Meaning, pandemic self-efficacy, social support, and discrimination predict trajectories of peri-pandemic growth and distress for international students

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Abstract

**Objective:** International students face unique COVID-19-related stressors, such as financial aid loss, limited social support, and discrimination (e.g., verbal harassment, physical assault). Additionally, pandemic and chronic stress research is largely cross-sectional, and trajectories over time remain unclear for psychological and environmental factors predicting distress and peri-pandemic growth. Accordingly, the current study examined trajectories of psychological distress and growth, as well as weekly psychological and environmental predictors of psychological distress and growth, in international students during early stages of the pandemic.

**Method:** International students (*N* = 42) at a U.S. university were surveyed weekly for 14 weeks.

**Results:** Latent growth mixture modeling resulted in three trajectories over time of distress (*Minimal Impact*; *Emergent Resilience*; *Increasing Distress*) and peri-pandemic growth (*Limited PrTG*; *Decreasing PrTG*; *Increasing PrTG*). For multilevel models, within-person increases in meaning and self-efficacy as well as between-person changes in discrimination and emotional social support predicted distress. Within-person changes in meaning and self-efficacy and between-person changes in self-efficacy and discrimination predicted peri-pandemic growth.

**Conclusions:** Despite the stressors they face, many international students demonstrated a trajectory of resilience. Positive coping factors and environmental factors predicted distress or peri-pandemic growth, which can inform interventions and studies examining trajectories of distress during prolonged adversity.

 *Keywords:* meaning in life; distress; social support; posttraumatic growth; international students

Clinical Impact Statement

The current study shows that sampled international students were resilient during the early stages of the pandemic, despite experiencing additive stressors. Additionally, the current study identified coping factors (i.e., meaning in life, self-efficacy) and environmental factors (e.g., discrimination, social support) that were related to distress and posttraumatic growth. These findings provide insight into trajectories of distress during stressful events and identify factors that predict changes in distress, which has the potential to inform interventions and policy changes for international students.

Meaning, pandemic self-efficacy, social support, and discrimination predict trajectories of peri-pandemic growth and distress for international students

 International students living in the U.S. during the COVID-19 pandemic experienced additive stressors (Sahu, 2020). Many were unable to return to their nations of origin at the pandemic’s onset (Sahu, 2020) and experienced elevated discrimination (Maleku et al., 2021). Given the rapidly evolving nature of the pandemic, it is imperative to understand trajectories and predictors of psychological functioning in those disproportionately impacted, which will inform an understanding of processes that contribute to psychological difficulties during prolonged stressors (Bonanno & Diminich, 2013).

 Psychological factors relevant to mental health during the pandemic include meaning in life and self-efficacy. Adverse events (e.g., disasters) impact one’s core beliefs (Park, 2010), and meaning-making after potentially traumatic events facilitates growth and recovery by changing core beliefs, which is often perceived as posttraumatic growth (PTG; positive psychological changes occurring after adverse experiences; Park, 2010; Tedeschi et al., 2018). Regarding self-efficacy, research connecting self-efficacy to resilience has often focused on coping self-efficacy, or an individual’s perceived capacity to function after a stressor (Bandura, 2018). Disaster *preparedness* and *response* self-efficacy, rather, are frequently overlooked in the literature. Studies examining self-efficacy for disaster response have focused on disaster preparedness outcomes (redacted for blind review) rather than on mental health outcomes, even though disaster preparedness is linked to disaster resilience (redacted for blind review). Thus, the relationship between disaster self-efficacy and mental health outcomes remains a prominent point of inquiry.

 Pertinent external factors for pandemic mental health include discrimination and social support. Given elevated discrimination (e.g., verbal and physical attacks) international students experienced during the pandemic, it would be useful to understand how changes in discrimination relate to psychological functioning longitudinally. Social support has been established as a positive predictor of resilience and posttraumatic growth and an inverse predictor of distress (Southwick et al., 2016). Like meaning in life, studies on social support after prolonged stressors are mostly cross-sectional, which hampers generalizability to a longer-term pandemic, during which opportunities for social support are limited given social distancing guidelines and quarantine orders.

**The Present Study**

International students’ mental health is understudied during prolonged stressors. To identify protective and risk factors for their peri-pandemic psychological functioning, longitudinal examination is necessary. The current study explored trajectories and predictors of distress and peri-pandemic growth (PrTG) over 14 weeks in a sample of international students and assessed within- (i.e., person-centered) and between- (i.e., person-mean) individual meaning in life, self-efficacy, discrimination, and social support as predictors of distress and PrTG. It was hypothesized that: 1) increased between- and within-person meaning, social support, and disaster self-efficacy would predict decreased distress and increased PrTG; and 2) increased between- and within-person discrimination would predict increased distress and decreased PrTG.

**Method**

**Procedure and Participants**

 The Institutional Review Board at a southeastern university approved the protocol; participants checked a box to consent. Participants were compensated $5 per weekly survey. Data were collected May through October of 2020. Eighty-four participants responded; data from 42 international students who completed ≥ 2 waves were retained. Participants self-identified as male (54.8%) or female (45.2%), with no respondents identifying as non-binary. Most participants identified as heterosexual (90.5%). As for race/ethnicity, with the option to select all that applied, many respondents identified as Asian (66.7%), Black (23.8%), or White (7.1%), while 2.4% preferred not to respond. Among those reporting age, mean age was 24.8 (*SD* = 5.1). Many participants (45.2%) said they qualified for need-based financial aid (i.e., scholarships or loans), while 31.0% did not and 23.8% were unsure. Many participants reported having a parent or guardian with a graduate/professional degree (33.3%) or a bachelor’s degree (23.8%).

**Measures**

The following measures were adapted for weekly use and tailored specifically to COVID-19.

 **Exposure to Discrimination.** Seven items on COVID-specific forms of discrimination were used based on certain categories of discrimination identified by Jeung (2020): barred from a business, barred from transportation, coughed/spat upon, online harassment, physical assault, shunning, verbal harassment, and “other.” Additionally, items 1, 2, and 4 were used from the 5-item Everyday Discrimination Scale-Short Version (Sternthal et al., 2011). The other two items from this scale were omitted because they overlapped with items from Jeung (2020). Instructions were adapted for participants to select whether they had experienced each instance of discrimination since the COVID-19 outbreak: “Since the Coronavirus (COVID-19 outbreak), have any of the following things happened to you due to discrimination? Check all that apply.” An example of discrimination in response to the prompt is: “Someone coughed or spit on me.” Endorsement of the “other” item prompted text entry of any other forms of discrimination. Discrimination was coded “1” for ≥ 1 any discrimination incident reported and “0” for none reported due to low base rate and combined use of two different measures.

 **Traumatic Stress.** The Posttraumatic Stress Disorder Checklist for the *DSM-5* (PCL-5; Blevins et al., 2015) is a 20-item self-report measure assessing four domains of posttraumatic stress (e.g., “Blaming yourself or someone else for the stressful experience or what happened after it”). Higher scores suggest increased symptoms of posttraumatic stress. The PCL-5 has excellent psychometric properties (Weathers et al., 2013). Internal consistency was excellent at wave one, αTotal = .97.

 **Mood and Anxiety.** The Depression Anxiety Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995) is a 21-item self-report measure assessing dysphoric mood, physiological and cognitive anxiety, and irritability. Higher scores for each subscale indicate increased depression, anxiety, and stress (e.g., “I found it hard to wind down”). The DASS-21 has excellent psychometric properties (Lovibond & Lovibond, 1995). At wave one, internal consistency was excellent, αTotal = .95.

 **Peri-traumatic Growth.** The Posttraumatic Growth Inventory-Short Form (PTGI-SF; Cann et al., 2010) is a 10-item self-report measure assessing domains of posttraumatic growth. PTG domains include 1) relating to others, 2) new possibilities, 3) personal strength, 4) spiritual change, and 5) appreciation of life. An item example includes: “I established a new path for my life as a result of the COVID-19 outbreak” compared to “I established a new path for my life” in the original PTGI-SF. Higher scores indicate greater perceived PrTG/PTG. The PTGI-SF has excellent psychometric properties (Cann et al., 2010). Internal consistency at wave one was excellent, αTotal = .91.

 **Meaning in Life.** The Meaning in Life Questionnaire-Presence Subscale (MLQ-P) is a 5-item self-report measure assessing Presence of meaning. An item example for MLQ-P is “I understand my life’s meaning.” Higher scores indicate increased perceived meaning in life and search for meaning. Psychometric properties are excellent (Steger et al., 2006). Internal consistency at wave one was good, αPresence = .86.

 **Social Support.** The 2-Way Social Support Scale (2WSSS; Shakespeare-Finch & Obst, 2011) is a 21-item self-report measure assessing support in emotional (e.g., “I felt that I had a circle of people who value me”) and instrumental categories (e.g., “There was someone who could give me financial assistance”). Support received was the primary focus of the current study, given the expected impact of quarantining and travel restrictions on limiting receipt of emotional and instrumental social support. Higher scores for the emotional support items are indicative of increased emotional social support. Higher scores for the instrumental support items reflect greater instrumental support. The 2WSSS demonstrates good psychometric properties (Shakespeare-Finch & Obst, 2011). Internal consistency was excellent for the entire 21-item measure, αTotal = .92.

 **Pandemic Self-Efficacy.** Two items were adapted from the PhenX COVID-19 library (RTI International, 2020), which have since been used in extant research (e.g., Shafiq et al., 2021). These items were “I believe I can protect myself from the Coronavirus (COVID-19)” and “I believe I can protect others from the Coronavirus (COVID-19).” One item related to disaster preparedness (redacted for blind review) was adapted to assess confidence in responding to the pandemic. Higher scores indicate greater perceived self-efficacy in responding to COVID-19. The average inter-item correlation was good at .5, and internal consistency was adequate (α = .73).

**Data-Analytic Plan**

 Two separate trajectory analyses were conducted, one for distress and one for PrTG. To model trajectories of distress (Galatzer-Levy et al., 2018),a one-factor latent variable model comprised of the three DASS-21 subscales and PCL-5 total scores was calculated to create the dependent variable in the trajectory analysis. Following guidelines from Hooper et al. (2008), Comparative Fit Index (CFI), Tucker Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Residual (SRMR) were used to assess model fit. Interpretation was primarily based on the CFI, as it is best suited for small samples (Hooper et al., 2008). For PrTG trajectories, the PTGI-SF total score was used as the dependent variable. Latent Growth Mixture Modeling (LGMM) assessed trajectories of the latent distress variable (i.e., *z*-scores of latent means) and the PrTG variable. Models with 1, 2, 3, and 4 classes were examined for each model. Akaike’s Information Criterion (AIC) and Bayesian Information Criterion (BIC) were used to select the model with optimal fit (lower numbers suggest better fit), as well as a visual inspection of trajectories. Race (coded as Asian or non-Asian), time (days since start of the study), gender, qualification for need-based financial aid, education level of parent or guardian, and COVID-19 symptoms were used as baseline predictors for trajectories presented.

Finally, two separate multilevel models (MLM) were conducted predicting distress and PrTG. Predictors for both models were within- and between-person scores of the following: meaning (MLQ), received instrumental and emotional support (2WSSS), pandemic self-efficacy, and discrimination. Between-person scores were each participant’s average across time; within-person scores were centered around each participant’s unique mean (Bolger & Laurenceau, 2013). Random intercept models were used to control for participant differences in each outcome (distress and PrTG). Within- and between-person fixed effects were added to the random intercept model in a second step.

 Missing data were examined across outcome type (negative and positive outcomes). For the DASS-21 and PCL-5, surveys missing less than 5% of their data points were replaced using imputation with the *mice* package. For the positive outcomes, surveys were replaced in the same manner. All analyses were computed using *R*/RStudio software.

 **Results**

**Power and Data Cleaning**

Approximately 81 participants over eight weeks (*n* observations = 648) were necessary for 80% power estimating a two-level MLM, an intraclass correlation of .55 based on previous research, small slope heterogeneity, and medium effect sizes. The final sample size was 42 international participants with at least two time points of data. The final dataset included 439 surveys with an average of 10.45 (*SD* = 4.28) surveys completed per respondent, comparable to retention rates in studies with related designs (e.g., Burke et al., 2017). In general, sensitivity analyses indicated the ability to detect small effects for all predictors (i.e., see the following Open Science Framework [OSF] link for coefficients: https://osf.io/kn42y/?view\_only=158ed2040a2c4a0fa55b53ea6ebb3990).

**Distress**

For the latent mean of distress, robust model statistics supported the creation of the one-factor model, CFI = .984, TLI = .951, RMSEA = .185 [90% CI .086, .303], SRMR = .013. Better-fitting models are indicated by higher TLI and CFI scores (closer to 1) and by lower RMSEA and SRMR scores (closer to 0). The CFI, TLI, and SRMR scores were within conventional parameters for acceptable fit (Hooper et al., 2008), while RMSEA was not. The standardized estimates of the loadings for each measured variable supported a strong relationship to the latent variable (.923 for stress, .899 for anxiety, .904 for depression, and .925 for traumatic stress, respectively). Higher scores indicate greater distress.

 For the LGMM with the distress latent variable, the three-class model was selected as optimal for analyses. The *Minimal Impact* class(66.67%) had low symptoms, while the *Emergent Resilience* class (11.90%) had decreasing symptoms. The *Increasing Distress* class (21.43%)had increasing symptoms. For all models, *N* = 42 participants, *n* observations = 427. Model fit statistics, a visual of trajectories for the three-class solution, and *R* packages used for analysis are reported at the aforementioned OSF link.

 For the MLM predicting distress, the random intercept model (i.e., weekly scores nested within participants) was compared to the fixed effects model in which within- and between-person meaning, social support received, pandemic self-efficacy, and discrimination were entered as predictors. The fixed effects model had improved fit over the intercept-only model, AICfixed-effects = 753.99, AICintercept-only = 783.17. Fixed effects accounted for 33.2% of the variance. International students reported lower distress the weeks they reported greater meaning and lower self-efficacy than usual. Greater levels of overall (between-person) emotional support were related to lower levels of distress. Participants who reported discrimination at any time during the study had greater distress.

**Peri-traumatic Growth**

For the PrTG LGMM, the three-class model was again selected as the best model. The sample size was *N* = 42, *n* observations = 428. The *Limited PrTG* class (26.19%) had a small decrease in PrTG, while the *Decreasing PrTG* class (40.48%)evidenced a steeper decline. The *Increasing PrTG* class (33.33%)reported more PrTG over time. Model fit statistics are provided at the previously mentioned OSF link, in addition to a visual of the PrTG trajectories from the three-class solution.

For the MLM predicting PrTG, the random intercept model (i.e., weekly scores nested within a participant) was compared to the fixed effects model with the same predictors as the distress MLM. The fixed effects model demonstrated improved fit over the intercept model, AICfixed-effects = 2954.06, AICintercept-only = 3011.87. Fixed effects accounted for 23.8% of the variance of PrTG scores. PrTG was greater the weeks international students reported greater meaning in life and self-efficacy than usual. Greater overall (between-person) self-efficacy and PrTG were associated with greater PrTG.

**Discussion**

The current study explored peri-pandemic trajectories of distress and PrTG in international students during the first waves of the COVID-19 pandemic, identifying weekly psychological and environmental predictors of distress and PrTG. For distress, three trajectories were identified: *Minimal Impact*, *Increasing Distress*, and *Emergent Resilience.* For PrTG, the three trajectories identified were *Decreasing PrTG*, *Increasing PrTG*, and *Limited PrTG*. Even for international students facing compounded stressors, resilience was the modal response. These findings support prototypical chronic stress trajectories of minimal impactresilience and emergent resilience (Bonanno & Diminich, 2013).

The weeks that individuals reported greater perceived meaning and self-efficacy, they reported lower distress and higher distress, respectively. Discrimination and emotional social support evidenced between-person effects, such that distress was greater overall for individuals who experienced discrimination at any time and less overall for those who experienced emotional social support. Results suggest that enhancing meaning and social support may mitigate the impact of such adversities on mental health outcomes. Within-person associations between meaning, self-efficacy, and PrTG were consistent with the post-disaster literature demonstrating the effect of meaning in life on decreased symptoms and increased growth (redacted for blind review), and with the foundational theories of *peri-*traumatic meaning making (redacted for blind review).

Although the sample diversity was a strength, limitations include the small sample size and the lack of causal inference. There was a lapse in time between weeks eight and nine, so time was measured by days since the start of the study and controlled for in LGMMs. Participant attrition was also high (i.e., many participants did not complete more than one wave), given that data collection occurred during the initial stages of the pandemic. While COVID-19 specifically is not considered a Criterion A trauma (Norrholm et al., 2021), international students were at increased risk of discrimination and other stressful events during COVID-19 (e.g., Sahu, 2020). Thus, an overall latent factor of distress was modeled.

Despite these limitations, our findings have implications for future research and disaster interventions with international students. Even for individuals with significant distress at the onset of a pandemic, symptom reduction is possible. Interventions focusing on enhancing social support and meaning in life may be viable avenues for international students. Community-Based Psychological First Aid (CBPFA; Jacobs, 2016) is one such intervention focusing on provision of emotional support and/or referrals for emotional support interventions that has been implemented in post-disaster contexts. Future research should focus on interventions involving social support, meaning, and COVID-19 self-efficacy. Particularly in light of the limitations of the current study, such future research should involve larger, diverse samples to enhance generalizability.

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