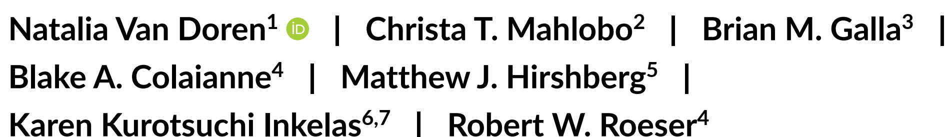
# The role of mindfulness and compassion in early adults' subsequent mental health, coping and compliance with health guidelines during the COVID-19 pandemic: A prospective longitudinal study



**Natalia Van Doren[1] | Christa T. Mahlobo[2] | Brian M. Galla[3] | Blake A. Colaianne[4] | Matthew J. Hirshberg[5] | Karen Kurotsuchi Inkelas[6,7] | Robert W. Roeser[4]**

[1]Department of Psychiatry and Behavioral Sciences, University of California, San Francisco, San Francisco, California, USA

[2]Positive Psychology Center, University of Pennsylvania, Philadelphia, Pennsylvania, USA

[3]Department of Health and Human Development, School of Education, University of Pittsburgh, Pittsburgh, Pennsylvania, USA

[4]Department of Human Development and Family Studies, The Pennsylvania State University, University Park, Pennsylvania, USA

[5]Center for Healthy Minds, University of Wisconsin Madison, Madison, Wisconsin, USA

[6]Curry School of Education & Human Development, University of Virginia, Charlottesville, Virginia, USA

[7]Contemplative Sciences Center, University of Virginia, Charlottsville, Virginia, USA

**Correspondence**

Natalia Van Doren, Department of Psychiatry and Behavioral Sciences, University of California, San Francisco, San Francisco, CA, USA.
Email: nataliavandoren@gmail.com

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## Abstract

The present study explored prospective links between trait mindfulness and compassion on subsequent coping and compliance with Centers for Disease Control (CDC) guidelines and indirect effects via well-being and internalized distress during the COVID-19 pandemic. The study included *N* = 736 US college students who participated in a three-wave longitudinal study across a single academic year. The first two assessment waves took place in 2018 and 2019, respectively, while the third wave took place in May 2020 during the COVID-19 pandemic. Participants completed self-report measures of trait mindfulness, compassion, well-being, internalized distress, coping, and compliance with CDC health guidelines. Results of a series of autoregressive, cross-lagged panel models revealed that trait mindfulness was associated with better coping via indirect effects of greater well-being and lower internalized distress. Greater compassion was linked with greater adherence to CDC guidelines. Findings suggest that trait mindfulness and

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compassion may play a role in college students' coping and compliance during the pandemic.

KEYWORDS
compassion, coping, COVID-19, health behavior, internalized distress, mindfulness, social distancing, well-being

## 1 | INTRODUCTION

The COVID-19 pandemic has been linked to significant increases in life stress and declines in mental health among college-attending adults (Elharake et al., 2022). Research suggests that both trait mindfulness and compassion for others played a buffering role against the negative mental health impacts of the pandemic among adults (e.g., Dillard & Meier, 2021; Matos et al., 2022). Less research has focused on the differential effects of these two processes on coping and compliance. For example, less is known about how mindfulness and compassion impact general coping strategies and specific compliance with behavioral health guidelines put out by the Centers for Disease Control (CDC) during the COVID-19 pandemic. While some recent research suggests that antecedents of science related skepticism (e.g. worldview, religious or political identity, conformity, etc.) may inform antecedents of COVID-19 related skepticism, further examination of other traits that differentiates compliers from non-compliers is still needed (Packer at el., 2021; Rutjens et al., 2021; Zhang et al., 2021). In this study, we draw on theoretical work which posits that individual differences in mindfulness and compassion skills are malleable antecedent factors affecting not only college students' mental health, but also their coping and compliance with CDC health guidelines—a form of prosocial health behavior (e.g., Dvořáková et al., 2019).

Both mindfulness and compassion may impact individuals' ability to cope successfully with pandemic-related stress as well as their ability to comply with CDC guidelines. Trait mindfulness can be defined as a habit of “paying attention in a particular way on purpose, in the present moment, and nonjudgmentally” (Kabat-Zinn, 1994, p. 4). Research has linked individual differences in trait mindfulness to fewer symptoms of anxiety and depression (Gómez-Odriozola & Calvete, 2020), better emotion regulation and adaptive responses to stress (Ramasubramanian, 2017; Tomlinson et al., 2018; Weinstein et al., 2009), and better compliance with medication regimes (Fanning et al., 2018). Dispositional mindfulness has been associated with better daily coping (Weinstein et al., 2009). Intervention studies of mindfulness training during the COVID-19 pandemic showed that training was associated with better coping and less stress among the treatment versus control group (Lim et al., 2021; Zheng et al., 2020).

While some past work has examined the links between mindfulness and compassion and compliance, to date, these constructs have been considered separately rather than in the same model. In addition, few studies have employed prospective, longitudinal designs. Moreover, less is known about the mechanisms through which mindfulness and compassion may be linked to greater coping and compliance. Both mindfulness and compassion have been linked to greater well-being and lower symptoms of depression and anxiety, which could, in turn, promote adherence to CDC guidelines and greater coping ability due to greater cognitive resources under stress. In other words, greater mental health could engender resilience to stress during the COVID-19 pandemic that may enable both greater compliance and coping resources.

There is some evidence that trait mindfulness is linked to greater compliance with health recommendations (Fanning et al., 2018; Lima et al., 2016). On the other hand, recent research on whether trait mindfulness is associated with greater compliance with CDC health guidelines (e.g., social distancing, handwashing) is more mixed. For instance, one study found that mindfulness was associated with higher engagement in preventive health behaviors in those with pre-existing conditions (Wen et al., 2022). Other work suggests that people higher in mindfulness were more likely to adhere to social distancing, but not cleaning guidelines (Bailey et al., 2021). In fact, some work suggested that the more mindful a person was, the less compliant they were with behavioral

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health guidelines, via lower threat and higher uncertainty intolerance (Matta et al., 2022). Thus, it is possible that young adults who are more mindful may be more tolerant of uncertainty and prone to greater risk taking that, when combined, lead to less perception of threat regarding the virus and therefore, less compliance (Matta et al., 2022). In sum, it remains an open question as to whether greater trait mindfulness was associated with greater compliance with CDC guidelines for mitigating the spread of COVID-19 (e.g., handwashing, wearing a face mask).

Regarding compassion or empathic concern for others (e.g., Roeser et al., 2018), there is some reason to believe that those with greater compassion should show more adaptive coping. Compassion is defined here as sensitivity to the suffering of others and a concomitant motivation to prevent or alleviate that suffering. In adults, compassion has also been linked to better mental health (Berking & Whitley, 2014), stress regulation (Lathren et al., 2019), and prosocial behavior (e.g., compliance with community health guidelines) (Terry & Leary, 2011; Welp & Brown, 2014). Further, greater compassion is associated with the use of adaptive coping strategies (e.g., active coping strategies) and lower use of maladaptive coping strategies (Sun et al., 2019). Matos et al. (2022) found that compassion was linked to better mental health and social safety in the pandemic. Together, findings suggest that compassion could enable greater adaptive coping during the pandemic.

While the evidence is equivocal with respect to whether greater trait mindfulness is associated with greater compliance with health guidelines, higher levels of compassion seem to generate a more straightforward prediction—the more compassion, the more compliance. Compassion for others may create a heightened sense of social solidarity during the pandemic, which could, in turn motivate individuals to comply with CDC and other health recommendations (Roeser et al., 2018). One study found that greater compassion was associated with greater compliance (Karnaze et al., 2022). However, this work was conducted in middle-aged adults and did not account for longitudinal mediators over time, limiting our understanding of mechanisms. In sum, based on previous work, we expect more compassionate college-attending young adults to show better subsequent coping and compliance with health guidelines during the pandemic.

In the present study, we explored prospective relations between mindfulness and compassion with coping and compliance, and indirect effects of mental health and well-being across three time points (Time 1 = T1; Time 2 = T2; Time 3 = T3). Specifically, we aimed to address the following research questions: 1) How are trait mindfulness and compassion (T1) associated with subsequent mental health (T2 and T3) and daily coping and compliance with guidelines during the pandemic (T3)? and 2) Do individual differences in mindfulness and compassion at T1 indirectly associate with early adults' compliance with behavioral health guidelines during the Pandemic (T3) through their mental health (T2)? We hypothesized that greater mindfulness and compassion would be linked to lower internalized distress and greater well-being at subsequent timepoints; that mindfulness and compassion would be linked to more adaptive and less maladaptive coping. Given the mixed findings on mindfulness and compassion regarding compliance, we did not have a directional prediction, but instead aimed to explore the relationships in a young adult sample. Finally, we hypothesized that mindfulness and compassion (T1) would be indirectly associated with coping and compliance (T3) via greater well-being and fewer internalizing symptoms at T2. We hypothesized the latter given existing evidence on the role of well-being in preventing health risk behaviors (e.g., Evers et al., 2014) as well as the role of mental health in conferring resilience to stressors, such as a global pandemic, which could conserve cognitive resources and enhance decision-making capacities (e.g., Starcke & Brand, 2016). Our conceptual model is depicted in Figure 1.

## 2 | METHOD

Data analysis syntax and results are provided at on the Open Science Framework (https://osf.io/72udw/). Supplementary analyses, results, and more expansive methodological details are provided in the online Supplemental Materials document, including all off the items for all measures (Appendix A).

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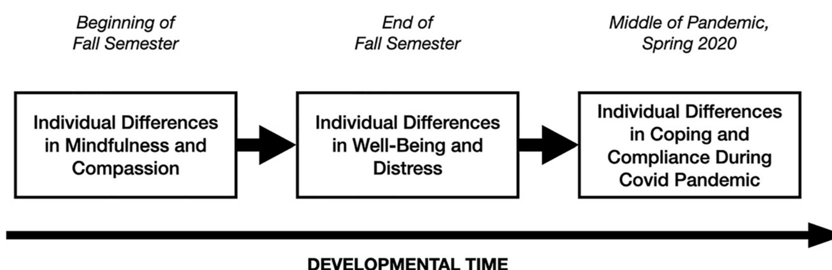


FIGURE 1 Conceptual model depicting cross-time relationships.

## 2.1 | Participants and procedure

Data was collected from 736 US college students across two cohorts as part of a longitudinal study of two cohorts in 2018 and 2019. In May 2020, follow-up assessments were administered to assess the long-term effects of trait mindfulness and compassion on coping and compliance during the COVID-19 pandemic. All measures were self-reported.

## 2.2 | Measures

***Mindfulness***. Mindfulness was assessed using the 24-item Five-Facet Mindfulness Questionnaire, short form (FFMQ-SF) at Waves 1 and 2 (Bohlmeijer et al., 2011), and the 15-item FFMQ at Wave 3 (Abujaradeh et al., 2020). Scores were summed ($\alpha$ = 0.82, 0.84, 0.84). Mindfulness was assessed at each assessment wave.

***Compassion***. Compassion was assessed using six items from the Empathic Concern subscale of the Interpersonal Reactivity Index (IRI; Davis, 1980) at Waves 1 and 2, and three items from the IRI at Wave 3 ($\alpha$ = 0.86, 0.89, 0.83). Compassion was assessed at each assessment wave.

***Internalizing Symptoms***. PHQ-9 measured depressive symptoms, and GAD-7 measured anxious symptoms. Depressive and anxious symptoms loaded onto a single factor at all three time points and cohorts and were collapsed for a reliable internalizing score ($\alpha$ = 0.93, 0.95, 0.94). Internalizing symptoms were assessed at each assessment wave.

***Well-being***. Well-being was measured with the Pemberton Happiness Index (PHI; Hervas & Vazquez, 2013; α = 0.92, 0.93, 0.93). Well-being was assessed at each assessment wave.

***Coping***. Coping was assessed with a modified version of the Brief COPE inventory (Carver et al., 1989). One additional item from the original COPE was added to each of the 12 coping subscales from the Brief COPE to increase reliability (Carver, 1997). Participants indicated the frequency of coping behaviors in response to the COVID-19 pandemic. Factor analyses revealed a two-factor structure: 1) Adaptive coping (reappraisal, acceptance, planning, distraction, religious coping, active coping, and seeking social support—instrumental and emotional); 2) Maladaptive coping (substance use, denial, venting, and behavioral disengagement). Both factors were reliable (all α′s > 0.82). An adaptive coping score and maladaptive coping score were calculated by taking the mean of each group of subscales comprising each factor. Coping was assessed at third assessment wave only, as we were interested in understanding specifically how individuals were coping with the pandemic.

***Compliance***. Compliance with CDC guidelines for mitigating the impact of COVID-19 was measured using four self-reported items assessing the frequency of behaviors in line with CDC guidelines over the past two weeks: hand-washing, wearing a mask, staying home, and going out to public places (reverse-scored). Responses were rated on a 7-point Likert scale (1 = Rarely, 7 = Frequently). Additionally, compliance with social isolation recommendations was assessed by asking about in-person social gatherings attended (reverse-scored), visits to romantic partners that participants do not live with (reverse-scored), and visits to family members that they do not live with (reverse-scored).

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Responses were rated on a scale from 0 = not at all to 5 = Five times or more. A composite score was created using the percentage of maximum possible (POMP; Moeller, 2015) approach, whereby each item was converted into a percentage score by subtracting the minimum score and dividing by the possible scoring range. The composite score was calculated by averaging the POMP scores of all items ($\alpha$ = 0.66). Compliance was assessed at the third assessment wave, as it is the only assessment wave that took place during the pandemic.

***Demographic characteristics***. Participants in the study self-reported their sex, race, and grade level (see Table S1 for details). Demographics were assessed at the first assessment wave.

## 2.3 | Analytic plan

To maximize statistical power (and avoid post hoc exclusions), all students who participated in the study were included in the analysis regardless of their degree of missing data. A total of 709 out of 736 (96.33%) of participants provided data for at least one key variable at T1; 453 (61.55%) students provided data for at least one variable at T2; and 279 students (37.36%) provided data for at least one key variable at T3. A total of 497 (67.52%) participants provided data for all variables during at least one assessment wave, whereas 271 (36.82%) participants provided data for all variables during all three assessment waves.

Demographic differences across race, gender, and grade level were tested using SPSS. All analyses were conducted in Mplus (Muthén & Muthén, 1998-2017), using full information maximum likelihood. Autoregressive, cross-lagged panel models with 5000 bootstrapped samples were used to test study hypotheses. Indirect effects were inferred when the 95% bootstrapped confidence interval did not include zero ($p < 0.05$). Model fit and comparisons were assessed using standard indices (Chen, 2007; Schumacker & Lomax, 2010). All analyses controlled for autoregressive effects, cross-lagged paths, and demographic covariates of sex, grade level, cohort, and race.

# 3 | RESULTS

## 3.1 | Descriptive statistics and bivariate correlations

Table 1 shows estimated means and standard deviations (using full information maximum likelihood; FIML), alphas, and available n for all variables. Table 2 shows the bivariate correlations for all study variables. Demographic differences across gender, race, and grade level were examined next (see Supplementary Materials Tables S2-S5 for results).

## 3.2 | Autoregressive, cross-lagged panel model analysis

Preliminary analysis revealed that each of the constrained models fit the data as well as the unconstrained model (see Table 3). Since the fully constrained model fit the data as well as the unconstrained model, for parsimony and interpretability, results are reported from the most constrained model (M5), in which the cross-lagged paths, autoregressive paths, and T2 and T3 within-wave residual covariances were time-invariant (T1 covariances were allowed to freely estimate).[1] The final model (depicted graphically in Figure 2) provided acceptable fit to the data: $\chi^2$ (50) = 124.99, $p < 0.05$, CFI = 0.97, RMSEA = 0.05.[2] All autoregressive paths were significant, with standardized betas between 0.46 and 0.59, suggesting that each variable demonstrated cross-time stability.

Turning to the analysis of indirect effects, mindfulness at T1 prospectively predicted greater well-being ($b$ = 0.63, $p < 0.001$) at T2. Levels of well-being (at T2) in turn prospectively predicted greater adaptive coping ($b$ = 0.10, $p < 0.01$), indicating a significant indirect effect on the association between mindfulness (T1) and adaptive coping (T3; unstandardized indirect effect = 0.06, standardized indirect effect = 0.06, 95% CI [0.026, 0.131]). In addition,

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TABLE 1 Descriptive statistics and reliabilities for all study variables ($N = 739$).

| Variables | *M* | *SD* | *n* | α |
|---|---|---|---|---|
| Mindfulness T1 | 3.11 | 0.54 | 709 | 0.84 |
| Mindfulness T2 | 3.16 | 0.57 | 453 | 0.86 |
| Mindfulness T3 | 3.21 | 0.67 | 273 | 0.84 |
| Empathic concern T1 | 3.95 | 0.65 | 684 | 0.86 |
| Empathic concern T2 | 3.99 | 0.70 | 447 | 0.89 |
| Empathic concern T3 | 4.20 | 0.80 | 271 | 0.83 |
| Internalizing T1 | 1.91 | 0.67 | 687 | 0.93 |
| Internalizing T2 | 2.02 | 0.73 | 447 | 0.95 |
| Internalizing T3 | 1.96 | 0.71 | 271 | 0.94 |
| Well-being T1 | 7.21 | 1.59 | 675 | 0.92 |
| Well-being T2 | 7.19 | 1.59 | 447 | 0.93 |
| Well-being T3 | 7.16 | 1.64 | 271 | 0.93 |
| Adaptive coping T3 | 2.65 | 0.52 | 276 | 0.89 |
| Maladaptive coping T3 | 1.88 | 0.45 | 276 | 0.83 |
| Compliance T3 | 78.38 | 15.75 | 275 | 0.66 |

*Notes*: T1 = Time 1, T2 = Time 2, T3 = Time 3.

mindfulness at T1 prospectively predicted lower internalizing symptoms at T2 ($b = -0.17$, $p < 0.01$), and internalizing symptoms at T2, in turn, prospectively predicted maladaptive coping at T3 ($b = 0.17$, $p < 0.01$), thus indicating a significant indirect effect on the association between mindfulness (T1) and maladaptive coping (T3; unstandardized indirect effect = −0.029, standardized indirect effect = −0.032, 95% CI [−0.066, −0.008]). In addition, there was a significant negative indirect effect of well-being in the link between mindfulness and compliance (unstandardized indirect effect = −1.298, standardized indirect effect = −0.045, 95% CI −3.268, −0.202]).

Compassion at T1 prospectively predicted greater well-being at T2 ($b = 0.17$, $p < 0.05$). Greater well-being at T2, in turn, prospectively predicted greater adaptive coping at T3 ($b = 0.10$, $p < 0.01$), thereby indiciating a significant indirect effect on the association between compassion (T1) and adaptive coping (T3; unstandardized indirect effect = 0.17, standardized indirect effect = 0.02, 95% CI 0.002, 0.046]). Finally, there was a significant negative indirect effect of well-being (T2) on the link between greater compassion (T1) and greater compliance (T3; unstandardized indirect effect = −0.387, standardized indirect effect = −0.02, 95% CI −1.181, −0.026]).[3]

## 4 | DISCUSSION

Findings suggest that individual differences in mindfulness and compassion were differentially related to both intra- and inter-personal regulation during the COVID-19 pandemic. First, results suggest that trait mindfulness was associated with greater well-being, lower internalizing symptoms, and more adaptive coping with the pandemic. Results add to the prior literature by suggesting a mechanism through which mindfulness is associated with more adaptive coping responses via increased well-being and mental health. Our results suggest that, if replicated, mindfulness may reduce mental health problems and boost well-being and coping during the pandemic.

Second, we found that empathic concern was linked with *greater* compliance, while mindfulness was *negatively* linked to compliance. Results dovetail with prior findings in middle-aged adults (Matta et al., 2022) and further suggest additional mechanisms via which mindfulness may decrease compliance—namely, through greater well-being and lower anxiety/depression. Accordingly, these results may suggest that, while trait mindfulness may

TABLE 2 Bivariate correlations among all study variables ($N$ = 739).

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Mindfulness T1 | | | | | | | | | | | | | | |
| 2. Empathic concern T1 | **0.10** | | | | | | | | | | | | | |
| 3. Internalizing T1 | **−0.58** | **−0.03** | | | | | | | | | | | | |
| 4. Well-being T1 | **0.59** | **0.27** | **−0.62** | | | | | | | | | | | |
| 5. Mindfulness T2 | **0.67** | 0.09 | **−0.49** | **0.51** | | | | | | | | | | |
| 6. Empathic concern T2 | **0.12** | **0.58** | 0.01 | **0.16** | **0.07** | | | | | | | | | |
| 7. Internalizing T2 | **−0.45** | 0.02 | **0.62** | **−0.41** | **−0.62** | **0.06** | | | | | | | | |
| 8. Well-being T2 | **0.53** | **0.20** | **−0.51** | **0.63** | **0.65** | **0.24** | **−0.60** | | | | | | | |
| 9. Mindfulness T3 | **0.57** | −0.07 | **−0.48** | **0.48** | **0.66** | −0.06 | **−0.48** | **0.48** | | | | | | |
| 10. Empathic concern T3 | −0.02 | **0.39** | **0.13** | 0.08 | **−0.09** | **0.40** | **0.25** | −0.03 | −0.07 | | | | | |
| 11. Internalizing T3 | **−0.47** | 0.06 | **0.55** | **−0.46** | **−0.51** | 0.09 | **0.63** | **−0.39** | **−0.64** | **0.20** | | | | |
| 12. Well-being T3 | **0.49** | 0.10 | **−0.42** | **0.68** | **0.51** | 0.14 | **−0.40** | **0.64** | **0.57** | **0.17** | **−0.61** | | | |
| 13. Adaptive coping T3 | **0.16** | **0.13** | **−0.13** | **0.36** | **0.33** | **0.27** | −0.14 | **0.40** | **0.21** | **0.26** | **−0.12** | **0.43** | | |
| 14. Maladaptive coping T3 | **−0.31** | **0.12** | **0.39** | **−0.22** | **−0.29** | 0.10 | **0.37** | **−0.20** | **−0.47** | 0.12 | **0.60** | **−0.30** | 0.07 | |
| 15. Compliance T3 | **−0.15** | **0.21** | **0.06** | −0.09 | **−0.22** | **0.17** | **0.20** | **−0.25** | **−0.15** | **0.18** | 0.09 | **−0.12** | 0.10 | 0.04 |

*Notes*: T1, Time 1, T2, Time 2, T3, Time 3. Bolded values are significant at $p < 0.05$.

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**TABLE 3** Fit indices and model comparisons for the cross-lagged panel model ($N = 736$).

| | Model Fit Indices | | | | | Model Fit Comparisons | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Model (M) | $\chi^2$ | *df* | RMSEA | CFI | Model comparisons | $\Delta\chi^2$ | $\Delta df$ | *p* | ΔRMSEA | ΔCFI |
| M1: Baseline | 88.91 | 28 | 0.05 | 0.97 | | | | | | |
| M2: Time-invariant cross-lagged paths | 112.26 | 40 | 0.05 | 0.97 | M1 versus M2 | 23.35 | 12 | 0.02 | 0.000 | 0.000 |
| M3: Time-invariant autoregressive paths | 94.223 | 32 | 0.05 | 0.97 | M1 versus M3 | 5.313 | 4 | 0.27 | 0.000 | 0.000 |
| M4: Time-invariant residual covariances | 94.71 | 34 | 0.05 | 0.97 | M1 versus M4 | 5.8 | 6 | 0.45 | 0.000 | 0.000 |
| M5: M2 + M3 + M4 | 124.99 | 50 | 0.05 | 0.97 | M1 versus M5 | 36.08 | 22 | 0.03 | 0.000 | 0.000 |

*Note*: Gender and cohort were included as covariates.

Abbreviations: $\chi^2$, chi-square; df, degrees of freedom; CFI, Comparative fit Index; RMSEA, Root mean square error of approximation; Δ, change in parameter.

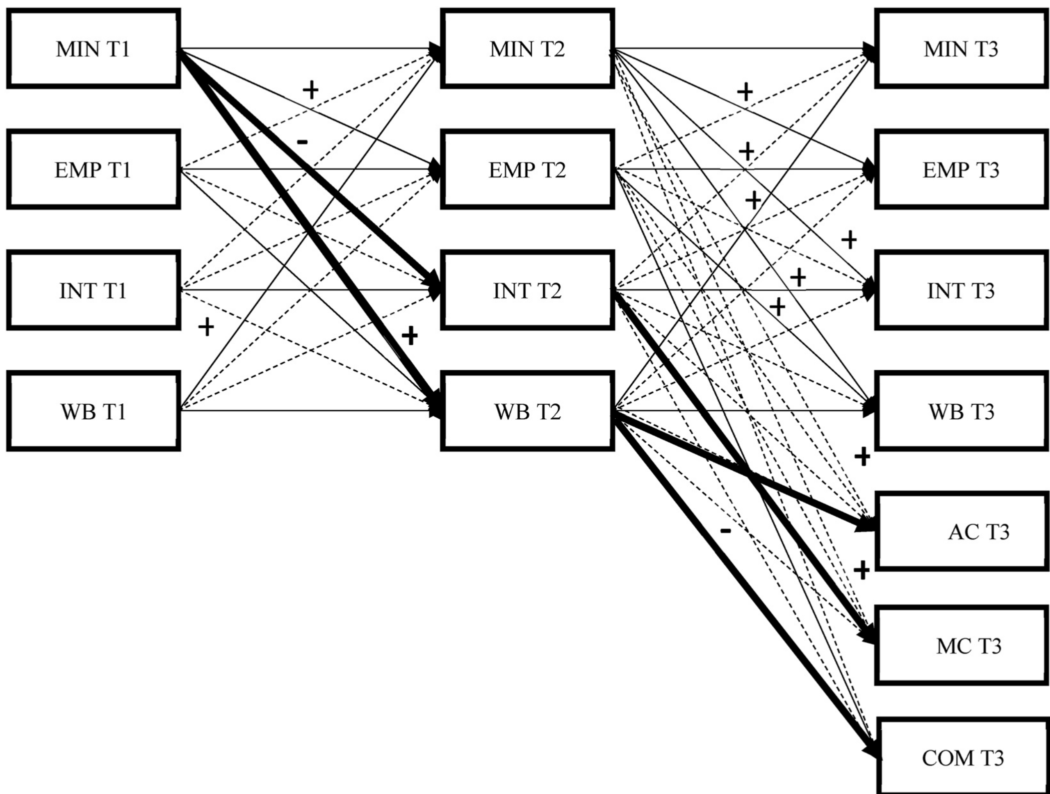


**FIGURE 2** Autoregressive, cross-lagged panel model. Cross-lagged paths, autoregressive paths, and T2 and T3 within-wave residual covariances were constrained to be time-invariant (T1 covariances were freely estimated). Within-wave covariances and covariates of race, sex, first-year status, and cohort were included (but are not displayed to ease presentation). MIN = mindfulness, EMP = Empathic Concern, INT = internalizing, WB = Well-being, AC = adaptive coping, MC = maladaptive coping, and COM = compliance. T1, T2, and T3 represent assessment waves one, two, and three, respectively. Solid lines represent paths that are significant at the $p < 0.05$ level; Dotted lines represent nonsignificant paths. Bolded lines represent a significant indirect effect. + indicates a positive relation; - indicates a negative relation. Directions are given for significant cross-lagged paths only (all autoregressive paths were positive); and are placed above the relevant path.

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boost well-being and coping, whereas compassion in the COVID-19 pandemic was associated with better mental health outcomes for college students and greater compliance with CDC guidelines. Thus, mindfulness for *intra*-personal effects of coping and mental health, but also aims at affecting *inter*personal outcomes of kindness and caring towards others in the interest of motivating prosocial behaviors like compliance with CDC guidelines may be beneficial.

Greater compassion was prospectively linked to greater compliance, and there was a significant indirect effect through greater well-being at T2. However, the direction of the indirect effect was negative, whereas the correlation between compassion and compliance was positive. This may be evidence of a suppressor effect of well-being on the compassion-compliance relationship. Suppressor variables are variables that improve the overall effect of the predictor(s) onto the criterion variable (MacKinnon et al., 2002; Watson et al., 2013). Therefore, the significant indirect effect in this instance may suggest that by virtue of well-being's negative relationship to compliance, including well-being in the model improves the prediction of compassion on compliance. Further research should attempt to replicate this effect which could aid in parsing apart shared variance between compassion and well-being, thereby refining its measurement (e.g., Blonigen et al., 2010).

Findings add to the social personality psychology literature by explicating the differences between these mindfulness and compassion in terms of their behavioral and self-regulation outcomes in the context of a pandemic. While both processes may aid in well-being and coping, mindfulness led to greater decreases in mental health symptoms (e.g., anxiety/depression), which then led to lower compliance with CDC guidelines; whereas, individual differences in compassion showed less reduction in anxious/depressive symptoms which may serve to motivate more prosocial health behaviors.

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## CONFLICT OF INTEREST STATEMENT

None.

## ORCID

*Natalia Van Doren* https://orcid.org/0000-0001-6044-7208

## ENDNOTES

[1] Results were consistent across all models.

[2] The Supplementary Materials (Table S6) provide a complete reporting of the unstandardized path estimates, including 95% confidence intervals and *p* values.

[3] There were no differences in cohorts across study variables (see supplement). We ran models separately by cohort and found the same pattern of results. Cohort was also included as a covariate.

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## AUTHOR BIOGRAPHIES

**Natalia Van Doren**, PhD, is a postdoctoral fellow at the University of California, San Francisco.

**Christa T. Mahlobo**, PhD, is a postdoctoral fellow at the University of Pennsylvania.

**Brian M. Galla**, PhD, is an associate professor of Health and Human Development at University of Pittsburgh.

**Blake A. Colaianne**, PhD, is an assistant research professor at Penn State University.

**Matthew J. Hirshberg**, PhD, is a research scientist at the Center for Health Minds at the University of Wisconsin, Madison.

**Karen Kurotsuchi Inkelas**, PhD, is a professor of education at the University of Virginia.

**Robert W. Roeser**, PhD, is the Bennett Pierce Professor of Caring and Compassion and Professor of Human Development and Family Studies at Penn State University.

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