UNIVERSITY OF CALIFORNIA

Santa Barbara

Mental Health Outcomes of Young Adults Amid COVID-19: Examining Pre-Pandemic and Current Factors

A dissertation submitted in partial satisfaction of the

requirements for the degree of Doctor of Philosophy

in Counseling, Clinical, and School Psychology

by

Melissa Anne Janson

Committee in charge:

Professor Erika Felix, Chair

Professor Miya Barnett

Professor Jill Sharkey

September 2023

The dissertation of Melissa Janson is approved.

_____

Miya Barnett

_____

Jill Sharkey

_____

Erika Felix, Committee Chair

May 2023

ACKNOWLEDMENTS

I would like to express my deepest appreciation to all those who provided me with unwavering mentorship, support, and belief in my scholarly abilities throughout my time spent completing my dissertation project.

First, I extend my utmost thanks to my advisor and dissertation committee chair, Erika Felix, Ph.D. I have received continual mentorship and support from Erika over the past six years, and I have learned so much from her knowledge and expertise of disaster mental health. She has helped me become a better writer and researcher, and has always held me to high standards, encouraging me to grow and improve. I am also very grateful to Erika who supported me through the process of obtaining extra funding to support my dissertation project. We submitted grant applications during the very early months of the COVID-19 pandemic. I appreciated Erika's willingness to pursue this important research during a particularly trying time in our world. Next, I would like to thank my dissertation committee members, Jill Sharkey, Ph.D., and Miya Barnett, Ph.D. Both Jill and Miya have continually helped me to expand my thinking and have contributed to my development of thoughtful and meaningful conclusions. I am so grateful to have been able to learn from Jill and Miya throughout this experience. It is also very important that I acknowledge and thank the many funding sources that supported this study. Without monetary support from the University of California, Santa Barbara (UCSB) Academic Senate and the UCSB Institute for Social, Behavioral, and Economic Research, this work would not have been possible.

In addition, I wish to express my sincere gratitude to the many collaborators who supported this multi-site, multi-disaster research study across the United States and Puerto Rico over many years; these collaborators include Krzysztof Kaniasty, Ph.D., Eduardo A. Lugo-Hernández, Ph.D., Glorisa Canino, Ph.D., Yarimar Rosa-Rodríguez, Ph.D., and Sonia Rubens, Ph.D, who have strengthened the study and allowed the opportunity to collect data at their affiliated universities. Thanks to Eduardo, Glorisa, Yarimar, and Krzysztof, I have developed a greater understanding of the historical, social, and political contextual influences that may affect mental health, particularly, in Puerto Rico.

I must also acknowledge my research lab mates at UCSB who have supported this research project. Both undergraduate and graduate students provided critical feedback throughout the study and assisted with translation of the survey materials from English to Spanish, creation of Qualtrics questionnaires, and cleaning and scoring multiple databases.

Importantly, I also would like to acknowledge and thank the many young adults who participated in this study and have been affected by natural disasters and the COVID-19 pandemic. These young adults have dedicated their time over the past few years – and have willingly shared about their lives during very tumultuous and stressful time periods. It is important to listen and strive to understand the experiences and needs of our youth and young adults. Thank you for giving me the opportunity to do so through this work. I hope this research may be used to help young adults affected by collective trauma, and I vow to continually improve as a scholar, clinician, and researcher, so that I can keep learning how to best support this population through adjustment and recovery processes.

Finally, I wish to acknowledge and extend my gratitude to my family and loved ones– I could not have completed this work without your unconditional love, support, and patience. You have encouraged me every step of the way and have never doubted my strength, intelligence, and perseverance. My heart is filled with gratitude.

CURRICULUM VITAE OF
MELISSA JANSON
June 2023

Education:

2023 **Ph.D. in Clinical Psychology**
University of California, Santa Barbara, Santa Barbara, CA

2022-2023 **Doctoral Psychology Intern**
Children's Hospital Los Angeles, USC Center for Excellence in Developmental Disabilities, Los Angeles, CA
Specialized Year-Long Placement: Department of Adolescent and Young Adult Medicine

2019 **M.A. in Counseling Psychology**
University of California, Santa Barbara, Santa Barbara, CA

2013 **B.A. in Psychology**
University of California, Berkeley, Berkeley, CA

Awards, Fellowships, and Nominations:

2021 **UCSB Department of Counseling, Clinical, and School Psychology Dissertation Fellowship,** $14,000
Awarded for distinguished dissertation work and academic promise.

2021 **Nominated for University of California President's Dissertation Year Fellowship**
One outstanding student nominated by each department for competitive university-wide fellowship aimed at supporting doctoral students' dissertations who contribute to the university's diversity mission.

2020-2021 **UCSB Gevirtz Graduate School of Education Gale and Richard Morrison Fellowship,** $1,400
Awarded to one predoctoral candidate for recognition of academic excellence.

2020-2021 **UCSB Gevirtz Graduate School of Education Alumni Fellowship,** $350
Awarded to one highly qualified and promising graduate student to honor their academic endeavors.

2020-2021 **UCSB Graduate Student Internship Fellowship,** $500
Awarded to provide monetary support to accomplished students obtaining additional internship experiences beyond academic program requirements.

2019 **UCSB Hosford Hero Award**
Awarded to graduate student clinicians for their dedication to clinical work and professionalism.

Grants:

2021-2023 **National Institute on Alcohol Abuse and Alcoholism,** R25AA028464 (PI, Flanagan), Preparing Trainees from Diverse Backgrounds for Alcohol Research Careers
Role: Scholar

2020-2021 **UCSB Rapid COVID-19 Collaborative Research Initiative Grant at the Institute of Social, Behavioral, and Economic Research,** Health Behaviors & Psychosocial Outcomes among Gen Z Youth Amidst the COVID-19 Pandemic, $8,000
Role: Co-Principal Investigator

2020 **UCSB Multidisciplinary Research on the Coronavirus and its Impact Grant, Graduate Student Division,** COVID-19's Impact on Grocery Store Workers' Distress, Perceptions of Parenting, and Child Mental Health Symptoms, $2,500
Role: Co-Principal Investigator

Research and Evaluation Experience:

2020-2023 **Dissertation Project: Mental Health Outcomes Amid COVID-19: Examining Pre-Pandemic and Current Factors**
Role: Principal Investigator and Graduate Student Researcher
Project focuses on examining pre-pandemic risk and current protective factors that may influence current pandemic functioning in disaster exposed emerging young adults in the U.S. and Puerto Rico. Linear regression used to examine predictors. Mental health trends also examined across four time points using hierarchical linear modeling. Committee: Erika Felix, Ph.D. (Chair), Miya Barnett Ph.D., Jill Sharkey, Ph.D.

2019 **Family Services Agency (FSA) and Council on Alcoholism and Drug Abuse (CADA) Evaluation**
Role: Graduate Student Researcher and Evaluator
Compiled information, analyzed data, and wrote summaries for evaluation of FSA and CADA school/evidenced-based mental health counseling within Santa Barbara Unified School District for students grades 7-12. The project involved the evaluation of services designed to promote well-being and reduce/prevent mental health symptomatology and/or substance use.

2017- 2018 **First 5 Santa Barbara County (SBC) Program Evaluation**
Role: Graduate Student Researcher and Evaluator
Conducted analyses and evaluated First 5 SBC Programs. Involved evaluation of countywide family strengthening, early care and education, and systems change efforts designed to promote well-being and optimal development of children 0-5 years old.

2017-2023 **Families and Stress Lab**

Role: Graduate Student Researcher
Conducted research in collaboration with Erika Felix, Ph.D. (advisor) focusing on understanding the individual, relational, and contextual factors that promote positive youth development or recovery following natural disaster, terrorism, or other collectively experienced traumas such as COVID-19. Coordinated "College Life After Natural Disaster and During COVID-19" study: wrote IRB materials, compiled psychological measures, created questionnaire in Qualtrics, coded responses, cleaned and merged databases, and computed sum and total scores. This is a multi-site longitudinal study looking at effects of Hurricanes Harvey, Irma, and Maria in Texas, Florida, and Puerto Rico and wildfires/mudslides in California, and COVID-19, on college youths' psychosocial, occupational, educational, and health outcomes.

2015-2017 **UCLA, Norman Cousins Center for Psychoneuroimmunology**
Role: Research Associate II
Co-coordinated a longitudinal study examining biological and psychological risk factors of the development of depression and fatigue in 302 early-stage breast cancer patients, and scheduled assessments for baseline, post-treatment, 6-month, 12-month and 18-month follow-ups. Managed data collection: reviewed questionnaire response for completeness in Qualtrics, administered the Structured Clinical Interview for DSM-IV, Research Version (SCID DSM-IVR) and Stress and Adversity Inventory (STRAIN) interview with study participants, instructed and gathered saliva collection for analysis, oversaw phlebotomy draws and transported blood specimens, cleaned and organized data, and compiled scoring guide for study scales.

2013-2015 **RAND Corporation, Survey Research Group**
Role: Research Assistant
Conducted 60 min long interviews for longitudinal Deployment Life Study examining the well-being and resilience of military families (military member, spouse, child).

Publications:

1. Sadeh, Y., Denejkina, A., Graham, L., Curtis, M., **Janson, M.**, Schwartz, A. N., & Undset, A. B. *(Submitted)*. Examining PTS and Depression Symptom Profiles in Parents of Trauma-Exposed Children: A Transdiagnostic perspective using Pooled Individual Participant Data.

2. **Janson, M.**, Felix, E., Kaniasty, K., Lugo-Hernández, E., Rosa-Rodríguez, Y., & Canino, G. (2023). Life stressors and posttraumatic stress symptoms mediate the relationship between disaster exposure and identity distress in emerging adults. *Journal of American College Health*, 1-10. Advance online publication. https://doi.org/10.1080/07448481.2022.2155826

3. **Janson, M.**, Felix, E., Kaniasty, K., Lugo-Hernandez, E., Rosa-Rodríguez, Y., & Canino, G. (2023). Life stressors and posttraumatic stress symptoms mediate the relationship

between disaster exposure and identity distress in emerging adults. *Journal of American College Health*, 1-10. Advance online publication. https://doi.org/10.1080/07448481.2022.2155826

4. **Janson, M.**, Sharkey, J. D., & del Cid, D. A. (2021). Predictors of mental health outcomes in grocery store workers amid the COVID-19 pandemic and implications for workplace safety and moral injury. *International Journal of Environmental Research and Public Health, 18*(16), 8675. https://doi.org/10.3390/ijerph18168675

5. Felix, E., **Janson, M.**, & Fly, J. (2021). Threat perception and resource loss as potential mediators of media exposure to acute mass violence and distress among adolescents. *American Journal of Orthopsychiatry.* Advance online publication. https://doi.org/10.1037/ort0000580

6. Felix, E., **Janson, M.**, & Fly, J. (2020). Factors affecting mental health service use among university students following a mass murder. *Psychological Trauma: Theory, Research, Practice, and Policy*, *13*(3), 263–270. https://doi.org/10.1037/tra0000571

Technical and Brief Reports:

1. **Janson, M.** (2021). *Results from the International Student Survey at UCSB- Spring 2021*. Report submitted to the UCSB Committee on International Education.

2. **Janson, M.**, Sharkey, J., Ebrahaim, S., Lopez, J., & del Cid, D. (2021). *Frontline Grocery Store Workers: Mental Health during COVID-19. Results from the UCSB/United Food and Commercial Worker (UFCW) Union Local 770 Survey*. Report submitted to UFCW Union Local 770.

3. Davis, J., Felix, E., Brown, A., Contracter, A., Kudler, H., **Janson, M.**, Pacquet, C., & Stevens S. (2021). *Membership Engagement Task Force Final Report*. Report Submitted to International Society of Traumatic Stress Studies (ISTSS).

4. Felix, E. D., Terzieva, A., & **Janson, M.** (2019). *Family Service Agency (FSA)/Council on Alcohol and Drug Abuse (CADA) Mental Health Services, Grades 7-12 Evaluation Report 2018-2019.* Report submitted to FSA/CADA.

5. Felix, E. D., Terzieva, A., & **Janson, M.** (2018). *First 5 Santa Barbara County (SBC) Evaluation Report 2016-2017.* Report submitted to First 5 SBC.

Posters and Presentations:

1. **Janson, M.**, Felix, E., Barnett, M., & Sharkey, J. (November 2022). A Longitudinal Exploration of Risk and Protective Factors Influencing Pandemic PTSS Among Disaster-Exposed Young Adults. Flash talk presented at the International Society of Traumatic Stress Studies (ISTSS) in Atlanta, GA.

2. **Janson, M.**, del Cid, D. A., & Sharkey, J. D. (November 2021). Grocery store worker caregivers' mental health symptoms mediate the association between workplace threat

perception and child emotion dysregulation during the COVID-19 pandemic. Poster presented at the ISTSS virtual conference.

3. **Janson, M.**, Felix, E., Fly, J., Powers, J. (November 2020). Social cognitive mediators of the relationship of media exposure to acute mass violence (AMV) and distress among adolescents. Poster presented at the ISTSS virtual conference.

4. **Janson, M.**, Felix, E., Kaniasty, K., Rubens, S., La Greca, A., Canino, G., Rosa-Rodríguez, Y., & Lugo-Hernandez, E. (November 2019). Post-traumatic stress symptoms mediate the relationship between disaster exposure and identity distress in emerging adult university students. Poster presented at the ISTSS conference in Boston, MA.

5. Jaramillo, N., **Janson, M.**, Felix, E. D., Canino, G., Rosa-Rodríguez, Y., & Lugo-Hernandez, E. (October 2019). The role of post-traumatic stress symptoms in mediating the relationship between hurricane disaster exposure and identity distress in Puerto Rican college students. Poster presented at the annual meeting of the National Latinx Psychological Association in Miami, Florida.

6. **Janson, M.**, Felix, E., Jamarillo, N., & Meskunas, H. (November 2018). Bullying victimization moderates the relationship between media exposure to acute mass violence and distress. Poster presented at the ISTSS conference in Washington, D.C.

7. **Janson, M.**, Felix, E., Jamarillo, N., & Meskunas, H. (November 2018). Bullying victimization moderates the relationship between media exposure to acute mass violence and distress. Poster presented at the ISTSS conference in Washington, D.C.

8. **Janson, M.**, Khulman, K. & Bower, J. (March 2017). Mindfulness mediates association between age and depressive symptoms in early-stage breast cancer patients. Poster presented at the Society of Behavioral Medicine conference in San Diego, CA.

Clinical Experience:

2022-2023 **Children's Hospital Los Angeles, (CHLA), USC Center for Excellence in Developmental Disabilities (UCEDD), Division of Adolescent and Young Adult Medicine,** Los Angeles, CA
Role: Doctoral Psychology Intern

Provide weekly psychotherapy utilizing evidence-based practices (e.g., CBT, Seeking Safety, Coping Cat, MI, MATCH) to diverse children, adolescents, and young adults (ages 6-20), and their families, with complex mental health needs and/or comorbid health conditions. Conduct comprehensive developmental, psychological, and educational assessments within a pediatric population. Conduct consultations and collaborate on treatment plans with physicians, psychiatry fellows/psychiatrists, case managers, educators, occupational therapists, and other health care providers to support clients. Participate as a mid-term trainee in Leadership Education in Adolescent Health (LEAH) Program on a weekly basis, which provides interdisciplinary

training in adolescent health. Provide weekly Coping Cat therapy to youth with severe anxiety as part of a PCORI study. Co- facilitate group therapy utilizing Seeking Safety to support teen and young adult males with developmental disabilities. Receive weekly individual supervision (3.5 hrs.) and group supervision (2 hrs.) in integrative and CBT approaches. Supervisors: Jacqueline Donahue, Psy.D., Sari Glassgold, Ph.D., Oscar Donoso, Ph.D. Program Director: Amy West, Ph.D.

2021-2022 **Santa Barbara County Department of Behavioral Wellness**, Santa Barbara, CA
Role: Practicum Trainee
Provided weekly psychotherapy to children, adolescents, and adults ages 8-19, and their families, using CBT and MI in a community mental health clinic serving a diverse cultural population with severe and chronic mental health problems and impairments. Worked in a multidisciplinary treatment team to provide services. Received weekly individual (1 hr.) and group supervision (2 hrs.) in integrative and CBT approaches. Supervisor: Rosanna Jimeno, Psy.D.

2021-2022 **Mind and Behavior Assessment Clinic (MBAC),** UCSB, Santa Barbara, CA Role: Practicum Trainee
Administer psychological, neuropsychological, and personality assessment batteries to children and adults within an outpatient mental health clinic serving diverse patients. Score, interpret, and aggregate testing results into comprehensive integrated psychological and neuropsychological reports. Conduct semi-structured clinical interviews assessing symptomatology. Write assessment reports and provide oral feedback sessions to clients/families. Discuss cultural considerations and how to conduct assessments in a therapeutic manner. Supervisor: Miriam Thompson, Ph.D.

2020-2022 **Insight Neuropsychology,** Camarillo, CA
Role: Assessment Clinician
Administered psychological, neuropsychological, and personality assessment batteries to children and adolescents (ages 11-18 years old) to diagnose psychiatric and developmental disorders within a private practice setting. Conducted clinical interviews with clients, teachers, and parents, and review educational/past testing records. Scored, interpreted, and aggregated testing results into comprehensive integrated psychological and neuropsychological reports. Write assessment reports and provide oral feedback sessions to clients/families. Supervisor: Skye Stifel, Ph.D.

2019-2020 **Child Abuse Listening Mediation (CALM),** Santa Barbara, CA
Role: Practicum Trainee
Provided weekly psychotherapy to children and adolescents ages 6-15 consisting of TF-CBT to address psychological issues like depression, anxiety, panic disorder, adjustment disorder, and PTSD, due to effects of trauma (e.g., sexual abuse, domestic violence, neglect, parental drug

addiction, parental emotional abuse). Also utilized PCIT and psychodynamic therapy as relevant. Conducted collateral and family therapy sessions. Co-led a somatic processing therapy group for adult sexual abuse survivors. Co-led two psychotherapy groups utilizing a TF-CBT model for children ages 5-7 exposed to domestic violence. Participated in a DBT consultation group. Received weekly individual (1 hr.) and group supervision (2 hrs.) within an integrative approach. Supervisor: Rachel Hopsicker, Ph.D.

2018-2019 **Child Abuse and Listening Mediation (CALM),** Santa Barbara, CA
Role: Assessment Specialist
Scored established child and adult assessments for clinic clients relating to parenting behaviors and attitudes, internalizing/externalizing behaviors, psychopathology, domestic violence, sexual abuse, depression, protective factors, and post-traumatic stress symptoms. Acquired knowledge of norms and clinical cutoffs for assessments and provided interpretations and summaries of scores to clinicians. Compiled and wrote a scoring and interpretation guide for clinic utilized measures. Supervisor: Rachel Hopsicker, Ph.D.

2018-2019 **Hosford Counseling and Psychological Services Clinic,** UCSB, Santa Barbara, CA
Role: Graduate Student Clinician
Provided weekly psychotherapy to adults ages 18 to 36 consisting of psychodynamic therapy and ACT to address a range of psychological issues. Administered and scored clients' self-report measures assessing distress levels, overall satisfaction with life, quality of therapeutic alliance, and satisfaction with session. Conducted intake interviews and presented impressions/preliminary diagnoses to clinic treatment team. Received advanced training in case conceptualization, empirically based therapies, cultural/ethnic diversity considerations, and diverse theoretical orientations. Received weekly individual (1 hr.) and group supervision (2 hrs.) within an integrative approach. Supervisors: Steve Smith, Ph.D.; Heidi Zetzer, Ph.D.

2015-2017 **UCLA Norman Cousins Center for Psychoneuroimmunology,** Los Angeles, CA
Role: Research Associate II
Conducted semi-structured interviews with breast cancer patients assessing psychopathology and past trauma/life stressors using the Structured Clinical Interviews for DSM-IV, Research Version (SCID DSM-IVR) and the Stress and Adversity Inventory Interview (STRAIN). Compiled written impressions and summaries of clinical interviews and presented diagnoses at weekly SCID consensus meetings. Assessed for risk and distress and referred to outside mental health services if necessary. Supervisors*:* Michael Irwin. M.D.; Julienne Bower, Ph.D.

Teaching Experience:

2022 **CNCSP 102: Research in Applied Psychology,** UCSB, Santa Barbara, CA
Role: Teaching Assistant at 25%
Taught, lectured, and implemented interactive activities during two weekly sections of 20 students each (40 total), graded course assignments/essays, held office hours, provided academic support, and assigned grades.

2020-2021 **WRIT 2: Writing 2,** UCSB, Santa Barbara, CA
Role: Teaching Instructor at 50%
Independently designed and taught a writing course and received two-week training on writing studies teaching methods and curriculum. Taught three 10-week courses of 25 students each (75 total). Met weekly with students, facilitated class exercises and activities, including peer review workshops and asynchronous assignments, provided in-depth feedback and review of writing and academic support, and assigned final grades.

2020 **CNCSP 102: Research in Applied Psychology,** UCSB, Santa Barbara, CA
Role: Instructor of Record at 100%
Independently created course content and design for 120 students, taught lectures and provided academic support, constructed research design assignment and weekly quizzes, held office hours, provided support to students, and assigned final grades.

2020 **CNCSP 114: Psychology of Gender,** UCSB, Santa Barbara, CA
Role: Teaching Assistant at 50%
Taught, lectured, and implemented interactive activities during four weekly sections of 20 students each (80 total), graded course assignments/essays, held office hours, provided academic support, and assigned grades.

2020 **CNCSP 112: Positive Psychology Across the Lifespan,** UCSB, Santa Barbara, CA
Role: Teaching Assistant at 25%
Taught, lectured, and implemented interactive activities during two weekly sections of 20 students each (40 total), graded course assignments/essays, held office hours, provided academic support, and assigned grades.

2019 **CNCSP 101: Intro to Helping Skills,** UCSB, Santa Barbara, CA
Role: Teaching Assistant at 25%
Taught, lectured, and implemented interactive activities during one bi-weekly section of 20 students, graded course assignments/essays, held office hours, provided academic support, and assigned grades.

2019 **CNCSP 102: Research in Applied Psychology,** UCSB, Santa Barbara, CA
Role: Teaching Assistant at 25%
Taught, lectured, and implemented interactive activities during two weekly sections of 20 students each (40 total), graded course assignments/essays, held office hours, provided academic support, and assigned grades.

2018 **CNCSP 101: Intro to Helping Skills,** UCSB, Santa Barbara, CA
Role: Teaching Assistant at 25%
Taught, lectured, and implemented interactive activities during one bi-weekly section of 20 students, graded course assignments/essays, held office hours, provided academic support, and assigned grades.

Invited Guest Lectures:

2022 Mental Health Outcomes of Young Adults Amid COVID-19: Examining Pre-Pandemic and Current Risk and Protective Factors, CNCSP 197: Disaster Mental Health Research and Services

2021 Young Adults in Puerto Rico Amid Disaster and COVID-19, Virtual event led by Eduardo Lugo, Ph.D. from University of Puerto Rico, Mayagüez

2021 Post-traumatic Stress Symptoms Mediate the Relationship Between Disaster Exposure and Identity Distress, CNCSP 197: Disaster Mental Health Research and Services

2019 My Path to the PhD, CNCSP 102 Research Methods

Trainings and Certifications:

2022 Seeking Safety, Treatment Innovations, Newton Centre, MA

2022 Incredible Years, Children's Hospital Los Angeles, Los Angeles, CA

2022 Coping Cat, Children's Hospital Los Angeles, Los Angeles, CA

2021 Community of Practice Group for Graduate Students: Course Design for Equity, UCSB, Santa Barbara, CA

2020 Completion of the Summer Teaching Institute for Associates Program, UCSB, Santa Barbara, CA

2020 Writing Program Intensive Instructor Training, UCSB, Santa Barbara, CA

2019 Suicide Assessment and Intervention, Fielding Graduate Institute, Santa Barbara, CA

2018 Psychological First Aid, Santa Barbara Response Network, Santa Barbara, CA

2016 Interpersonal Practice Program, UCLA Mindful Awareness Research Center, Los Angeles, CA

2015 200-Hour Yoga Teacher Training Certification, YogaWorks Westlake, CA

Leadership and Service Work:

2021- 2023 **International Society of Traumatic Stress Studies Trauma, Health, and Primary Care Special Interest Group**
Role: Student Co-Chair
Met monthly to support SIG efforts and assembled monthly newsletter. Conducted interviews with researchers and wrote summary for spotlight article. Compiled and new grants and publications.

2021-2022 **Counseling, Clinical, and School Psychology Department,** UCSB, Santa Barbara, CA
Role: Student Assistant to the Chair and Graduate Student Representative

Provided administrative assistance to chair and attended faculty/departmental meetings as student representative. Took minutes and send out meeting summaries to graduate students. Collected feedback/concerns from graduate students and facilitated conversations with faculty. Utilized REDCap to implement/create a data-collection system with multiple surveys to assist department in tracking students' milestones for American Psychological Association-accreditation reporting purposes.

2021- 2022 **Graduate Scholars Program,** UCSB, Santa Barbara, CA
Role: Mentor
Served as a formal mentor to three first-year doctoral students from diverse backgrounds and facilitate monthly meetings. Provided information and guidance relating to orientation to campus resources, professional opportunities, and networking events.

2020-2022 **Counseling, Clinical, and School Psychology Department Diversity and Inclusion Taskforce,** UCSB, Santa Barbara, CA
Role: Student Taskforce Member
Met monthly and supported departmental efforts to recruit and retain students and faculty of color; uphold departmental commitments to racial justice; relayed resources to faculty and students about decolonizing curriculum and clinical training.

2019-2021 **International Society of Traumatic Stress Studies Member Engagement Taskforce**
Role: Student Taskforce Member
Met monthly to increase member engagement/volunteer opportunities. Devised survey, collected data on member attitudes/involvement, implemented virtual mentorship/consultation/ workshops, assessed event satisfaction, helped write report.

2017-2019 **Counseling, Clinical, and School Psychology Department Associated Students Committee,** UCSB, Santa Barbara, CA
Role: Student Member
Assessed graduate student needs via survey/data collection and devised strategies to improve program in areas of diversity, clinical training, faculty support, educational opportunities, and self-care; assisted in disseminating findings to faculty. Implemented and co-led events (e.g., roundtable discussion on barriers to self-care and work-life balance, self-care event with art and snacks).

2014-2017 **UCLA Mindful Awareness Research Center,** Los Angeles, CA
Role: Volunteer
Set up/closed mindfulness classes, checked-in students, answered questions about class logistics.

ABSTRACT

Mental Health Outcomes of Young Adults Amid COVID-19: Examining Pre-Pandemic and Current Factors

by

Melissa Janson

Exposure to disasters and the life stress that can result in the aftermath has been associated with subsequent mental health (MH) problems in up to about 30% of affected individuals (Bonanno et al. 2010). Young adults, ages 18-30 may be more vulnerable to the impact of disaster than older adults (Acierno et al., 2006; Bonanno et al., 2007). Increased levels of MH symptom severity have been observed among young adults over the past two decades (Twenge et al., 2019; Twenge et al., 2020), as well during the COVID-19 pandemic (National Center for Health Statistics, 2021). Additional research investigating risk and resilience factors associated with long-term patterns of MH is needed (Chen & Bonanno, 2020), particularly among disaster-exposed young adults during the COVID-19 pandemic.

Originally intended to understand young adult psychosocial adjustment after exposure to natural disasters in 2017 and 2018, the current longitudinal study also examined impacts of the COVID-19 pandemic on MH across four waves (two pre-pandemic and two during-pandemic). This presented a unique opportunity to evaluate the associations among prospective data collected prior to the pandemic, and pandemic functioning among disaster-exposed young adults in the mainland U.S. and Puerto Rico. The current study had the following aims: 1) identify pre-pandemic, and pandemic risk and protective factors predicting pandemic-MH; 2) examine the shape of MH symptom trajectories over time, from pre to during-pandemic; and 3) examine whether pre-pandemic factors were associated with

differences in MH trajectory starting points, or with increases or decreases in MH growth rates over time.

Data were collected at universities in California, Florida, Texas, and Puerto Rico through online Qualtrics questionnaires in English and Spanish. The Wave (W) 1 surveys were distributed in the mainland U.S. in 2018, about three to six months after several natural disasters; the Spanish survey was distributed in Puerto Rico also in 2018, a little over one year after several hurricanes occurred. W1 participants indicated whether they agreed to be contacted for subsequent follow-up surveys as part of a longitudinal study. A subset of participants *(n* = 466) agreed and were contacted via personal email to participate in Ws 2-4. W2 data collection occurred in October through December 2019, W3 data collection occurred in summer of 2020 during the COVID-19 pandemic, and W4 data collection took place between late February and early April 2021. Compensation differed slightly across waves; at W1, participants chose to either receive research credit or to enter a raffle to win one of many e-gift cards ($25.00), while at Ws 2-4, each participant received an e-gift card.

Pre-pandemic factors were measured at W1 and included prior trauma history, disaster exposure (e.g., specific to hurricanes, wildfires, mudslide), life stressors since disaster, and MH. Pandemic risk factors were measured at W3 and included COVID-19 fear, COVID-19-related experiences, and life stressors during the pandemic. Also measured at W3, pandemic protective factors included perceived social support, self-compassion, and coping self-efficacy. MH outcomes were measured across Ws 1-4 and included anxiety, depression, and post-traumatic stress symptoms (PTSS).

To evaluate aim one, a subsample of 120 young adults who experienced a natural disaster during college and who had complete Ws 1 and 3 data were selected. Participants

were mostly female (88%), and half identified as Latinx and from Puerto Rico. The majority (69.2%) had reported been exposed to a hurricane, and the remainder experienced wildfires. At W1, participants were on average 20.3 years of age.

Three separate multiple linear regression analyses for each W3 pandemic-MH outcome (anxiety, depression, and PTSS) were conducted using Mplus Version 8. In summary, W1 MH or prior MH functioning was the only pre-pandemic factor significantly associated with pandemic MH. Pandemic risk factors (W3 COVID-19 fear, W3 COVID-19 experiences, and W3 life stressors) were significantly associated with anxiety and PTSS during the pandemic, but not depressive symptoms. W3 coping self-efficacy was associated with decreased risk for depression and PTSS during the pandemic. Lastly, W3 self-compassion and W3 social support were not significantly associated with any pandemic MH outcomes, and no pandemic protective factors were associated with anxiety during the pandemic.

To evaluate aims two and three, a subsample of 205 young adults who completed W1 and one or more of the subsequent three waves of data collection were selected. Participants were again mostly female and about half identified as Latinx and from Puerto Rico. Three separate MH trajectories (anxiety, depression, and PTSS) were plotted using hierarchical linear modeling analyses (HLM) and HLM8 statistical software. Associations among pre-pandemic factors and young adults' MH starting points and trajectories were examined. MH symptom trajectories of young adults with higher levels of prior trauma history, disaster exposure, and life stressors since disaster were hypothesized to be more severe at W1 and decelerate more slowly across subsequent waves than those without.

The anxiety trajectory did not differ among individuals and changes in anxiety symptom levels across Ws 1-4 were non-significant. The only significant pre-pandemic factors associated with W1 anxiety (trajectory starting point) were past trauma history (p = .042) and W1 life stressors since the disaster (p = .027). Similarly, the depression trajectory did not differ among individuals and changes in depression symptom levels across Ws 1-4 were non-significant. The only significant pre-pandemic factors associated with W1 depression (trajectory starting point) were also past life trauma (p = .01), and W1 life stressors since the disaster (p = .005).

Significant differences among PTSS were found across Ws 1-4. The PTSS trajectory followed an *S*-shaped cubic trend. From Ws 1-2 (post-disaster to pre-pandemic), the PTSS trajectory was observed to be linear and slightly decreasing, from Ws 2-3 (pre-pandemic to during-pandemic), the trajectory significantly increased and from Ws 3-4 (during-pandemic to one-year-during-pandemic) it gradually declined. The PTSS trajectory model statistics with all time-level predictors included were significant and showed improvements in fit. Significant pre-pandemic factors associated with W1 PTSS (trajectory starting point) were prior trauma history (p = .042), W1 life stressors since the disaster (p = .003), and region (p = .03). Young adults from Puerto Rico and those with higher levels of prior trauma history or W1 life stressors since the disaster on average endorsed higher levels of PTSS post-disaster and at the start of the PTSS trajectory (W1), than those who did not. No other person-level factors significantly predicted changes among PTSS over time.

In summary, a close examination of both environmental and individual risk and protective factors can help to predict subsequent MH outcomes after collectively experienced disasters. The current study results suggest that prior-MH functioning, COVID-19 fear,

pandemic life stressors, COVID-19 related experiences, and coping self-efficacy may predict pandemic-MH outcomes among disaster-exposed young adults. Additionally, young adults who have experienced greater levels of prior trauma history or W1 life stressors following a disaster are more likely to experience higher levels of initial MH outcomes after a collectively experienced trauma, like the pandemic, as well as young adults from Puerto Rico, in comparison to young adults from the mainland U.S. Increases in PTSS may also occur after the experience of another collective trauma. These findings can help to identify young adults that may benefit from MH support. Increased support and protections can be provided accordingly to those at greater risk of developing more severe MH symptoms, particularly at the university level.

Keywords: Young adults, trauma, natural disasters, COVID-19 pandemic, mental health, post-traumatic stress symptoms, emerging adulthood

TABLE OF CONTENTS

I. Introduction

The COVID-19 pandemic has induced several psychosocial stressors such as health threats to oneself or loved ones, severe disruptions of routines, separation from family and friends, shortages of food, social isolation, school closures, and financial hardships, which can add to distress and exact a general toll on the quality of everyday health and well-being. Such stressors resulting from the COVID-19 pandemic and other natural disasters can have long-term effects on physical and mental health (MH) of those affected (Bonanno et al. 2010). Young adults experienced higher rates of anxiety, depression, post-traumatic stress (PTSS), and general stress during the COVID-19 pandemic compared to older age groups (American Psychological Association [APA], 2020; Glowacz & Schmits, 2020; Holingue et al., 2020; Xiong et al., 2020).

The current generation of young adults may be vulnerable to MH symptoms during the current pandemic (APA, 2020; Charles et al., 2021), even though they are at lower risk of adverse physical health impacts due to the COVID-19 virus (Mueller et al., 2020). Prior to the pandemic, young adults reported more stress about issues in the news than older adults, were more likely to report MH problems, and reported that work, money, and health concerns were a significant and common stress in their lives (APA, 2019). Last year, Gen Z adults in particular indicated significantly overall higher stress levels than older age groups (APA, 2020).

Situated in a developmental timeframe called emerging adulthood (ages 18 to 29 years old), young adults may experience instability and change as they explore and further develop aspects of their identity, values, and life possibilities ahead. During emerging adulthood, the aftermath of natural disasters, such as wildfires, hurricanes, and the COVID-

19 pandemic, can pose many challenges with the potential for long term effects, such as the ability to complete or finance education, find a job in the local community, and maintain familial and social relationships and physical and mental wellness. Due to this developmental stage, young adults may have potentially unique disaster recovery needs compared to adult or child survivors, which may include distress or worry about various aspects of their life relating to their identity and future. Young adults need to be studied independently post-disaster and during the COVID-19 pandemic to better understand their experiences and needs.

Additionally, information is needed to understand how the pandemic affects young adults' psychosocial adjustment over time. Thus far, much of the available research pertaining to COVID-19 is mainly cross-sectional, which limits understanding and the ability to draw casual inferences. Investigating long-term patterns of MH while integrating multiple risk and resilience factors is important to enhance the prediction of MH outcomes (Chen & Bonanno, 2020). To understand MH and psychosocial functioning during the pandemic, it is critical to know how people were functioning *prior* to the pandemic. Drawing from disaster research, prior functioning is known to be the best single predictor of post-disaster adaptation (Bonanno et al., 2010), and is important in discerning differences in post-disaster recovery trajectories (Bonanno et al. 2010); however, it is rare to have pre-disaster data to assess this. Specific understudied protective factors that may contribute to adaptive coping and reduced MH outcomes during the COVID-19 pandemic also need to be examined.

A. A Contemporary Conceptual Disaster Mental Health Model for Young Adults

Given the complexity and continual changes within our current world, and the experience of compounded, collectively experienced traumas brought on by the COVID-19

pandemic, it is important that existing disaster MH conceptual models are adapted to fit experiences of present day. Multiple factors may influence the MH of young adults during a potentially vulnerable developmental period that may be associated with instability and change. The current study research hypotheses are informed by the integration of a transactional-ecological theory, empirical evidence from an existing disaster MH model, and COVID-19 specific contextual factors. Figure 1 displays an image of the main aspects of a contemporary conceptual disaster MH model for young adults.

1. Transactional-Ecological Model as a Foundation

First, this work draws upon Bronfenbrenner's (1977) ecological systems theory, which emphasizes the influence of five different environmental layers on human development across the lifespan. The microsystem is the most immediate and influential environmental layer in which a person is situated and consists of activities, social roles, and interpersonal experiences that one may experience within home, school, or workplace. Within the microsystem, an individual often experiences interactions that are aligned with their most prominent role (e.g., daughter, student). Next, the mesosystem consists of the interactions between the various microsystem settings. The exosystem extends past the mesosystem and includes broader societal structures or organizations (e.g., neighborhoods, mass media, government agencies) that may influence interactions within the mesosystem and microsystem. Next, the macrosystem is made up of broader, overarching cultural influences that may result from economic, social, educational, legal, or political systems. Lastly, the chronosystem (Bronfenbrenner, 1994) incorporates time and includes the influence of personal, societal, or historical events throughout the life span (e.g., life transitions, parental divorce, periods of economic loss, COVID-19 pandemic). Changes over

time within an individual's characteristics (e.g., age) and the environments in which they live are also considered part of the chronosystem. Each level of one's environment consist of specific factors that may either contribute to or reduce the likelihood of negative outcomes for an individual.

Building upon the ecological systems theory, Cicchetti and Lynch (1993) proposed a transactional-ecological model, which incorporates several risk and protective factors that can be applied to understand the impact of trauma on youth adaptation over time. Broadly, there are risk or potentiating factors, which may increase the likelihood of negative psychosocial adaptation or more severe mental health problems among youth, and protective or compensatory factors, which may reduce such risk. For the purpose of this manuscript, the terms risk and protective factors will be used throughout. These factors exist at each level of the transactional-ecological model and vary in the strength of their influence, depending on whether they are transient or enduring.

Transient risk or protective factors may be present for a short duration and can change or fluctuate quickly, having a time-limited possible impact on development or psychopathology. Such factors can also vary depending on what may be occurring in various ecological systems. Some examples of transient protective factors that may contribute to better outcomes may include having an increase in finances or periods of positive engagement with loved ones. Transient risk factors that may contribute to stressful circumstances or poor outcomes might include being sick with an illness, suddenly losing a job, having family problems, or having trouble adapting to a time-limited transition or period of development.

In addition to transient influences, enduring risk or protective factors are also present within the transactional-ecological model and are associated with long-term or stable attributes, factors, or conditions (i.e., biological, or historical in nature) that can influence adaptation. Enduring vulnerability factors are lasting factors that may contribute to poor psychosocial or mental health outcomes. Such examples may be prior trauma history or certain demographic characteristics. Enduring protective factors are relatively stable or permanent conditions that decrease the likelihood of negative outcomes and may include a history of supportive parenting, social support, or generally good health. Such enduring characteristics can influence a person's environment, and vice versa.

The transactional-ecological theory also strongly emphasizes the reciprocal influence that environmental forces and individual characteristics have on development, functioning, and symptomatology (Cichetti & Lynch, 1993; Lynch & Cicchetti, 1998). The ecological contexts (e.g., micro-, exo-, macrosystem) not only exert influence on an individual, but an individual can also have an equal impact on their environment and undergo changes within their own development and psychosocial adaptation, called ontogenic development (Lynch & Cicchetti, 1998). Repeated transactions between an individual and their environment may influence and shape the changes that occur within an individual. The potential for change is constant and endures across the lifespan; however, certain factors can exert a greater influence on individual change and development than others.

The location of various risk and protective factors, and whether they are enduring or transient can determine the amount of influence they may have on an individual. For example, enduring risk or protective factors housed within the ecological layers of closest proximity to an individual may have the strongest long-term effects on development. Distal

and/or transient factors may influence the overall impact of enduring risk and protective factors, as well as the individual itself. Ultimately, the balance of each risk and protective factor within an individual's ecological context and their interactions with each other, may lead to healthy or maladaptive adjustment. For example, having a lack of protective factors such as social support within one's microsystem, may contribute to an increased risk of more severe depressive symptoms within a young adult with a family history of depression. This in turn may contribute to a young adult feeling increased stress or adversity in other environments, such work or school, which can further impact behavior or performance. Depending on whether peers or older adults within work and school settings are supportive or dismissive of a young adult can either further exacerbate or reduce MH difficulties. When weighing the impact of various risk and protective factors, it is important to consider the unique and specific circumstances of an individual and their environment, and how they interact and influence one other.

The next section of this manuscript integrates a transactional-ecological model of development with an empirically supported model predicting post-disaster MH symptoms within the context of collectively experienced disasters. Several risk and protective factors and their influence on psychosocial adaptation are discussed.

2. Integrating Empirical Support from a Disaster Mental Health Model

A conceptual model of how natural disaster exposure may influence posttraumatic stress (PTSS) and other MH or distress symptoms has guided the disaster MH research field for decades (La Greca et al., 1996), and can be used to understand how the COVID-19 pandemic may influence MH among young adults. Several factors influence post-disaster MH, such as exposure to the traumatic event or disaster; an individual's characteristics such

as race/ethnicity, age, and gender; pre-disaster psychological functioning and coping abilities; and characteristics of the recovery environment post-disaster (La Greca et al., 1996). Exposure to a disaster (i.e., life threat during the event and loss/disruption after) and an individual's preexisting characteristics (e.g., demographics, psychological functioning) simultaneously influence a person's efforts to process and cope with events that occur post-disaster. Characteristics of the post-disaster recovery environment (e.g., life stressors and social support) influence coping processes in a reciprocal manner over time. All components of the disaster MH model can be integrated within various ecological layers and are considered risk or protective factors within the transactional-ecological framework.

First, disaster exposure severity is conceptualized as strongly influencing post-disaster MH (La Greca et al., 1996), and is housed within the chronosystem, affecting multiple ecological layers and risk and protective factors. Exposure to disaster can include frightening or life-threatening events while the disaster is occurring, or experiences of loss and disruption post-disaster, such as bereavement, injury to self or death of family members or loved ones, property damage, financial loss, relocation, loss of possessions, or disruption of familiar roles or routines, etc. (Furr et al., 2010; La Greca et al., 1996). In a meta-analysis, predictors of increased PTSS include higher death toll in the disaster, the experience of personal losses and disruption, perceived threats, and distress at the time of the event (Furr et al., 2010). Disaster MH research has documented that as disaster exposure experiences increase, typically MH symptoms do as well (Vernberg et al., 1996). This is often seen through a dose-response relationship. Greater or more intense disaster exposure has consistently and strongly predicted higher risk of MH symptoms (Goldmann & Galea, 2014).

Exposure to disaster can interact with an individual and their unique traits or circumstances, which in turn also affects coping and behaviors post-disaster.

Next, enduring factors close in proximity include an individuals' preexisting, relatively stable characteristics such as certain demographics (e.g., gender, ethnicity, SES, age and/or developmental stage), prior MH/functioning, and cumulative or prior lifetime trauma exposure, which can each influence MH post-disaster (LaGreca et al., 1996). These factors predate the disaster and may predict adjustment over time, either increasing vulnerability or protection (LaGreca et al., 1996). They can also affect each ecological level, depending on one's unique traits. Being of female gender, younger age, and/or minority racial/ethnic background or low SES are considered risk factors for experiencing post-disaster mental illness or poor outcomes (Goldmann & Galea, 2014; Norris et al., 2002), however more research is needed to understand the influence of race/ethnicity on disaster-exposed groups. In comparison to older adults aged 60 or older, younger adults reported higher MH symptoms after and were found far less likely to be resilient in a variety of disaster contexts (Acierno et al., 2006; Bonanno et al., 2007). Many studies have also found that pre-disaster MH and prior history of mental illness are usually among the best predictors of post-disaster MH (Goldmann & Galea, 2014; Norris & Elrod, 2006). Pre-disaster MH has been consistently associated with post-disaster PTSD, depression, substance use, and reduced likelihood of resilience (Goldmann & Galea, 2014). Additionally, prior exposure to traumatic life events may make a person more reactive to subsequent trauma (Bonanno et al., 2010), and may increase one's risk of developing PTSS post-disaster (LaGreca et al., 1996), however there may be some exceptions.

Prior disaster exposure may help to buffer against the MH impacts of subsequent disasters *only* when the disasters are of a similar nature (Bonanno et al., 2010). For example, survivors of floods, earthquakes, and plane crashes, who then experienced similar events again, reported less distress in the aftermath than those who had not experienced such disasters before. In one study, a dose-response inoculation effect was found, with the more experiences an individual has had with prior earthquake experiences, the less likely they were to experience MH symptoms after a recent earthquake (Knight et al., 2000). The experience of prior traumatic events and life stressors, however, may negatively affect one's MH post-disaster when the traumatic event or disaster is one that has not yet been experienced before.

In addition to individual, enduring factors, transient risk and protective factors can influence the post-disaster recovery context. Life stressors since disaster and social support have been found to influence MH post-disaster (Bonanno et al., 2010; Felix et al., 2013; Goldmann & Galea, 2014; LaGreca et al., 1996). These factors can be found within all ecological layers, but may be more prevalent in the micro-, meso-, and exo- systems. Life stressors since disaster are considered risk factors, while social support has been found to be protective. Such post-disaster recovery factors may differ by region or culture and are unique to specific contexts.

Disaster exposure can engender life stressors in the aftermath which can include deaths, divorce or conflict, job loss, property damage, physical health conditions related to the disaster, displacement, or other life stressors. Life stressors since the disaster are included in the conceptual model as transient challengers, as they are short-term events that may magnify one's stress reactions and may influence MH (Goldmann & Galea, 2014; LaGreca et al., 1996). The life stressors that can occur after disaster are believed to partially explain the

relation between disaster exposure and chronic MH symptoms, specifically PTSD (Bonanno et al., 2010). Among people who had experienced the September 11th, 2001, terrorist attack, those who reported no prior traumatic events nor recent life stressors or other traumatic events were found to be more resilient than those who had (Bonanno et al., 2007). Individuals who experienced the most extreme recent life stressors were one-third less likely to be resilient (Bonanno et al., 2007). The presence of life stressors post-disaster may also affect the availability and amount of social support that is available to survivors.

The presence of social support post-disaster via other individuals, familial relationships, schools, neighborhoods, or broader communities may be considered transient buffers or protective factors within several ecological levels. Greater sources of social support are associated with resiliency and fewer MH symptoms while low levels of, and reductions in social support are associated with greater MH symptoms (Goldmann & Galea, 2014; LaGreca et al., 1996). Social support can change post-disaster. Circumstances like displacement, death, or disruptions in communication may make it difficult to access social support and result in the loss of pre-disaster social networks (Goldmann & Galea, 2014). Ultimately, social support is believed to help individuals to be able to cope more effectively with the impacts of disaster exposure and the life stressors that result.

Within the disaster MH model, MH symptoms, social support, disaster exposure, and life stressors reciprocally influence an individual's efforts to cope (LaGreca et al., 1996; Vernberg et al.,1996). Coping can include a variety of helpful or maladaptive strategies, which may be associated with PTSS or other MH symptoms, as individuals work to process possible trauma responses. The life stressors that result after disaster and the amount and frequency of social support can either magnify or attenuate one's response to disaster and

their ability to cope or adjust. Two factors that may contribute to adaptive coping after disasters include coping-self efficacy and self-compassion, which are found to be associated with reductions in PTSS through reviews of many studies (Luszcynska et al., 2009; Thompson & Waltz, 2008). More research is needed to understand how these factors may influence MH among other disasters, including the COVID-19 pandemic.

In summary, all components of the disaster MH model interact reciprocally with each other to influence MH post-disaster across multiple ecological layers. Individual characteristics, disaster exposure, life stressors since disaster, coping, and social support are established as important factors within disaster contexts. The current work aims to integrate specific aspects of the COVID-19 pandemic, specifically disaster-related stressors and experiences, with existing factors, into a transactional-ecological model predicting pandemic MH among young adults. Within the next section, information about the pandemic, related risk and protective factors, potential impacts on young adult MH and development, and emerging MH trends are discussed.

B. The COVID-19 Pandemic

In March of 2020, the World Health Organization (WHO), declared the transmission of the SARS-CoV-2 (COVID-19) virus a pandemic after it originated in Wuhan, China in December of 2019. Between the months of December 2019 and March 2020, the COVID-19 virus spread across many countries causing what appeared to be a treatment resistant, pneumonia-like respiratory illness, resulting in many deaths. After the WHO's declaration, the U.S. also declared a nationwide emergency in March of 2020, and restricted travel to and out of the country. Across the U.S., shelter-in-place or stay-at-home orders were implemented for several months in efforts to reduce transmission of the virus, or "to flatten

the curve." Many individuals worked and attended school virtually from home, except for essential workers (e.g., medical providers, nurses, grocery store clerks). Over the next two years of the pandemic, periods of lifted stay-at-home orders were associated with increases in positive cases of COVID-19 and death, which sometimes resulting in further mandated periods of isolation. Many people grieved the death of loved ones due to the virus, as well as prior ways of living and engaging with others. Due to the pandemic, everyday life was disrupted (e.g., individual, family, educational, occupational, medical, societal systems), and resulted in major life changes, stressors, fear, uncertainty, and grief and loss, likely impacting not only physical health, but also MH (Gruber et al., 2020; Pefferbaum & North, 2020). The current paper conceptualizes the COVID-19 pandemic and its associated stressors during its acute phases (e.g., high transmission of cases and deaths), primarily during the first year-and-a-half of the pandemic, prior to development and rollout of vaccines. In mid-2021, the vaccines helped to largely reduce deaths associated with the virus, resulting in the beginning of the return to pre-pandemic life.

Based the on the combined transactional ecological and disaster MH model, the degree to which an individual is affected by the COVID-19 pandemic may depend on aspects of one's current situation, ongoing life stressors, and exposure to, or proximity to COVID-19 related experiences in the various ecological layers of their life. For this reason, it is important to continually evaluate one's unique mix of enduring and transient risk and protective factors, which altogether interact to influence MH. It is important to build upon our existing knowledge of disaster MH and apply it to our understanding of the COVID-19 pandemic, which was a chronic, pervasive, and persistent disaster. Several pandemic-related

stressors and experiences that occurred during acute phases are conceptualized as a potential proxy for disaster exposure.

Many aspects of the COVID-19 pandemic can be considered stressful. Some specific stressors included: the implementation of stay-at-home or public health orders that restricted movement of individuals and limited freedom, forced quarantines, isolation, work and school closures, loss of financial security or growing financial losses, experiencing conflicting messages from authorities, distrust of the government and medical professionals, inadequate resources for medical workers and responses, adversity among families, loss of loved ones due to COVID-19, healthy anxiety or worries about one's own health or physical safety or those of their loved ones, inability to receive medical care, and general uncertainty of the future (Gruber et al., 2020; Pfefferbaum & North, 2020). In particular, the protections and actions needed to guard against infection may have prevented individuals from accessing protective factors that buffer against stress (e.g., social support) due to stay-at-home and social-distancing mandates (Gruber et al., 2020). Experiences of isolation may have caused a variety of emotions such as stress, depression, anxiety, irritability, insomnia, fear, confusion, anger, boredom, and shame (Pefferbaum & North, 2020), and may have exacerbated existing MH conditions (Gruber et al., 2020). Shortly after the pandemic emerged, several studies examined its MH impacts.

Large scale cross-sectional studies examined general MH trends worldwide during the COVID-19 pandemic. Increases in, and high prevalence rates of MH symptoms were found in comparison to those measured before the pandemic in the U.S. and throughout the world (Ettman et al., 2020; Pierce et al., 2020; Twenge & Joiner, 2020; Xiong et al., 2020). U.S. adults were more than three times as likely to screen positively for depressive or anxiety

disorders, or both, with more than one out of three adults screening positive for either disorder, or both (Ettman et al., 2020; Twenge & Joiner, 2020). In addition, psychiatric patients with MH disorders had a worsening of symptoms, compared to individuals infected with COVID-19, and the public (Vindegaard & Benros, 2020). Despite this finding, however, one-in-four of adults without pre-existing MH conditions reported experiencing psychological distress early in the pandemic (Holingue et al., 2020). Specifically acute and depressive symptoms were found to increase significantly over time as COVID-19 deaths increased (Holman et al., 2020). Many studies sought to expand on these findings and identify possible risk factors associated with increases in distress and MH difficulties.

Many general risk factors associated with psychological distress during the COVID-19 pandemic largely align with those identified by La Greca and colleagues' (1996) conceptual disaster MH model. Several early pandemic studies identified factors related to individual characteristics and disaster exposure or experiences. The individual, enduring characteristics associated with greater distress included having a past history of MH problems (prior functioning); experiencing greater exposure to secondary stressors (prior life stressors or other trauma exposure); being female, younger than 40 years of age, a college student, or unemployed; and having lower educational levels or economic resources (Ettman et al., 2020; Holingue et al., 2020; Holman et al., 2020; Pierce et al., 2020; Xiong et al., 2020). In terms of COVID-19 related disaster exposure or experiences, having frequent exposure to social media or news concerning COVID-19, and reporting that the COVID-19 pandemic caused major changes to personal life or was a threat to personal health were also significantly associated with distress.

In addition, several cross-sectional studies noted associations between younger age and increased MH symptoms early in the pandemic, as well as significant risk factors. Specifically, young adults reported the greatest increases in mental distress (Pierce et al., 2020) and were found to be at greater risk of experiencing worse MH than other age groups in the U.S. (Zhou et al., 2020). When considering young adult MH trends during the COVID-19 pandemic, it is important to understand the influence of age and psychosocial adaptation and development during this stage of life.

1. Developmental Considerations: Emerging Adulthood

The unique developmental period of emerging adulthood (ages 18-29 years old) occurs after adolescence, but before being settled fully into adult life, and may be considered challenging, prolonged, and complex, especially within contemporary Western societies (Arnett, 2004). Emerging adulthood is characterized by identity development, instability, self-focus, feeling "in between", having many possibilities ahead, and numerous life transitions (Arnett, 2000). Young adults may explore a variety of possibilities in personal identity, relationships, careers, values, and living spaces and form, break, and reform social connections as they experiment who they are and what they want out of life (Arnett, 2000; Tanner et al., 2009). Several stressors may be experienced during this period as young adults attempt to establish themselves or accomplish a variety educational, professional, familial, or personal endeavors that may influence MH. This current work conceptualizes the developmental stage of emerging adulthood as being both a part of the chronosystem (e.g., representing the impact of time and development, as well as an enduring, individual risk factor (e.g., younger age). An individual's status as a young adult affects all ecological layers in a reciprocal manner and may contribute to stress even in non-disaster contexts.

Even prior to the COVID-19 pandemic, young adults have reported greater MH symptoms and increasing stress in the last decade or so, revealing possible preexisting vulnerabilities. From 2007 to 2018, self-reported rates of depression, anxiety, anger, nonjudicial self-injury, suicidal ideation, and suicide attempts have markedly increased among young adult, undergraduate college students (Auerbach et al., 2018; Duffy et al., 2019). In some instances, these increases have been observed more sharply among female teens and young adults, than males (Keyes et al., 2019). Colleges have also reported increases in MH service usage between 2007 and 2017 (Lipson et al., 2018), which may indicate that more students in recent years may be suffering from psychological problems (Duffy et al., 2019). Reasons for this increase in MH symptoms and treatment are not entirely understood, but electronic communication, constant access to digital media (e.g., exposure to anxiety-provoking world events), and sleep disturbance may be especially impacting younger adults (Goodwin et al., 2020; Twenge et al., 2019). Gen Z adults (ages 18-23) also reported feeling more stressed about issues and reported that work, money, and health concerns were a significant and common stress in their lives, in comparison to adults, prior to the pandemic (APA, 2019). This age group was also found to be more likely to endorse MH symptoms than others, suggesting increased openness, reduced stigma, and understanding, or a possible increase in MH challenges. Young adults continued to experience similar MH trends into 2020.

Emerging cross-sectional research during the COVID-19 pandemic identified significant impacts on young adult mental health, as well as several risk factors. One month after the U.S. declared a state of emergency due to the pandemic, a third or greater of young adults (n = 898) surveyed in the U.S. reported significant levels of depression (43.3%),

anxiety (45.5%), and PTSD symptoms (31.8%) that were at the clinical cut-off levels or above (Liu et al., 2020). Another large-scale cross-sectional study over four phases from April of 2020 to July 2021 (sampling different individuals at each follow-up), found that U.S. young adults aged 18 to 29 reported the highest levels of anxiety and depression out of any other age groups, with 38.6%- 51.7% endorsing anxiety and 32.7%- 43.6% endorsing depression at least once (National Center for Health Statistics, 2021). Risk factors associated with increased MH difficulties among young adults were high levels of loneliness, high levels of COVID-19 worry, and low distress tolerance (Liu et al., 2020). These factors likely affected the ability to cope and adapt to the pandemic. Since research suggests that young adults have been at-risk of developing MH symptoms in the years leading up to and through the pandemic, it is important to examine the unique impact the pandemic has had on development during emerging adulthood.

Most notably, many young adults had their social networks disrupted. At the start of the pandemic, many university students moved back home with their parents or caregivers to their hometowns, which likely restricted and weakened social connections among their peers due to the stay-at-home, or isolation measures that were implemented. Social isolation and loneliness can increase risk of depression and anxiety in youth (Loades et al., 2020), as well as a lack of in-person social interaction, which can affect development and reduce opportunities of growth and exploration with peers (Gruber et al., 2020). Young adults were found to be the most psychologically impacted group by COVID-19 lock down conditions, reporting higher levels of distress during such periods than older adults (Glowacz & Schmits, 2020).

Young adults may have also experienced a stalling in their development or an inability to participate in meaningful rites of passage or milestones. For example, the pandemic may have delayed key developmental milestones, as well as freedom and independence in many aspects of life including sexual relationships, expression of sexual and gender identity, and the ability to personally choose whether or not to engage in religious, political, or other meaningful pursuits (Gruber et al., 2020). This may have caused confusion about an individual's role, especially if young adults moved in with family members who were unsupportive of individual pursuits or self-expressions. Additionally, the pandemic disrupted several important, collective cultural experiences, typically considered relevant to emerging adults in the U.S. Several university students were unable to graduate from college in-person or experience living on a college campus and felt as though they had missed out. Being unable to participate in these experiences may have contributed to feelings of sadness, loss, or mourning.

The pandemic is also associated with young adult stress specific worries about being able to achieve or complete future endeavors, amid unprecedented uncertainty. In August of 2020 (about six months into the pandemic), a sample of American Gen Z adults answered questions about stress and endorsed the highest stress levels recorded thus far out of any other age group (APA, 2020). Most Gen Z adults surveyed (82%) reported that uncertainty about the 2020-2021 school year and their educational endeavors caused them stress (APA, 2020). Over half (67%) also reported that the pandemic made planning for their future feel impossible (APA, 2020). Many universities were unsure if they were to return to in-person instruction and many plans were subject to change. Due to economic stress and safety measures, many young adults were likely grappling with constraints and frequent changes

within educational or vocational systems, due to limited training opportunities, reduced classes, and less overall funding (Gruber et al., 2020). The COVID-19 pandemic also contributed to a tenuous economy with high unemployment, which may have affected available job opportunities for young adult, entry-level workers. Six months into the pandemic, young adults who had recently lost a job or expected to lose a job, were at higher risk of experiencing anxiety and depressive symptoms than those who had not or did not expect to lose employment (Ganson et al., 2020). More than 65% of this sample experienced poor MH, 59% experienced direct or household employment loss since the start or the pandemic, and 38% expected to experience direct or household employment loss in the next four weeks (Ganson et al., 2020). In sum, feelings of uncertainty or fear relating to the loss of education or employment opportunities during the pandemic were associated with increased stress and MH difficulties in young adults.

In sum, general trends indicate that young adults have been increasingly vulnerable to MH difficulties over the past decade, which the pandemic has seemed to exacerbate. Stressful and unpredictable circumstances, lack of social connection, and an inability to achieve certain milestones and continue development as expected or planned may have contributed to high levels of distress. The research findings reviewed thus far were mainly cross-sectional and although these studies provide critical information, they are unable to account for the measurement of young adults' MH symptoms prior to the pandemic. Examining the findings of longitudinal studies can illuminate MH trends and changes over time within the same group of individuals, thus revealing more robust information about the true possible impact of the COVID-19 pandemic.

Many emerging longitudinal studies identified large increases in MH symptoms of young adults shortly after the pandemic began, compared with pre-pandemic MH levels. One longitudinal study surveyed adolescents and young adults (N = 451) living in Long Island, New York for several years pre-pandemic (from 2014-2019) and in 2020 from March to May. A nearly three-fold increase in rates of depressive symptoms from pre-COVID to during-COVID among adolescents and young adults was found (Hawes, Szenczy, Klein, et al., 2021). Almost half of females reported clinically elevated generalized anxiety symptoms during the pandemic. Another longitudinal cohort study assessed a convenience sample of young adult U.S. college students at eight (time [T] 1), five (T2), and two months (T3) prior to April 2020, and found increases in psychological distress, depression, and anxiety between February and April 2020 (T4; Zimmerman et al., 2021). During this same period (T4), average depression scores were above clinically significant levels (12.09), when throughout previous time points (T1-3), it was below a score of ten. Almost half of the sample (41.4%) that was below the clinical cut off score for depression at T3 (n = 128), were above the clinical cutoff level at T4. Similar trends were found among participants in terms of anxiety symptoms, with 36.5% of those below the cutoff at T3 (n = 137), having scores above the cutoff at T4 in April 2020 (Zimmerman et al., 2021). There is strong support for significant increases in MH shortly after the pandemic began, but limited studies examined MH symptoms over longer durations during the pandemic. It is important to examine MH over time to examine whether such increases in MH remain high or return to baseline levels, and to identify who may be at risk of experiencing greater MH symptoms. In addition, it is also useful to review longitudinal studies that examined chronic COVID-19 related stressors and their impact on MH.

Other longitudinal studies with pre-pandemic assessments also found changes in MH associated with periods of lockdown during the pandemic and peak COVID-19 positive infection rates (Hawes, Szenczy, Olino, et al., 2021; Meda et al., 2021). In Italy, 358 university students ages 18-30 years old provided self-reported MH symptoms in October and December of 2019, then six months later in April of 2020 during lockdown in Italy, and in May/June of 2020 after lockdown was lifted (Meda et al., 2021). On average, students reported mainly worse depressive symptoms during lockdown than six months before isolation (Meda et al., 2021). After lockdown had lifted, depressive symptoms returned to pre-lock down levels (Meda et al., 2021). These findings suggest that MH symptoms may fluctuate and worsen during times of lockdown but may resume to baseline levels once lockdown is lifted (Meda et al., 2021). Another study found similar patterns in youth in New York, from April to July of 2020, with higher levels of depression and anxiety associated with peak infection rates, and decreases observed as infection rates declined (Hawes, Szenczy, Olino, et al., 2021). It is worthwhile continuing to examine this pattern, as periods of high infection rates or mandated lockdowns or quarantine, may be associated with distress or more severe MH symptoms. Apart from examining changes or patterns in MH symptoms during the pandemic, it is also important to consider important pre-pandemic factors (e.g., enduring factors such as prior MH functioning, prior lifetime trauma) that may either contribute or hinder positive adjustment and fewer MH symptoms during the pandemic.

Several prospective, longitudinal studies examined the influence of pre-pandemic MH on pandemic-MH. Many studies found that young adults' pre-pandemic MH disorders or symptoms, or emotional distress levels were strongly predictive of MH symptoms during the pandemic (Hawes, Szenczy, Klen, et al., 2021; Shanahan et al., 2020; Zimmerman et al.,

2021). Greater levels of pre-pandemic anxiety and depression predicted greater anxiety and depressive symptoms during the pandemic (Hawes, Szenczy, Olino, et al., 2021). Emotional distress measured two years pre-pandemic among 22-year-old young adults from Switzerland was the greatest predictor of during- pandemic emotional distress during a period of lockdown in spring of 2020 (Shanahan et al., 2020). Additionally, pre-pandemic social stress (e.g., bullying victimization, perceived feelings of social exclusion), life stressors, and perceptions of one having poor health (which altogether can be considered a proxy or form of MH functioning), also predicted increases in pre- to during-pandemic emotional distress (Shanahan et al., 2020). The research findings reviewed thus far suggest that pre-pandemic MH symptoms are associated with during-pandemic MH, although individuals without preexisting MH symptoms were also found to be affected.

Results of other longitudinal-cohort studies found that young adults *without* preexisting MH symptoms were still affected psychologically during the pandemic, sometimes experiencing greater increases in MH than those with existing MH disorders. Canadian young adult university students completed surveys assessing MH and recent stressful experiences in May 2019 ($N = 964$) and May 2020 ($n = 733$). University students *without* pre-pandemic MH difficulties had greater increases in MH symptoms and psychological distress during-pandemic than those *with* pre-pandemic MH conditions; despite these findings, young adults *without* prior MH difficulties were considered to be at lower risk than those *with* pre-pandemic MH problems since the amount of MH problems endorsed were on average, less severe (Hamza et al., 2020). Repeated measures analyses found that young adults with pre-pandemic MH challenges were showing the same or lower levels of MH symptoms during the pandemic (May 2020), compared with the prior year

(May 2019). Specifically, these students reported having experienced lower stress levels, less social isolation and fewer depressive, anxiety, and PTSD symptoms, than those without pre-pandemic MH issues, who reported larger increases in these factors during-pandemic than in 2010 (Hamza et al., 2020).

Meda et al. (2021) also found significant increases in depressive symptoms during lockdown among Italian young adults without pre-pandemic MH disorders, those with pre-pandemic MH disorders; no differences in symptom levels were found in young adults with a pre-pandemic MH disorder. This research suggests that young adults who did not endorse pre-pandemic MH difficulties experienced an increase in symptoms during the pandemic, yet these levels were not considered on average as high as those with pre-pandemic MH symptoms. Just because an individual does not have MH difficulties pre-pandemic does not necessarily mean that they would be unlikely to experience MH difficulties during-pandemic. Instead, they may be at lower risk of experiencing more severe MH symptoms, than those with pre-pandemic MH conditions. More research is needed to understand the associations among pre-pandemic functioning and pandemic-MH.

The measurement of pre-pandemic-MH and its ability to predict pandemic-MH, appears to change depending on the timing. Another study examined prior MH in a convenience sample of U.S. young adult college students assessed at three different time points: eight-, five-, and two-months pre-pandemic, and during-pandemic, in April 2020 (Zimmerman et al., 2021). Prior levels of depressive and anxiety symptoms were predictive of later anxiety and depressive symptoms only at two months prior to the pandemic, with greater levels of MH symptoms at two months pre-pandemic predicting greater MH symptoms during-pandemic (Zimmerman et al., 2021). MH symptoms measured at eight and

five months prior to the pandemic were not predictive of MH symptoms during the pandemic (Zimmerman et al., 2021). These findings suggest that pre-pandemic MH measures in closer proximity to the pandemic may have greater predictive power, while earlier MH symptoms may not. It is also worthwhile to investigate longer MH trends over time throughout the pandemic to understand its impact on young adults.

Several multi-wave studies examined changes in young adults' long-term MH trends during the pandemic. A longitudinal sample of youth in NY were assessed for depression and anxiety in March 2020 (Hawes, Szenczy, Onlino, et al., 2021) and throughout the summer of 2020 from May to July 2020 (Hawes, Szenczy, Klein, et al., 2021). Multilevel growth modeling was used to identify the trajectory of symptoms, as well as predictors of various trajectories. Youth depression and anxiety symptoms peaked in late April but fell throughout summer and continued to decrease throughout May until July 2020 (Hawes, Szenczy, Olino, et al., 2021). Increases in MH symptom trajectories were associated with periods of peak positive COVID-19 infection rates and lockdown (Hawes, Szenczy, Olino, et al., 2021). Younger participants (ages 16-18) also showed rising MH levels, with a peak in early May, while older participants (19 years old and older) showed no change in symptoms across the study (Hawes, Szenczy, Olino, et al., 2021). Additionally, the MH trajectories of youth with higher levels of initial concerns about school, being confined at home, being infected with COVID-19, or having one's basic needs, peaked in April 2020, but gradually decreased throughout the summer (Hawes, Szenczy, Olino, et al., 2021). Youth with higher initial COVID-19 related concerns showed steeper declines in MH symptoms across the study (Hawes, Szenczy, Olino, et al., 2021). Overall, average youth MH trends displayed a

decelerating quadratic shape from April to July of 2020, suggesting that youth may have begun to adapt to the COVID-19 pandemic and experienced reductions in MH symptoms.

While many important findings provide information on the COVID-19 impacts on young adult MH, and emerging trends, several gaps still exist. It is necessary to broaden our understanding of unique pre-pandemic factors, and their associations with pandemic-MH. Several prospective studies have examined prior MH functioning, which is a strength. Examining the influence of pre-pandemic natural disaster exposure, pre-pandemic life stressors, and pre-pandemic overall, cumulative life trauma, on young adult pandemic-MH would also be beneficial to better understand associations among these variables. It would also be useful to further examine pandemic-specific associated stressors, as well as understudied possible protective factors, that can contribute to a better understanding of the development of young adult MH problems during the COVID-19 pandemic. Lastly, additional information is needed about MH trends further into the pandemic to identify whether the observed increase in MH severity remains, or subsides, which will contribute to better understanding young adult long-term MH needs.

C. Possible Protective Factors Amid COVID-19

In addition to studying pre-pandemic factors that may influence MH during the pandemic, it is also important to examine possible short-term protective factors or transient buffers, that may help reduce pandemic-distress. LaGreca et al.'s (1996) conceptual model has identified that one's efforts to cope with disaster (e.g., positive coping, use of blame or anger, wishful thinking, or social withdrawal) may contribute to subsequent MH (Vernberg et al., 1996); however, more research illuminating adaptive forms of coping during and after disaster is needed. Protective factors such as social support, self-compassion, and coping

self-efficacy have largely been unstudied within a pandemic context but have demonstrated protection mainly against PTSS after the experience of other traumatic events. This evidence suggests that such protective factors may indirectly support an individual's ability to positively cope or adapt to trauma and its impacts. It is worthwhile to examine whether social support, self-compassion, and coping self-efficacy have a negative association with young adult anxiety, depression, and PTSS symptoms during the pandemic. If so, there are implications for developing or increasing access to such factors to aid with coping and reduce MH risk during acute or stressful phases of future pandemics. Research findings on the possible benefits of social support, self-compassion, and coping self-efficacy after trauma exposure are further discussed.

1. Social Support

Many forms of social support have been studied within the context of disaster MH; however, the current study focuses on perceived social support, which has been the most widely studied (Kaniasty, 2020). Perceived social support is the subjective evaluation of how much support an individual receives from others (e.g., can be emotional, tangible), regardless of the actual amount that they receive. Higher levels of perceived social support may be protective after disaster and associated with greater psychological well-being, fewer depressive or PTSD symptoms, or psychosocial adjustment (Bonanno et al., 2010; Chan et al., 2015; Dar et al., 2018; Sprague et al., 2015). Perceived social support can come from various ecological layers (e.g., partner, close family and friends, workplace, neighborhood, university, broader communities).

Even though research findings suggest that social support is protective post-disaster, the ability to access and benefit from such support may be difficult due to disruptions within

and across social units or networks post-disaster (Bonanno et al., 2010; Kaniasty, 2020). Some examples of disruptions include loss of communication methods, destruction of infrastructure, death, increased stress, having to take care of urgent needs, or needing to move or evacuate from one's former place of living. Additionally, during the COVID-19 pandemic, mandated periods of social distancing or quarantine were implemented in efforts to reduce transmission of the virus, which also placed significant strain on the ability to safely access in-person social support. Being separated from close loved ones and experiencing such disruptions in accessing social support are associated with greater psychological distress (Dar et al., 2018; Gallagher et al., 2016). Furthermore, one's MH functioning and distress may influence their ability to obtain social support in a reciprocal manner, with greater distress sometimes undermining support (Kaniasty, 2020; Lai et al., 2018; Platt et al., 2016). Sometimes individuals with high levels of post-disaster distress may feel overwhelmed and push away people from whom they typically obtain social support from. In communities that were deeply affected by disaster, it is also possible that individuals experienced worsening distress as they connected with others and listened to personal experiences relating to the trauma. Even though there is evidence to suggest that perceived social support is a protective factor amid disasters against distress and severe MH symptoms, it is important to consider specific disaster contexts, as the amount of destruction or loss impacting the ability to access social networks may considerably vary (Kaniasty, 2020).

Emerging research examined the association between social support and psychological functioning during the COVID-19 pandemic. Periods of the pandemic were marked by significant disruptions, difficulties, and risks associated with engaging with others in-person. Even though reducing time spent with others in-person was protecting oneself

physically against the COVID-19 virus, there were associated psychological risks. Lower levels of perceived social support were reported among individuals who voluntarily reduced interactions with others (e.g., family members, friends, classmates) to prevent the spread of COVID-19 virus, in comparison to those who did not (Chou et al., 2020). Difficulties among young adults who were not able to obtain social support were also observed. Feelings of loneliness and social or relational stressors among young adults were associated with greater MH symptoms (e.g., depression), as well as MH symptoms and alcohol use during the pandemic (Graupensperger et al., 2021; Lee et al., 2020). During periods of quarantine or social isolation, higher levels of perceived social support were negatively associated with depressive and anxiety symptoms, loneliness, sleep quality, and irritability (Grey et al., 2020). Additionally, during the pandemic, associations between perceived social support and hope were found across the U.S., U.K., and Israel (Bareket-Bojmel et al., 2021). These findings suggest that perceived social support was protective during the pandemic, and may have been especially important for young adults, as social engagement and connection largely contributes to psychosocial development during emerging adulthood.

2. Self-compassion

Because the COVID-19 pandemic was a collectively challenging event during which many individuals felt isolated, distressed, or filled with grief, the possible protective influence of self-compassion is worthwhile investigating. Derived from Eastern philosophy and Buddhist psychology, self-compassion is considered to be a specific aspect of mindfulness that can enhance psychological well-being. Self-compassion is and made up of three major components: which include: 1) extending kindness and compassion towards oneself instead of harsh criticism and judgment, 2) seeing one's experiences as part of the

larger human experience rather than separated or isolated, and 3) holding one's painful thoughts and feelings in balanced awareness rather than over-identifying with them (Neff 2003a).

According to Neff (2003a), self-compassion can be viewed as a useful emotion regulation strategy, where painful experiences or distressing feelings are not avoided or pushed aside, but instead made aware of with kindness, gentleness, and awareness that all humans experience such feelings. The impact of negative experiences may be lessened as a result of employing self-compassion. It may be easier to maintain a more balanced awareness of one's thoughts and emotions, rather than over-identifying with one's pain. Engaging in self-compassion does not involve being selfish or self-centered, nor does it mean feeling self-pity for oneself or being engrossed by one's own problems or feelings (Neff, 2003a). Self-compassion can reduce self-absorption and ego-centric feelings of separation, while increasing awareness of feelings of interconnectedness.

There are several proposed benefits of self-compassion that may enhance psychological well-being and reduce psychopathology. Higher self-compassion scores have been associated with psychological health, life-satisfaction, social connectedness, emotional intelligence, and shifts in mood and emotional flexibility, while lower self-compassion scores were associated with self-criticism, higher levels of psychopathology, depression, anxiety, rumination, thought suppression, and neurotic perfectionism (MacBeth & Gumley, 2012; Neff, 2003a; Trompetter et al., 2017). Additionally, engaging in self-compassion may allow individuals to feel calm, cared for, and connected to others, which can lower activated nervous systems (Gilbert, 2005). Because of these benefits, self-compassion may be helpful during life stressors or after trauma.

Evidence suggests that self-compassion may be protective against the potential impact of trauma exposure on MH. A recent review of 35 studies found that self-compassion is associated with less PTSD or trauma-related symptomatology in youth and young adults who have experienced a range of problems such as substance use, suicidality, child maltreatment, sexual trauma, domestic violence, or natural disasters (Shebuski et al., 2020; Thompson & Waltz, 2008; Tanaka et al., 2011; Vettese et al., 2011; Winders et al., 2021). This association was found specifically in wildfire-exposed adolescents and adults after Hurricane Florence, six months post-disaster (Lea et al., 2020; Zeller et al., 2015). Individuals with greater levels of self-compassion may be more likely to engage in more adaptive and healthy ways of coping with life difficulties and stress post-disaster (e.g., incorporating self-care, reducing self-blame, recalling traumatic experiences from a curious, distanced perspective; Zeller et al., 2015).

A limited number of studies conducted during COVID-19 have found positive associations between self-compassion and psychological well-being and reduced COVID-19 related stress and threats. Among self-quarantined Chinese residents in isolation, self-compassion was significantly associated with positive coping, which was significantly related to life satisfaction within males (Li et al., 2021). Similarly, higher levels of self-compassion were associated with reduced COVID-19 stress and greater levels of psychological well-being among Vietnamese adults (Nguyen et al., 2021). In two samples of adults from Turkey, lower levels of COVID-19 threat were associated with greater levels of self-compassion and subsequently, less anxiety about death (Kavakli et al., 2020). Similarly, in another sample from Turkey, lower levels of intolerance of uncertainty and fear were negatively associated with self-compassion, and self-compassion was positively associated

with well-being (Deniz, 2021). An online self-compassion intervention was also found to be associated with a reduction in anxiety, depression, and stress symptoms within six patients at-risk of experiencing psychosis during a period of lockdown in Italy (Cheli et al., 2020). These findings further suggest that self-compassion may influence the way that individuals transform negative COVID-19 related thoughts and emotions into self-acceptance or more adaptive ways of coping, which may lead to greater psychological well-being (Deniz, 2021). Furthermore, this also suggests that an individual's mindset may serve an important role in how internal thoughts and reactions are managed during the pandemic.

3. Coping-Self Efficacy

Another protective factor of interest to the current study is coping self-efficacy, which refers to an individual's belief or confidence in their ability to cope effectively with stressful or traumatic events, based off social cognitive theory (Bandura, 1997). After the experience of trauma, coping self-efficacy has been found to help aid in psychological recovery and may make a difference in how people feel, possibly influencing emotional states, MH symptoms, or other health-related outcomes (Bandura, 1997; Luszczynska et al., 2009). Coping self-efficacy has been studied in various trauma contexts, such as chronic war or combat, acute mass violence or terrorist events, such as the September 11th, 2001, terrorist attack, and natural disasters, and has found to reduce immediate and long-term distress as a result of those collectively experienced events (Luszczynska et al., 2009). A review of 27 studies enrolling adult and adolescent survivors of acute, escalating, and chronic collective traumas, found medium to large effect sizes of coping self-efficacy on psychopathology (Luszczynska et al., 2009). Specifically, coping self-efficacy has been associated with lower levels of distress, PTSS, depression, anxiety, and negative affect, and with higher levels of positive

emotions (Luszcynska et al., 2009). Coping self-efficacy has also been found to be contribute to adjustment to posttraumatic distress over time in longitudinal studies (Bosmans & van der Velden, 2015).

Currently, there is limited information exploring coping self-efficacy within the COVID-19 pandemic context. In a study involving nurses located in Jordan during the pandemic, those of younger ages, with greater acute symptoms, and lower levels of coping self-efficacy had higher psychological distress (Shahrour & Dardas, 2020). Coping self-efficacy was found to be a protective factor (Shahrour & Dardas, 2020). It is worthwhile to investigate the impact of coping self-efficacy within a young adult sample during the pandemic to examine if it may be protective against MH symptoms that develop because of COVID-19 related experiences.

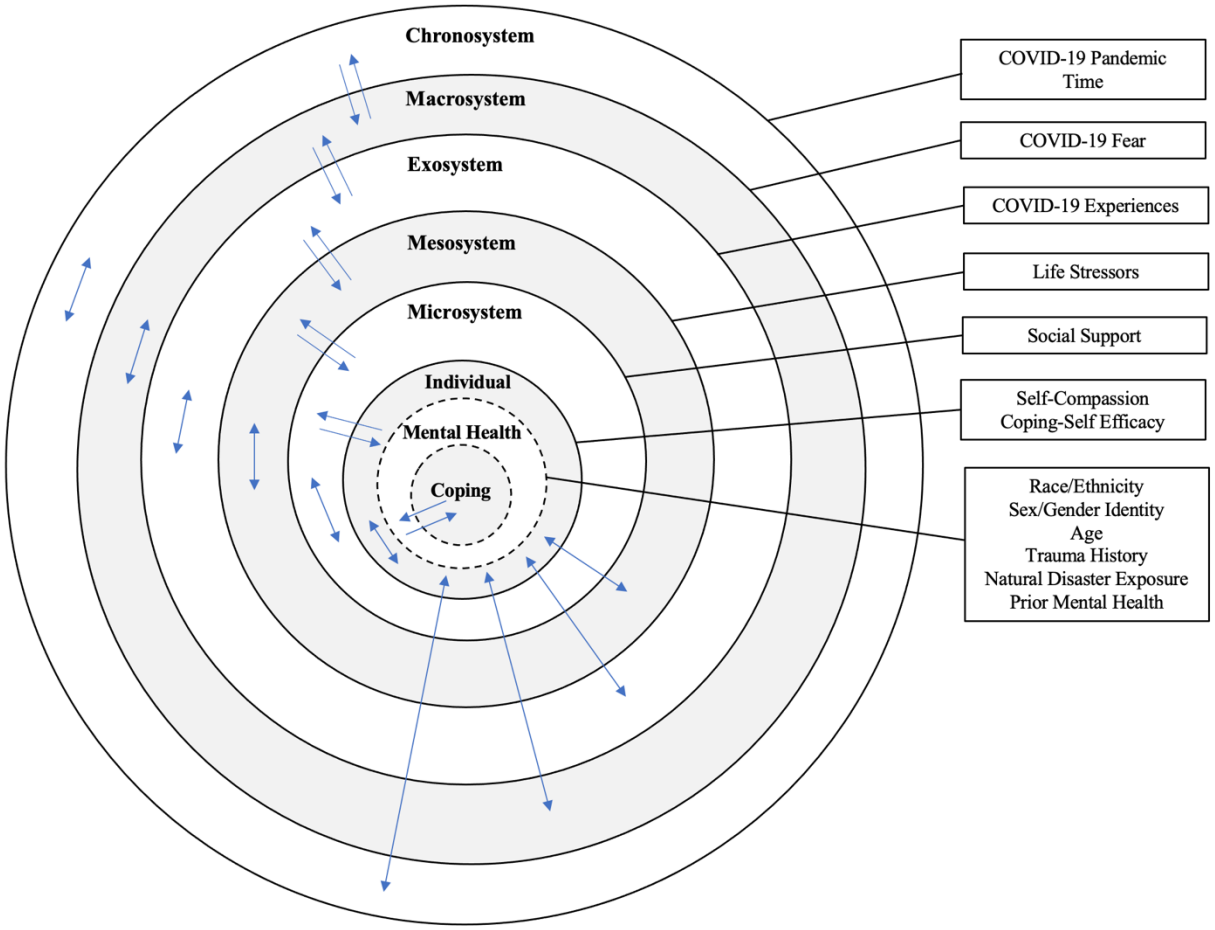
D. Proposed Study and Hypotheses

This dissertation investigated the long-term impact of natural disasters and the COVID-19 pandemic on young adults' psychosocial adjustment and MH outcomes in the mainland U.S. and Puerto Rico over time using longitudinal data spanning four waves. The current study has drawn from an empirically-supported disaster MH model integrated with a transactional-ecological developmental framework to inform its research questions (see Figure 1 for a visual representation of the model). Because the transactional ecological model suggests that various risk and protective factors interact with each other across multiple ecological layers across one’s environment, I decided to include both individual and environment factors in my model. Such factors interact reciprocally with each other, which also affects one’s ability to cope, which then influences MH and psychosocial adaptation post-disaster.

The current combined conceptual model contains risk and protective factors that are empirically found to have important influences on MH based on prior disaster MH research findings. First, pre-pandemic factors are conceptualized as being related to an individual's static or enduring traits that affect all other components of one's live and environment (e.g., demographic characteristics, prior trauma exposure and MH functioning, natural disaster exposure several years prior to the COVID-19 pandemic and life stressors since disaster). These individual factors then influence one's ability to effectively cope. Self-compassion and coping self-efficacy are conceptualized as possible protective factors and represent coping strategies that may be helpful to engage in in order to deal with stress during the pandemic. Next, life stressors, social support, COVID-19 fear, and COVID-19-related experiences are located within the microsystem, mesosystem, exosystem, and macrosystem, which in turn, also influence an individual's ability to cope. Lastly, the presence of the COVID-19 pandemic is conceptualized as the current disaster and is considered part of the chronosystem, along with the concept of time. Each component of the model interacts with the other in a reciprocal manner. It is important to note that the current model is not exhaustive. There are many other individual and environmental risk and protective factors that may be important in influencing MH during the pandemic, that could not be investigated in the current study; however, the risk and protective factors chosen are of particular interest for young adults.

Figure 1

A Conceptual Model Predicting Young Adult Mental Health During the COVID-19 Pandemic



Note. This conceptual model is derived from the transactional-ecological model, as well as empirically reviewed research from disaster MH literature. It includes various risk and protective factors that may be relevant for young adults that had previously experienced a natural disaster, prior to the COVID-19 pandemic.

Below are the proposed research hypotheses (also see Table 1 for a display of questions, hypotheses, and corresponding independent and dependent variables, and analyses):

Hypothesis 1: Wave 1 (W1) pre-pandemic factors (prior trauma history, disaster exposure, life stressors since disaster, and levels of anxiety, depression, and PTSS post-

disaster) will be associated with higher levels of anxiety, depression, and PTSS symptoms during the COVID-19 pandemic (Wave 3 [W3]).

Hypothesis 2: W3 pandemic risk factors (life stressors, COVID-19 related experiences, and COVID-19 fear) will be associated with higher levels of anxiety, depression, and PTSS symptoms during the COVID-19 pandemic (W3).

Hypothesis 3: W3 pandemic protective factors (social support, self-compassion, and coping self-efficacy) will be associated with lower levels of anxiety, depression, and PTSS symptoms during the COVID-19 pandemic (W3).

Hypothesis 4: MH symptom trajectories (anxiety, depression, and PTSS) across four time points will gradually increase across Waves (Ws) 1-3, and then begin to gradually descend between Ws 3-4, forming a decelerating quadratic shape.

Hypothesis 5: The MH symptom trajectories (anxiety, depression, and PTSS) of young adults with higher levels of trauma history, disaster exposure, and life stressors since disaster will start out at a higher level and decelerate more slowly across all four time points than those without (i.e., MH symptom intercept and trajectory slope will vary depending on person-level characteristics).

Table 1

Current Study Research Questions, Hypotheses, and Analyses

	Research Question	Hypothesis	Independent Variable(s)	Dependent Variable(s)	Analysis
1	What pre-pandemic factors predict pandemic-MH?	Pre-pandemic factors will positively predict pandemic-MH.	W1 Pre-pandemic factors: trauma history, disaster exposure, W1 life stressors since disaster, W1 MH	W3 MH: anxiety, depression, and PTSS	Multiple linear regression
2	What pandemic risk factors predict pandemic-MH?	Pandemic risk factors will positively predict pandemic-MH.	W3 Pandemic risk factors: W3 life stressors, COVID-19 related experiences, COVID-19 fear	W3 MH: anxiety, depression, and PTSS	Multiple linear regression
3	What pandemic protective factors influence pandemic-MH?	Pandemic protective factors will negatively predict pandemic-MH.	W3 Pandemic protective factors: social support, coping self-efficacy, self-compassion	W3 MH: anxiety, depression, and PTSS	Multiple linear regression
4	What are the trajectories of MH symptoms across all four waves (from pre-pandemic/post natural disaster, to one year into the pandemic)?	Trajectories of MH symptoms will gradually increase across Ws 1-3, and gradually descend from Wave 3 to 4, forming a decelerating quadratic shape over time.	Level-one "time" variables: MH plotted across linear, quadratic, or cubic growth trends	Ws 1-4 MH: anxiety, depression, and PTSS	Hierarchical linear modeling (HLM)-assessing model fit and significance of level-one time variables on trajectory shape
5	Do higher levels of trauma history, disaster exposure, and W1 life stressors since disaster change: 1) the starting point of MH trajectories (intercept) and 2) changes in the shape of MH trajectories over time (acceleration or deceleration of slopes)?	MH trajectories will be higher on average, for those with higher levels of trauma history, disaster exposure, and W1 life stressors (influencing intercept level). These variables will also accelerate the growth rate of MH over time (influencing slope), resulting in sharper trajectories.	Level-two "person centered" variables: trauma history, disaster exposure, W1 life stressors since disaster	Ws 1-4 MH: anxiety, depression, and PTSS	HLM-assessing model fit and significance of level-two person characteristics on trajectory shape

Note. Three separate models were run for each analysis: one for each MH outcome: anxiety, depression, and PTSS. Region (U.S. mainland or Puerto Rico) was included in each analysis as a control variable.

II. Method

A. Procedure

Young adult university students were originally recruited for the study through research participation pools within their university or university wide or department emails. IRB approval was obtained at UCSB. Data were collected at universities in California, Florida, Texas, and Puerto Rico through an online Qualtrics questionnaire in English and Spanish across four time points. The Wave 1 (W1) questionnaire asked about exposure to natural disasters that occurred in 2017-18. An English survey was distributed in the mainland U.S. three to six months after several hurricanes (Harvey, Irma, Maria, and Jose), wildfires (Atlas, Nuns, Bears, Thomas, Creek, etc.), and a mudslide (Montecito) occurred in 2017-18. Data were collected between March 2018 and December 2018. A Spanish questionnaire was disseminated in November 2018 in Puerto Rico (a little over a year after Hurricanes Irma, Maria, and Jose occurred in 2017), and continued until April of 2019.

Participants received research credit for participation or had the choice to opt in for a raffle to win one of 20 $25.00 Amazon e-gift-cards. Additionally, participants indicated whether they agreed to be contacted for subsequent follow-up surveys as part of a longitudinal study. A subset of W1 participants *(n* = 466; 54%) agreed and provided personal contact information. Participants were contacted via personal email to participate in later waves.

Wave 2 (W2) data collection occurred in October-December 2019, Wave 3 (W3) data collection occurred in summer of 2020 during the COVID-19 pandemic, and Wave 4 (W4) data collection took place between late February and early April 2021. See Figure 2 for the number of participants who completed a survey during each Wave and the corresponding

retention rate. It is important to note that Figure 2 depicts general participation counts across waves, but that subsamples created to test current study hypotheses vary depending on varying levels of missing data and wave-completion patterns. As compensation for participating in Ws 2-4, each participant was given a $5.00 Amazon e-gift-card for their time.

1. Timing of Study During COVID-19

Two phases of data collection of the current study occurred approximately six months into the pandemic, and approximately one year into the pandemic. Data corresponding to a seven-day average of COVID-19 positive case rates, deaths, and hospitalizations across study regions (California, Florida, Texas, and Puerto Rico) were examined (see Table 2 for full details). This information was used to inform hypotheses four and five, regarding MH trajectories and differences among the mainland U.S. and Puerto Rico. General trends across the mainland U.S. six months in the pandemic revealed high rates, and the first significant wave that the country had observed. One year into the pandemic, although positive case rates, deaths, and hospitalizations remained high, they were lower in the mainland during this time. Additionally, vaccines had begun to be widely administered. Young adults were believed to have increases in MH symptoms six months into the pandemic, and by one year, they would begin to trend downward in a decelerating quadratic shape. Puerto Rico's rates were low compared to the mainland U.S., but it was hypothesized that they would still be impacted on the island and would be aware of cases in the mainland U.S. Their trajectory would be sharper due to the greater level of disaster exposure, prior trauma history, and life stressors since disaster, and have a slower decelerating rate between six months and one year into the pandemic. At one year, case rates in Puerto Rico are much higher, and young adults were hypothesized to have experienced some stress but were thought to adjust over time.

Table 2

COVID-19 Daily Case Increases, Deaths, and Hospitalizations During Current Study Waves 3 and 4 Data Collection by Region

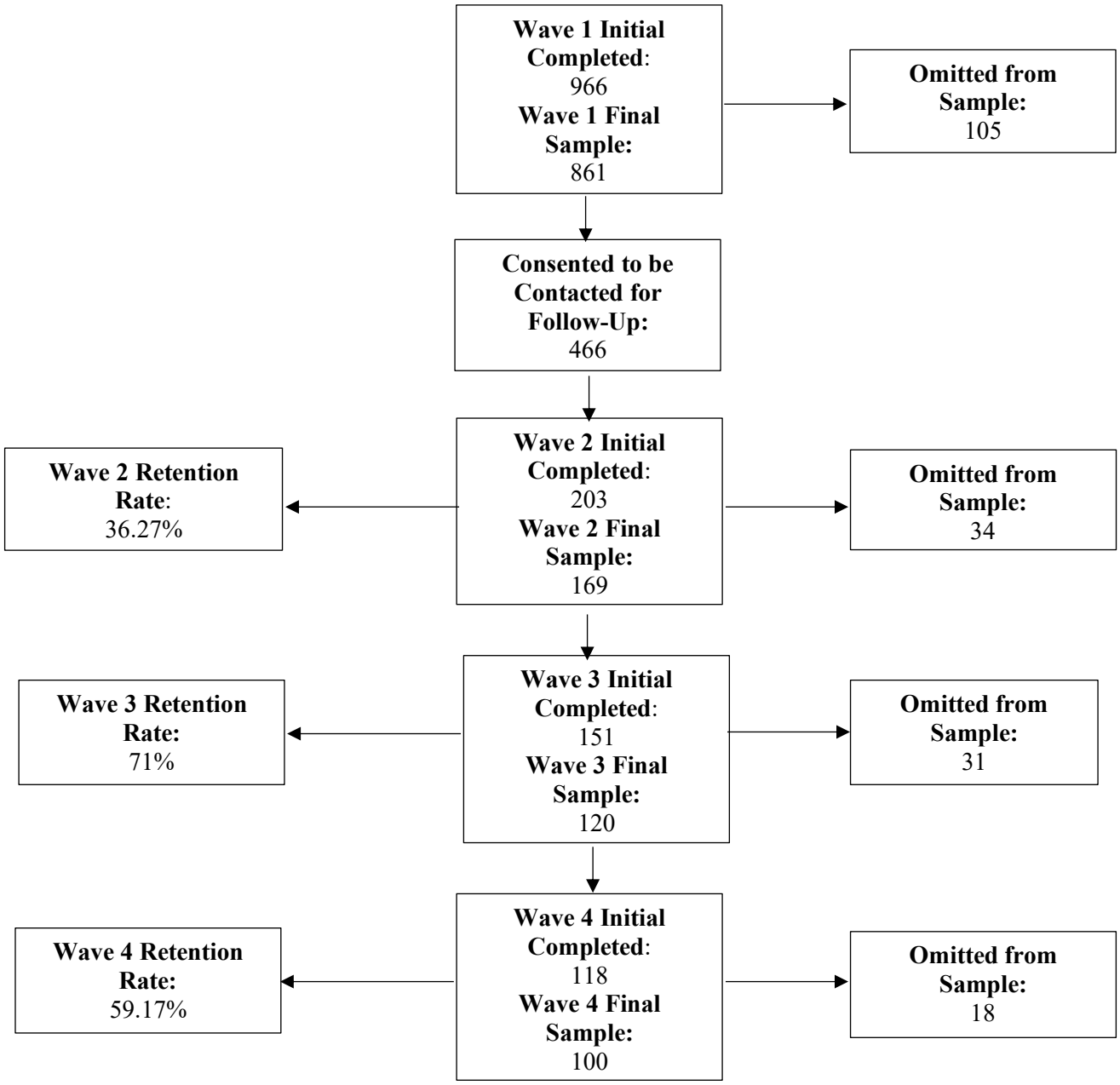
Region	California			Florida			Texas			Puerto Rico		
	Cases	Deaths	Hosp.	Cases	Deaths	Hosp.	Cases	Deaths	Hosp.	Cases	Deaths	Hosp.
Wave 3 (8-9/2020)												
August 6th	6,885	132	7,463	6,525	157	9,327	10,985	227	9,471	300	7	459
August 13th	9,181	123	6,768	5,801	181	8,105	9,745	117	8,371	331	8	412
August 20th	5,823	124	6,348	3,879	125	6,809	6,017	183	6,874	318	8	403
August 27th	5,057	115	5,569	3,002	113	5,740	4,949	146	5,720	250	6	398
Sept. 3rd	4,477	115	4,745	3,549	104	4,852	3,642	127	5,131	149	6	393
Wave 4 (2-4/2021)												
Feb. 26th	5,212	426	5,955	5,428	133	4,408	7,626	230	6,761	190	8	206
March 5th	4,448	268	4,562	5,341	109	3,393	5,591[a]	199[a]	5,513[a]	172[a]	4[a]	171[a]
March 12th	3,139	189	3,794	4,475	83	3,582	4,495[b]	153[b]	4,783[b]	192[b]	2[b]	169[b]
March 19th	2,940	184	3,230	4,511	62	3,397	3,728[c]	125[c]	4,166[c]	230[c]	2[c]	161[c]
March 26th	2,747	190	2,754	5,167	67	3,295	3,997	98	3,859	313	2	211
April 2nd	2,718	112	2,488	5,418	66	3,319	3,164	91	3,530	441	3	268
April 9th	3,285	97	2,213	5,791	49	3,535	3,578	72	3,406	908	4	378
April 16th	2,496	75	2,184	6,756	59	3,804	3,319	55	3,433	1,109	7	517
	Vaccinations			Vaccinations			Vaccinations			Vaccinations		
Feb. 26th	195, 368			93,910			127,535			10,449		
April 16th	456,322			188,071			227,626			32,437		

Note. All values listed in this table represent the seven-day average for the category and date listed. Data collection spanned four and seven weeks, during Waves 3 and 4, respectively. Data Source: https://coronavirus.jhu.edu/region

[a] Data reflect date of March 6th, 2021. [b] Data reflect date of March 13th, 2021. [c] Data reflect date of March 20th, 2021.

Figure 2

Participant Flow Chart Across Waves



Note. Participants were omitted from each wave due to incomplete data (more than 30% of the survey items missing), survey completion under 5 minutes, or reported age over 30 years old. W2 retention rate was calculated by dividing 169 by 466. W3 and W4 retention rates were calculated by dividing each wave final sample total by the W2 final sample total, as this was considered the extended study subsample. These numbers do not reflect the same numbers of samples used to conduct study hypotheses and are general participation trends across the study.

B. Participants

Young adult university students affected by natural disaster throughout the mainland U.S. and Puerto Rico completed surveys in English and Spanish. Participants across waves were mainly female, identified as Latinx, and were exposed to a hurricane (see Table 3 for a breakdown of participant demographics across waves). A total of 966 participants completed the W1 survey, but 105 were omitted from the current study due to incomplete data (more than 30% of the survey items missing), survey completion under 5 minutes, or reported age over 30 years old. This resulted in a W1 sample of 861 university students. Over half of W1 participants (n = 466), consented to be contacted for the extended, longitudinal study (see Figure 2). Over a third (36.3%) of young adults that were contacted participated in W2, about a quarter participated in W3, and one-fifth in W4.

The W1 sample was female, on average 20 years old, ranging from ages 18 to 30, and diverse in terms of ethnicity. Over one-third of students identified as White and over one-quarter as Latino. The majority of students reported that they were freshman at W1 and located in the mainland U.S. Almost half of students reported they had experienced a wildfire in the U.S., and less than one-fifth had experienced a hurricane in Puerto Rico. Of those who had experienced wildfires, a small percentage of respondents reported that they had also experienced a mudslide that followed one of the wildfires.

Differences were noted in the frequencies of demographic characteristics between the W1 sample and subsequent waves (see Table 3). White participants made up the largest ethnicity group at W1, but across Ws 2-4, the largest percentage of participants identified as Latinx (49.7% - 54.5%) and from Puerto Rico (48% - 52.5%). Instead, White participants accounted for a much smaller proportion of the sample at later waves (19.2% - 23.7%). At

W1, about a quarter of participants were males, but across Ws 2-4, this reduced to one-fifth or less (11.7% - 15%). The majority of the Ws 2-4 sample was female (85%-88.3%).

Table 3

Participant Demographics Across Waves

	W1 (*n* = 861)		W2 (*n* = 169)		W3 (*n* = 120)		W4 (*n* = 100)	
	n	%	n	%	n	%	n	%
Sex								
Female	646	75	146	86.4	106	88.3	85	85
Male	212	24.6	23	13.6	14	11.7	15	15
Ethnicity								
Asian	130	15.1	19	11.2	16	13.3	13	13.1
Black	43	5	8	4.7	3	2.5	3	3
Latinx	246	28.6	84	49.7	62	51.7	54	54.5
White	329	38.2	40	23.7	25	20.8	19	19.2
Mixed/Other	98	13.1	18	10.7	13	10.8	10	10.1
W1 Region by Disaster								
Mainland U.S.								
Hurricane	304	35.3	40	23.7	26	21.7	22	22
Wildfire	402	46.7	49	29	37	30.8	26	26
Total	706	82	89	52.7	63	52.5	48	48
Puerto Rico								
Hurricane	152	17.7	80	47.3	57	47.5	52	52
W1 University Class								
Freshman	294	34.1	34	20.1	24	20	20	20
Sophomore	185	21.5	37	21.9	27	22.7	19	19
Junior	130	15.1	23	13.6	13	10.9	13	13
Senior	189	22	38	22.5	29	24.4	25	25
Graduate Student	54	6.3	35	20.7	26	21.9	23	23
	M	SD						
W1 Age	20.3	2.5						

Additionally, significant differences among pre-pandemic factors were found when comparing participants who completed the W1 survey only, with those who participated in the longitudinal study (i.e., those who completed W1 and at least one subsequent wave). Young adults who participated in the longitudinal study reported higher levels of past trauma, life stressors since disaster, and anxiety, depression, and PTSS than those who did not continue past W1 (see Table 4). No differences in disaster exposure were found.

Table 4

Differences in Pre-Pandemic Factors Among Wave 1 Only and Longitudinal Study Participants

	Wave 1 Only (n = 692)		Longitudinal Study (n = 169)				
Pre-Pandemic Factors	*M*	*SD*	*M*	*SD*	*t*	*df*	*p*
Past Trauma	2.14	1.80	2.49	2.09	-2.04	232.33	.021
W1 Disaster Exposure	.01	.99	.09	1.04	-.86	793	.194
W1 LS Since Disaster	1.68	2.31	2.90	2.58	-5.50	230.33	<.001
W1 Anxiety	.87	.75	1.00	.74	-2.02	859	.022
W1 Depression	.81	.64	.94	.67	-2.47	858	.007
W1 PTSS	.37	.49	.53	.54	-3.53	819	<.001

Note. LS = life stressors.

1. Waves 1 and 3 Subsample Descriptive Statistics

A subsample of 120 young adults who participated in Ws 1 and 3 was selected to examine the association among W1 pre-pandemic factors, W3 pandemic-protective factors, and W3 pandemic risk factors, with W3 MH. Most participants were female, and half identified their ethnicity as Latino (see Table 3, W3 column). About half of participants indicated they were from Puerto Rico and the majority had been exposed to a hurricane. Participants also varied about evenly in university class standing.

2. Waves 1 through 4 Subsample Descriptive Statistics

A subsample of 205 participants who had completed at least W1 and one or more subsequent waves, with full person-level data was selected to examine MH trajectories over time, and the association among pre-pandemic factors and the trajectory starting point, as well as changes within the trajectory. Majority of this sample were female, and about half identified as Latinx and from Puerto Rico (see Table 5). The greatest attrition occurred between Ws 2 and 3, after the onset of the COVID-19 pandemic.

Table 5

Participant Demographics using a Subsample of Longitudinal Participants who Completed Wave 1 and One or More Later Waves (n = 205)

	n	%
Sex		
Female	177	86.3
Male	28	13.7
Ethnicity		
Asian	24	11.7
Black	9	4.4
Latinx	102	49.8
White	49	23.9
Mixed/Other	21	10.3
Missing	1	.5
Region by Disaster		
Mainland U.S.		
Hurricane	50	24.4
Wildfire	58	28.3
Puerto Rico		
Hurricane	97	47.3
Region		
Mainland U.S.	108	25.7
California	58	28.8
Florida	42	20.5
Texas	8	3.9
Puerto Rico	97	47.3
Wave Participation		
Wave 1	205	-
Wave 2	162	79
Wave 3	117	57.1
Wave 4	97	47.3
Attrition Rate		
Waves 1-2	43	21
Waves 2-3	45	27.8
Waves 3-4	20	17.1
W1 University Class		
Freshman	44	21.5
Sophomore	44	21.5
Junior	28	13.7
Senior	48	23.4
Graduate Student	39	19
Missing	2	1
	M	*SD*
W1 Age	21.38	3.27

C. Measures

1. Pre-Pandemic Factors

W1 Prior Trauma History. The Life Events Checklist-5 (LEC-5) is a 17-item self-report measure designed to assess exposure to a variety of potentially traumatic events in a respondent's lifetime, such as a fire or explosion, transportation accident, physical or sexual assault, life-threatening illness or injury, or other very stressful experience, etc. (Gray et al., 2004). A subset of items from the original LEC-5 (13 items) were used. Respondents indicated whether that had experienced such traumatic events, indicating either 0 = *no* and 1 = *yes*. These items were summed into a total composite score. The LEC was found to be reasonably stable over seven days in regard to test-retest reliability and correlated with PTSD symptoms in a sample of undergraduate students (Gray et al., 2004).

W1 Disaster Exposure. Participants responded to disaster exposure questions based on the previous measures used by the research team (Felix et al., 2011; Felix et al., 2015) and prior disaster MH research (La Greca et al., 1996). Items varied slightly based upon hurricane and wildfire questionnaire versions, but both asked about experiences of threat, loss, damage, or disruption during the disaster, or caused by the disaster (e.g., whether participants were injured or forced to evacuate during the disaster, lost their home, an animal, or a loved one, experienced financial losses because of the disaster, or whether the disaster damaged/destroyed items of sentimental, emotional value, etc. Response options were 0 = *no* and 1 = *yes*. Participants also rated the extent of damage to their permanent and college residences caused by the hurricane on a 5-point scale from 0 (*no damage*) to 4 (*total loss or destruction*). This was converted to a dichotomous scale (0 = *no damage* and 1 = *any damage*) based on a prior study in which a descriptive analysis revealed that no damage,

versus any damage reported at all, distinguished between MH outcomes rather than the various levels of damage endorsed (Felix et al., 2020). Other prior disaster exposure measures demonstrated strong predictive validity of MH outcomes post-disaster (internalizing symptoms, and anxiety, depression, and PTSS) among youth and adults (Felix et al., 2011; Felix et al., 2019).

In the current study, hurricane and wildfire exposure experiences were summed separately to create a continuous measure of exposure. This was because some questions differed slightly depending on whether the hurricane, wildfire, or mudslide exposure questions were asked. Wildfire and mudslide experiences were combined, since these events occurred shortly after each other in Santa Barbara, California with little time in-between. If a participant endorsed an experience for either event, they were coded as yes. If a participant endorsed experiences relating to *both* the wildfire and the mudslide (e.g., evacuated in both), then they would receive only *one* yes, representing both disasters. Identical questions were asked about experiences relating to the wildfires and mudslide. Items were summed to create a composite score. Each disaster exposure type (hurricane, only wildfire, or wildfire and mudslide) were then transformed into *z*-scores since the exposure sum could not be compared directly across disaster types and was done to increase the ability to interpret scores.

W1 Life Stressors Since Disaster. Participants were asked if they had experienced 11 different life stressors in the time since the disaster. Items were adapted from questions used in prior research following wildfire disasters (e.g., Felix et al., 2020) and asked about job changes, moving away, illness or injury to self or a family member, money problems, relationship problems, etc. Response options were 0 = *no*, 1 = *yes*. Total scores were computed by the sum of the dichotomized items. Based on prior research, disaster exposure

sum was significantly and positively associated with the number of life stressors endorsed since disaster among a sample of youth ($r = .57$, $p < .001$; Felix et al., 2020); those who reported having greater levels of disaster exposure also endorsed more life stressors since disaster, demonstrating convergent validity for both constructs as objective measures of the disasters' impact.

2. During Pandemic Measures

W3 Pandemic Experiences. Participants were asked about seven various experiences relating to the ongoing COVID-19 pandemic. The current research team co-created these items using prior disaster exposure measures (e.g., Felix et al., 2011; Felix et al., 2015) as a model to assess COVID-19 related-experiences of threat or loss. Instead of focusing on aspects of natural disaster exposure, this measure was tailored specifically toward capturing possible stressful or traumatic experiences that may have occurred during the COVID-19 pandemic. Example items included, "Do you believe you had or currently have COVID-19?," "Did you receive treatment from a doctor for COVID-19?," "Has someone close to you been hospitalized because of COVID-19?," "Has someone close to you died from COVID-19?," etc. Response options were 0 = *no*, 1 = *yes*. Total scores were computed by the sum of the dichotomized items.

W3 COVID-19 Fear. Participants were asked seven items about their perceived threat or fear of the ongoing, global COVID-19 pandemic toward themselves and their loved ones. The principal investigator co-created possible items to assess for COVID-19 fear after reviewing emerging COVID-19 related measures intended for clinical or population research compiled by the National Institute of Health (NIH) Office of Behavioral and Social Sciences Research (OBSSR; 2020). These items were discussed and finalized with input from the

investigator's lab. Sample items included, "If I were to contract COVID-19, I believe that my life would be at threatened/at risk", "I fear that I will infect others even if I am asymptomatic", "I fear that others could infect me even if they are asymptomatic", "I fear that my loved ones (family members or friends) will be infected", etc. Response options utilized a 5-point Likert scale. A total score was computed. Cronbach's alpha for this measure in the current sample at Wave 3 was $\alpha = .84$, indicating good internal consistency.

W3 Life Stressors. To assess life stressors during the pandemic, participants indicated whether they had experienced 18 possibly stressful experiences during the COVID-19 pandemic. Response options were 0 = *no*, 1 = *yes*. The current research team co-created a list of relevant life stressors during the COVID-19 pandemic, which were based off prior measures used to assess life stressors post-disaster (Felix et al., 2020). Items included from prior studies were losing or changing a job, having friends move away, having more arguments or conflicts with loved ones, etc. (Felix et al., 2020). COVID-19-specific life stressors were also added. Participants were asked if they had difficulty adjusting to online remote learning, felt unsafe in their own home (e.g., due to domestic violence, prejudice from parents, or other conflict), had difficulty getting basic needs met (e.g., food, housing), or difficulty accessing physical or MH care during the pandemic. The sum of the checklist was computed, resulting in a total score, which represented the number of pandemic life stressors experienced.

W3 Social Support. The current research team co-created an 11-item measure to assess perceived social support during the pandemic that was based off the Social Provisions Scale (SPS; Cutrona & Russell, 1987). The SPS is a 24-item measure that assesses six forms of social provisions that an individual may receive from interpersonal relationships (Weiss,

1974). Current study items were either selected or modeled after original measure items from the following subscales: attachment (feeling at ease and secure through emotional intimacy and connection), guidance (being able to obtain helpful or trusted advice or information from others), and reliable alliance (feeling secure in knowing that others can be counted on for help during emergencies or times of need). Participants rated the degree to which they agreed or disagreed on a 4-point Likert-scale, of one through four (1 = *strongly disagree*, 2 = *disagree*, 3 = *agree*, 4 = *strongly agree*). Example items include, "I have close relationships that provide me with a sense of emotional security and well-being" (attachment), "There is no one that I feel comfortable talking to about intimate personal problems" (guidance), and "If I were sick, I could easily find someone to help me with my daily chores" (reliable alliance). Negative items were reverse-scored, and a total social support score was created by adding all items. Cronbach's alpha for W3 perceived social support was .88, demonstrating good internal consistency.

W3 Coping Self-Efficacy. The Coping Self-Efficacy-Trauma (CSE-T) scale is a 9-item self-report measure of general trauma-related coping self-efficacy perceptions, and is a shortened, modified version of the Coping Self Efficacy (CSE) measure focused on perceptions across trauma experiences (Benight et al., 2015). A modified version of the CSE-T was used in the current study, consisting of five items total focusing on the COVID-19 pandemic. Items included "How capable do you think you are to "… deal with your emotions (anger, sadness, depression, anxiety) during the pandemic", "… keep your life feeling normal", "… manage distressing dreams or images about the pandemic", etc. Responses ranged from 1-7, with 1 = "I'm not capable at all", 4 = "I'm moderately capable", and 7 = "I'm totally capable". This scale was developed and tested using several different samples,

including trauma-exposed college students disaster survivors, demonstrating good test–retest reliability, internal consistency, and convergent and discriminant validity (Benight et al., 2015). Cronbach's alpha $\alpha = .83$ in the current sample for the modified Wave 3 CSE-T, demonstrating good internal consistency.

W3 Self-Compassion. Self-compassion was measured using the Self-Compassion Scale- Short Form (SCS-SF). The SCS-SF is a self-report measure consisting of 12 items measuring the degree to which someone perceives themselves to be self-compassionate, accepting, and kind toward themselves instead of harshly critical (Raes et al., 2011) and is a shortened version of the full 26-item Self Compassion Scale (SCS; Neff, 2003a). There are five subscales of the SCS-SF made up of two items each: self-kindness, self-judgment, common humanity, mindfulness, and over-identification. The SCS-SF is especially useful for examining overall self-compassion scores and utilizes items such as "When I fail at something important to me, I become consumed by feelings of inadequacy", "I try to be understanding and patient towards those aspects of my personality I don't like,", "When something painful happens I try to take a balanced view of the situation", etc., with possible responses consisting of 1 *(almost never)* to 5 (*almost Always)*. Respondents' total self-compassion score was determined by reversing the score of the negative subscale items such as self-judgment, isolation, and over-identification (i.e., 1 = 5, 2 = 4, 3 = 3, 4 = 2, 5 = 1) and utilizing these scores to then compute a total mean. The SCS–SF demonstrates a near perfect correlation with the original scale when examining total scores as well as adequate internal consistency (Cronbach's $\alpha \geq 0.86$ in all samples), including a sample of 415 university students (Raes et al., 2011). In the current sample, Cronbach's alpha for W3 self-compassion was .88, indicating good internal reliability.

3. Pre- and During Pandemic Mental Health

W 1-4 Generalized Anxiety. Anxiety symptoms were assessed via the Generalized Anxiety Disorder-7 (GAD-7), a seven-item self-report questionnaire used for screening and measuring severity of symptoms of anxiety (Spitzer et al., 2006). Respondents were asked how often they experienced particular symptoms of anxiety within the last two weeks (e.g., "feeling nervous, anxious, or on edge"). A four-point response scale was used ranging from 0 (*not at all*) to 3 (*nearly every day*). A total score was formed by summing responses, with higher scores indicating increased likelihood of an anxiety disorder. A mean score was also computed and used, depending on the analysis. It has also been shown to be a reliable and valid instrument for accurately assessing generalized anxiety disorder symptoms in university students (Lee & Kim, 2019). The GAD-7 also has good reliability, as well as criterion, construct, factorial, and procedural validity (Spitzer et al., 2006). Cronbach's alpha for this measure in the current sample was high. For the first three Ws, $\alpha = .90$ and for W4, $\alpha = .89$.

W 1-4 Depressive Symptoms. The Patient Health Questionnaire-9 (PHQ-9) was used to measure depressive symptoms and consists of a nine-item self-report measure of depressive symptoms based on DSM-IV criteria (Kroenke et al., 2001). Respondents were asked how often they have experienced particular symptoms within the last two weeks (e.g., "feeling down, depressed, or hopeless") and response options are as follows: 0 (*not at all*), 1 (*several days*), 2 (*more than half the days*), and 3 (*nearly every day*). Scores were summed to form both separate mean and total scores, which were used for different analyses. Scores were also dichotomously coded into moderate or higher levels of depression of a score of 10 or higher (Kroenke et al., 2010). This score can establish provisional depressive disorder diagnoses as well as indicate greater depressive symptom severity. The

PHQ-9 has demonstrated good internal reliability and test-retest reliability with Cronbach's α = 0.89 and correlation = 0.94 (Kroenke et al., 2010). It has also shown to accurately and sustainably assess depression among 857 diverse racial/ethnic U.S. university students (Keum et al., 2018). Cronbach's alpha in the current sample for Ws 1-4 = .89, .89, .90, and .89 respectively, indicating strong internal consistency.

W 1-4 Posttraumatic Stress. The PTSD Checklist for DSM-5 (PCL-5) is a 20-item self-report measure that assesses DSM-5 symptoms of PTSD and was used in the current study to measure PTSS (Weathers et al., 2013). It is intended to screen for PTSD, monitor symptom change over time, and make a provisional PTSD diagnosis and requires that respondents refer to a stressful or traumatic experience when thinking about the impact it may have on various problems they may have experienced within the last month. Ws 1 and 2 instructed participants to think about their experiences with natural disaster when answering the questions, while Ws 3 and 4 instructed participants to think about their experiences related to the COVID-19 pandemic. Some sample items include, "In the past month, how much were you bothered by: repeated, disturbing, and unwanted memories of the stressful experience (disaster *or* the COVID-19 pandemic); feeling very upset when something reminded you of the stressful experience; avoiding memories, thoughts, or feelings related to the stressful experience?", etc. The self-report rating scale is 0-4 for each symptom: *not at all*, *a little bit*, *moderately*, *quite a bit*, or *extremely*. Both a mean score and a total sum score were computed and used for varying analyses. Psychometric properties of the PCL-5 were examined in two studies involving trauma-exposed undergraduate students, which exhibited strong internal consistency comparable to other PTSD measures (Cronbach's α=.94), test-retest reliability across testing occasions (*r* = .82), convergent validity (*rs* = .74 to .85),

meaning that the measure is associated with other PTSD measures, and discriminant validity (*rs* = .31 to .70), demonstrating that the measures scores are associated with related constructs (Blevins et al., 2015). Indicating strong internal consistency, Cronbach's alpha in the current sample for Ws 1–4 = .93, .90, .94, and .93, respectively.

III. Analytic Procedure

A. Preliminary Analyses

Prior to testing study hypotheses, SPSS software Version 28 (IBM, 2021) was used to conduct several preliminary analyses. First, frequencies of participant demographics across all waves were examined. The retention rates across all study waves were also calculated. Next, descriptive statistics (e.g., mean, standard deviation) of pre-pandemic factors, pandemic risk and protective factors, and mental health (MH) outcomes across all waves were conducted. Pearson's correlations were also conducted among all study variables to examine preliminary associations. Demographic characteristics among participants who participated in W1 only and those who participated in both W1 and at least one subsequent wave or more, were examined. Additionally, differences among pre-pandemic factors and pandemic risk and protective factors by sex (male, female) and region (mainland U.S., Puerto Rico) were assessed through independent samples *t*-test analyses based on findings from previous analyses (Janson et al., 2023). Lastly, a one-way analysis of variance (ANOVA) analysis was conducted to examine differences among study variables by ethnicity and disaster type by region (hurricane in mainland U.S., hurricane in Puerto Rico, and wildfire/mudslide in mainland U.S.). Four post-hoc analyses using G*Power (Faul et al., 2007) were conducted to examine whether there was sufficient power to detect differences in

study variables among each comparison group (e.g., sex, region, ethnicity, disaster type by region).

B. Examining Associations Among Pre-Pandemic Factors, Pandemic Risk and Protective Factors, and Pandemic Mental Health

Multiple linear regression analyses, or ordinary least squares (OLS) regression were conducted to examine associations among pre-pandemic factors, pandemic risk and protective factors, and pandemic MH. Several steps were required to prepare for analyses. First, a subsample of participants who completed both W1 and W3 surveys was selected. Next, power analyses were conducted using G*Power (Faul et al., 2007) to determine whether the selected sample size demonstrate sufficient power to proceed with linear regression analyses. Once confirmed, descriptive statistics were conducted for this subsample.

Next, all study variables were assessed to determine whether they possessed the properties of the four-OLS assumptions: linearity, normality, homoscedasticity, and independence (Osborne & Waters, 2002; Tabachnick & Fidell, 2013; Williams et al., 2013; Ernst & Albers, 2017). To assess linearity of independent and dependent variables, bivariate residual scatterplots were examined. Normality of variables was assessed through visual inspection and review of data plots, skew and kurtosis levels, and standardized normal probability plots (P-plots). Homoscedasticity was examined by visually reviewing plots of standardized residuals. Multicollinearity among variables was also examined through variance inflation factor (VIF) statistics. Lastly, it was evident that the Ws 1 and 3 subsample data did not meet the assumption of independence because the same participants provided information at these two time points (e.g., specifically, the MH measures which were

repeated at both waves), with irregular timing in-between waves. Even though the data were not considered independent, linear regression was determined important to conduct because of the unique opportunity to examine associations among prospective, pre-pandemic factors, including pre-pandemic MH, and pandemic risk and protective factors on pandemic-MH, despite the risk of having some error. Due to this limitation, results should be interpreted carefully. Other statistical methods such as hierarchical linear modeling (HLM) would be capable of accounting for the repeated-measures component of the data and reducing bias and error; however, this method would not enable pre-pandemic MH to be regressed onto pandemic-MH which was of key interest to the current study.

After the decision was made to proceed with multiple linear regression despite the assumption of independence being unmet, analyses were conducted using Mplus Version 8 (Muthén & Muthén,1998-2017) statistical software. This software was chosen due to its ability to analyze partially complete data using full information maximum likelihood (FIML) estimation. A FIML approach assumes that missing values are conditionally dependent on other observed variables and yields unbiased model parameter estimates and standard errors, utilizing all available data (Enders, 2001). In comparison to other methods aimed at managing missing data using linear regression (e.g., listwise deletion, pairwise deletion, and mean imputation), FIML is considered to be far superior with less bias and sampling variability (Enders, 2001).

Finally, three, separate standardized linear regression models in total were conducted. Pre-pandemic factors, and pandemic risk and protective factors were simultaneously regressed on each separate pandemic MH outcome (W3 anxiety, W3 depression, and W3 PTSS). Significant predictors of W3 anxiety, W3 depression, and W3 PTSS were identified,

and model fit statistics examined (R^2). Additional regression model analyses were conducted adding sex and region, and then, sex and disaster type by region, as separate pairs of covariates to the final model. Significant co-variates were retained, while non-significant covariates were removed.

1. Post-Hoc Analyses

Post-hoc linear regression analyses were conducted to further explore and better understand the associations among pre-pandemic factors, self-compassion, and PTSS without other pandemic risk or protective factors included. Two linear regression models were conducted using SPSS (IBM, 2021) and associations were examined for significance. Within the first model, W1 PTSS was regressed onto W3 self-compassion. The second model examined pre-pandemic factors (prior trauma history, disaster exposure, W1 life stressors since disaster, and W1 MH including anxiety, depression, and PTSS) on W3 self-compassion. Covariates were not included.

C. Examining Mental Health Trajectories and Pre-Pandemic Factors Associated with Trajectory Intercept or Growth Rates

Hierarchical linear modeling (HLM) was conducted using HLM8 software (Raudenbush et al., 2019) to conduct a growth curve analysis to: 1) examine the shape of MH trajectories across four time points (two pre-pandemic and two-during), and 2) identify pre-pandemic factors and demographic characteristics associated with W1 MH starting points (i.e., intercepts) and possible changes in trajectories over time (e.g., rate of growth of MH, increases or decreases in MH symptoms). In contrast to the use of multiple linear regression to examine associations among pre-pandemic and concurrent pandemic factors with pandemic-MH, HLM was deemed well-suited and appropriate for use with the current

study's longitudinal design consisting of the same participants across waves. HLM is a viable method to use for non-independent data because it allows greater general flexibility to accommodate sets of repeated measures, while accounting for within-group similarities and within-person variation among individuals, which reduces possible error and bias (Anderson, 2012). This methodology can also incorporate missing data and data with unequal intervals between assessments. With HLM, slopes are calculated for each individual, rather than a single average slope across students (e.g., as in linear regression), which allows the functional form of an HLM growth curve to vary. Growth curves can have linear, decelerating quadratic, accelerating quadratic, or cubic (*S*-shaped) trajectories or trend lines in either positive, negative, or both directions (Anderson, 2012).

An important caveat to note, is that when utilizing HLM, W1 (pre-pandemic) MH outcomes cannot be utilized as independent predictors of subsequent pandemic MH, because they are repeated across Ws 1-4, and conceptualized as part of the outcome at all time points; W1 MH is part of the MH trajectory shape and represents the initial starting point or intercept. Instead, associations among certain W1 pre-pandemic factors, which include prior trauma history, disaster exposure, and W1 life stressors (excluding W1 MH), and other demographic characteristics could be explored and examined for significance with MH trajectory shape, intercept, and growth rate. In sum, this HLM analysis was determined to offer a differing perspective of the impact of pre-pandemic factors (except for pandemic MH), on MH symptoms over time across four waves, rather than having only examined the influence of pre-pandemic factors on pandemic-MH at one specific time point. HLM was considered useful because it allows a broader understanding of their fluence of pre-pandemic factors on MH trends over time, rather than an initial snapshot. Additionally, HLM ensures

overall less bias and error, and does not risk over-estimating the associations of prior MH functioning on later MH, as multiple linear regression analyses may, due to the lack of independence. Instead, the influence of other pre-pandemic factors can be examined with less risk of error and the ability to understand the influence of prior trauma, disaster exposure, and W1 life stressors impact on MH itself, alone over time.

Prior to conducting HLM, several steps were completed in preparation. A sub-sample of participants who completed W1 and at least one subsequent wave (or more), with complete data for prior trauma history, disaster exposure, W1 disaster exposure, region, and sex, and at least partial to complete MH data, were selected. Level-one variables were designated as "time" or MH over time (plotted across four time points), and level-two variables were designated as "person-centered" or person-level variables (e.g., sex, region, prior trauma history, prior disaster exposure). Region was designated to serve as a control level-two variable. HLM8 software is able to estimate missing data for level- one variables (e.g., "time" or MH over time), but it cannot estimate missing data for any level-two variables (e.g., person-centered); thus, all individuals included needed to have complete level-two variables but could be missing some measures of MH. First, descriptive statistics were conducted for the Ws1-4 longitudinal subsample. Total sum scores for each Ws 1-4 MH outcomes were used to increase interpretability of results. Second, a power analysis was conducted using the Repeated Measures and Sample Size (RMASS) online power calculator specifically designed for two-level repeated measure designs, while accounting for the exact attrition rate of the current subsample and study time points (Gibbons, et al., 2015; Kapur et al., n.d.). Third, assumptions for HLM were examined (e.g., linearity, normality of level-one residuals, homogeneity of level-one residuals). For HLM, level-one residuals are assumed to

be normally distributed with a mean of zero and equal variance (Anderson, 2012). Linearity and normality were assessed via visual inspection of level-one variable residual data plots, level-one variable skew and kurtosis levels, and standardized normal probability plots, or p-plots within SPSS. Next, each MH outcome (anxiety, depression, and PTSS) was first plotted across the four time points in SPSS so that the shape of the data for each participant could be visually examined (Anderson, 2012). This helped to inform whether linear, quadratic, and/or cubic trends should be imposed on each trajectory. Additional level one-time variables predicting MH over time were created to account for other shapes, and coded as follows: linear shape (0 = *Wave 1*; 1 = *Wave 2*; 2 = *Wave 3*; 3 = *Wave 4*), quadratic shape (0 = *Wave 1*; 1 = *Wave 2*; 4 = *Wave 3*; and 9 = *Wave 4,* and cubic shape (0 = *Wave 1*; 1 = *Wave 2*; 8 = *Wave 3*; and 27 = *Wave 4*). Based on prior research findings, a decelerating quadratic term was hypothesized to be the pattern for MH over time (Hawes, Szenczy, Olino, et al., 2021), without prior knowledge of the visual shape of MH trajectories in the current study.

Data were then input into HLM8 (Raudenbush et al., 2019) from SPSS. A test of homogeneity of level-one variance among MH was conducted (an important part of checking the assumptions for HLM). Adjustments were made if homogeneity of level-one residuals, or the variance of residuals were not found to be equal. To conduct the HLM analysis itself, the HLM2 designation due to the level-one and level-two variables. First, a null model for each MH trajectory (anxiety, depression, and PTSS alone) without any predictors was conducted to calculate the intraclass correlation coefficient (ICC) statistic, which reveals whether HLM modeling to determine changes in MH trajectory shape, or level-one "time" variables would be appropriate based on the results. The baseline deviance statistic (-2LL) was also obtained from the null model and is used to compare the fit of other, more complex models. Once

HLM was determined to be appropriate based on the ICC statistic, time variable (linear, quadratic, and cubic) was imposed onto each trajectory (if deemed suitable) one at a time, and simultaneously, to assess whether these shapes significantly explained the models' trajectory. Significant time variables were retained and improvements in model fit were assessed. Each level-two predictor was evaluated on whether it contributed to predicting the MH trajectory intercept and changes in trajectory symptoms over time (Raudenbush & Bryk, 2002).

Lastly, the fixed and random effects of each level one-and two predictor variables were examined for significance. Significant fixed effects indicated that the predictors influenced the intercept, while significant random effects revealed that there was significant unexplained variance by predictors, which must be included in the model and accounted for. If both the fixed and random effects were significant, then they were retained in the model. An interaction term between each level one-time predictor and level-two person-centered predictor was also examined by selecting this function within HLM8 (e.g., choosing to multiply variables together), to assess the influence on the person-level factors on the slopes of MH linear, quadratic, and cubic growth. Non-significant terms were eliminated until a final, parsimonious form was decided upon. After each model was run, chi square statistics were also conducted to examine significant reductions in the deviance statistic, which indicated an improvement in the model fit.

1. Post-Hoc Analyses

Post-hoc analyses were conducted within SPSS, which examined participants' total MH scores across waves (e.g., anxiety, depression, and PTSS), and whether these scores met clinical significance. First, participants' MH scores were summed for a total score, which

represents the severity of symptoms experienced (e.g., lower scores indicate lower severity, higher scores indicate higher severity).

Next, clinical cutoff scores used for the anxiety (GAD-7; Spitzer et al., 2006), depression (PHQ-9; Kroenke et al., 2001), and PTSS (PCL-5; Weathers et al., 2013) measures, as well as associated severity ranges were identified. For anxiety, a score of 10 or greater is considered a clinical cutoff score, suggesting that further evaluation and screening of anxiety symptoms is warranted (Williams, 2014); typically, anxiety scores of 10 or greater are indicative of generalized anxiety disorder (Kroenke et al., 2007). Total sum anxiety scores ranging from zero to four no to minimal anxiety symptoms, five to nine indicate mild anxiety, 10 to 14 indicate moderate anxiety, and 15 to 21 indicate severe anxiety (Kroenke et al., 2007). For depression, a score of 10 or greater is also considered a clinical cutoff score, suggesting further evaluation and screening of depressive symptoms is necessary to determine whether criteria for a full major depressive episode or other MH condition is met (Kroenke et al., 2001; Kroenke et al., 2010). Severity of total depression scores are as follows (Kroenke et al., 2001): zero to four (no symptoms or minimal), five to nine (mild symptoms), 10 to 14 (moderate symptoms), 15-19 (moderately severe), and 20-27 (severe). Last, for the PCL-5, a score of 31 to 33 has been generally determined to be suitable as the clinical cutoff, suggesting that an individual would likely meet criteria for PTSD (Bovin et al., 2016), but additional research is needed. Severity of PTSS scores representing PTSD were not examined, as the PCL-5 is made up of subscales of clustered symptoms (e.g., intrusion, avoidance, negative alterations in cognitions and mood, hyperarousal) and endorsement of at least one symptom from each cluster of at least moderate or greater severity is required for a PTSD diagnosis (APA, 2013). Additionally, guidelines for meaningful change in PTSD

scores using the PCL-5 are not yet determined, but changes identified using prior PTSD measures (e.g., PCL for *DSM-IV;* Weathers et al., 1993) have suggested that a five-to-ten-point difference may reflect reliable changes (e.g., often due to treatment and not by chance), while a ten-to-20-point increase may likely reflect clinically significant changes that may impact life functioning (Weathers et al., 2013).

MH total sum scores were coded as either being below (0) or at or above the clinical cutoff (1) for each MH outcome across waves (e.g., 10 or greater for anxiety or depression, 31 or greater for PTSS). Then, frequencies were run to examine the percentage of individuals above the clinical cutoff range for each outcome, indicating the proportion of young adults that would benefit from further follow-up and assessment for their symptoms across waves to allow for a different way of interpreting MH symptoms.

IV. Results

A. Preliminary Results

Preliminary post-hoc power analyses revealed that there was an adequate level of power to identify differences by sex, region, ethnicity, and disaster type by region among study variables. Independent samples *t*-tests revealed differences by sex and region within the Ws 1 and 3 subsample (n = 120). This group of students was used to examine the association among pre-pandemic factors, and pandemic risk and protective factors on pandemic-MH. Results indicated that females reported greater W1 PTSS (M = .60, SD = .60) than males (M = .21, SD = .24), $t(40.29) = -4.59$, $p < .001$. Females also reported greater W3 PTSS (M = 1.10, SD = .84) than males (M = .59, S = .41), $t(30.97) = -3.64$, $p < .001$, and greater W3 anxiety (M = 1.10, SD = .79) than males (M = .50, SD = .48), $t(30.97) = -3.64$, $p < .001$. No other differences were found by sex. Several differences were also found by

region (see Table 6). Participants in Puerto Rico reported significantly greater scores among W1 life stressors, W1 depression, W1 PTSS, W3 COVID-19 fear, W3 anxiety and W3 depression than those in the mainland U.S. No other differences were found by region.

Table 6

Regional Differences in Study Variables (n = 120)

	Region							
	Mainland U.S. (*n* = 63)		Puerto Rico (*n* = 57)					
	M	*SD*	*M*	*SD*	*t*	df	*p*	Cohen's *d*
W1 Trauma History	2.16	1.78	2.60	2.28	-1.18	118	.241	2.03
W1 Disaster Exposure	.16	1.07	-.06	1.01	1.16	117	.247	1.04
W1 Life Stressors	1.34	1.80	3.95	2.33	-6.76	105.14	<.001	2.07
W1 Anxiety	.88	.75	1.08	.77	-1.43	118	.157	.76
W1 Depression	.76	.55	1.14	.74	-3.18	102.07	.002	.65
W1 PTSS	.36	.39	.77	.67	-4.10	88.77	<.001	.54
W3 Life Stressors	5.17	3.44	5.47	2.98	-.49	109	.623	3.24
W3 COVID-19 Fear	3.73	.63	4.22	.63	-4.03	116	<.001	.67
W3 COVID-19 Experiences	2.28	1.25	2.14	1.16	.62	116	.535	1.21
W3 Social Support	3.30	.42	3.41	.48	-1.36	118	.176	.45
W3 Coping Self-Efficacy	5.05	1.10	5.14	1.15	-.40	112	.693	1.12
W3 Self-Compassion	3.13	.70	3.08	.90	.33	118	.746	.80
W3 Anxiety	.85	.72	1.23	.81	-2.70	118	.008	.76
W3 Depression	.75	.58	1.10	.77	-2.78	103.93	.007	.70
W3 PTSS	.96	.85	1.12	.78	-1.04	113	.301	.82

Note. *p*-value is two-tailed. Mean scores were used for Waves 1 and 3 anxiety, depression, and PTSS.

ANOVA results corrected for multiple comparison (with a Bonferroni correction of $p < .01$) indicated significant differences by ethnicity and disaster type by region. Findings revealed that participants differed among W1 life stressors ($p < .001$), W1 PTSS ($p = .009$), and W3 COVID-19 fear ($p = .002$), depending on ethnicity. A post-hoc comparison indicated that Latino participants experienced a greater mean number of W1 life stressors ($M = 3.64$, $SD = 2.37$) than Asian ($M = 1.13$, $SD = 1.85$) and White participants ($M = 1.32$, $SD = 1.68$), and those from mixed or other ethnicities ($M = 1.38$, $SD = 1.66$). Latino participants also

reported higher W1 PTSS (M = .73, SD = .66) than White participants (M = .29, SD = .32), and greater COVID-19 fear (M = 3.49, SD = .76) than White participants (M = 4.17, SD = .67).

Significant differences by disaster type and region were found among W1 life stressors ($p < .001$), W1 depression ($p = .005$), W1 PTSS ($p < .001$), and W3 COVID-19 fear ($p < .001$). Participants in Puerto Rico exposed to a hurricane reported significantly greater W1 life stressors (M = 3.95, SD = 2.33), than those in the mainland U.S. exposed to a hurricane (M = 1.50, SD = 2.12), or wildfire (M = 1.23, SD = 1.54). Those who experienced a hurricane in Puerto Rico also reported greater levels of W1 depression (M = 1.14, SD = .74), and W1 PTSS (M = .77, SD = .67), than those exposed to a hurricane in the mainland U.S. ($M_{\text{W1 Dep}}$ = .68, $SD_{\text{W1 Dep}}$ = .60; $M_{\text{W1 PTSS}}$ = .19, $SD_{\text{W1 PTSS}}$ = .27) or a wildfire ($M_{\text{W1 Dep}}$ = .82, $SD_{\text{W1 Dep}}$ = .50; $M_{\text{W1 PTSS}}$ = .47, $SD_{\text{1 PTSS}}$ = .43). Lastly, hurricane-exposed young adults in Puerto Rico reported significantly greater COVID-19 fear (M = 4.22, SD = .63), than hurricane-exposed (M = 3.64, SD = .82), and wildfire-exposed (M = 3.78, SD = .61), young adults in the mainland U.S.

B. Pre-Pandemic, and Pandemic Risk and Protective Factors Predicting Pandemic Mental Health

Most W1 and W3 study variables were significantly related to each other (see Table 7 for bivariate correlations, means, and standard deviations). Trauma history and disaster exposure were not significantly related to W1 anxiety or depression, or pandemic risk factors, and disaster exposure was also not significantly related to W3 MH, which was not consistent with what was expected based on prior disaster MH research finding associations

among trauma/disaster exposure and MH. MH measures were highly correlated to each other among all time points**.**

Table 7

Descriptive Statistics and Correlations for Waves 1 and 3 Subsample used to Examine Associations Among Pre-Pandemic Factors, W3 Pandemic Risk and Protective Factors, and Mental Health (n = 120)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Trauma History	-														
2. Disaster Exposure	.17	-													
3. W1 Life Stressors	.23*	.21*	-												
4. W1 Anxiety	.18	-.09	.24**	-											
5. W1 Depression	.18	-.04	.38**	.78**	-										
6. W1 PTSS	.29**	.12	.38**	.62**	.65**	-									
7. W3 Life Stressors	.11	.14	.27**	.37**	.40**	.33**	-								
8. COVID-19 Fear	.03	-.03	.16	.26**	.19*	.34**	.11	-							
9. COVID-19 Experiences	.06	.12	.09	.10	.19*	.13	.20*	.03	-						
10. Social Support	-.16	-.05	-.06	-.23*	-.25**	-.23*	-.13	-.01	-.05	-					
11. Coping Self-Efficacy	-.09	.06	.01	-.44**	-.39**	-.41**	-.32**	-.34**	-.11	.27**	-				
12. Self-Compassion	-.15	.24**	-.11	-.56**	-.51**	-.47**	-.26**	-.22*	-.18*	.32**	.64**	-			
13. W3 Anxiety	.18*	-.05	.23*	.63**	.54**	.59**	.47**	.39**	.29**	-.17	-.51**	-.53**	-		
14. W3 Depression	.22*	-.06	.28**	.47**	.59**	.54**	.44**	.25**	.22*	-.26**	-.59**	-.55**	.73**	-	
15. W3 PTSS	.12	.12	.25**	.55**	.50**	.57**	.50**	.40**	.30**	-.26**	-.53**	-.42**	.73**	.60**	-
M	2.37	.06	2.60	.98	.94	.56	5.31	3.97	2.21	3.35	5.09	3.11	1.03	.91	1.04
SD	2.04	1.04	2.44	.76	.67	.67	3.22	.71	1.20	.45	1.12	.80	.78	.70	.82

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

1. Assessing Power and Linear Regression Assumptions Results

A priori power analyses determined that there was adequate power to detect small to large effects using linear regression among Ws 1 and 3 participants (n = 120), while including all 12 predictor variables of interest (pre-pandemic factors, and pandemic risk and protective factors) to predict W3 MH outcomes. Linear regression assumptions were partially met. Variables met the conditions for linearity, normality, and homoscedasticity, but did not fully meet the assumptions for independence. Bivariate residual scatterplots and P-plots demonstrated signs of linearity and normality. Skewness statistics ranged from -.7 to 1.5 and kurtosis statistics from -.9 to 2.6 and were determined to be in an acceptable range to conclude normal distribution. VIF statistics suggested that multicollinearity was not an issue, as all values, were considered within an acceptable range (1.08 to 3.3) since they were all below five (James et al., 2017); VIF statistics for MH outcomes were the highest of any variables (W1 anxiety = 3.1, W1 depression = 3.3, and W1 PTSS = 2.5), which was expected, as these measures come from the same individual. Lastly, the independence assumption for linear regression was not met because the current study utilizes a repeated-measure design, which is a common violation (Ernst et al., 2017). Each individual's set of responses are likely correlated to each other, particularly W1 and W3 MH. Despite the assumption of independence not being met, linear regression was still used, as it was deemed important to explore the associations between all pre-pandemic factors (including prior MH functioning, prior trauma exposure, disaster exposure, etc.), while taking into consideration a limitation of having some error. If HLM was utilized solely, it would not be possible to examine all associations among pre-pandemic MH, pandemic risk and protective factors and pandemic MH, at the same time, which was an important aim of the current study.

2. Significant Factors Predicting Pandemic Mental Health

Anxiety Model. Within the anxiety linear regression model, several significant associations among pre-pandemic, and pandemic risk and protective factors, and pandemic anxiety symptoms, were identified (see Table 8). Among pre-pandemic factors, only W1 anxiety was significantly associated with W3 anxiety; higher levels of anxiety symptoms at W1 predicted higher levels of W3 anxiety symptoms during the pandemic. Significant pandemic risk factors associated with W3 anxiety included W3 life stressors, W3 COVID-19 fear, and W3 COVID-19 experiences. As the number of life stressors, fear toward COVID-19, and frequency of COVID-19 related experiences increased during the pandemic, anxiety symptoms also increased. No pandemic protective factors were significantly associated with W3 anxiety. Lastly, no covariates were significant and thus removed to simplify the final model, and the overall model statistics were significant.

Depression Model. The depression linear regression model also examined the association among pre-pandemic and pandemic risk and protective factors and pandemic depressive symptoms (see Table 8). The only significant pre-pandemic factor associated with W3 depression was W1 depression; higher levels of depressive symptoms at W1 predicted higher levels of W3 depressive symptoms. No pandemic risk factors were associated with W3 depression. In terms of protective factors, only W3 coping self-efficacy was significantly associated with W3 depression in the negative direction; as W3 coping self-efficacy increased during the pandemic, W3 depressive symptoms decreased. No covariates were significant and therefore, were removed from the model. Additionally, the overall model statistics were significant.

PTSS Model. The third linear regression model sought to identify significant associations among pre-pandemic factors and pandemic risk and protective factors, and pandemic PTSS (see Table 8). The only pre-pandemic factor that was significantly associated with W3 PTSS, was W1 anxiety. Higher levels of W1 anxiety predicted higher levels of W3 PTSS. All three pandemic risk factors (i.e., W3 life stressors, W3 COVID-19 fear, and W3 COVID-19 experiences) were significantly associated with W3 PTSS. During the pandemic, as the number of life stressors and COVID-19 experiences, as well as fear of COVID-19 increased, PTSS Also increased. Next, W3 coping-self efficacy was the only pandemic protective factor significantly associated with W3 PTSS in the negative direction; as coping-self efficacy during the pandemic rose, PTSS decreased. No covariates were significant; they were not included in the final model. Lastly, overall model statistics were significant.

Table 8

Linear Regression Models for Waves 1 and 3 Subsample to Examine Associations Among Pre-Pandemic, and Pandemic Risk and Protective Factors, and Pandemic-Mental Health

	Model Results								
	W3 Anxiety (n = 107)			W3 Depression (n = 107)			W3 PTSS (n = 107)		
	ß	*SE*	*p*	ß	*SE*	*p*	ß	*SE*	*p*
Pre-Pandemic Factors									
W1 Trauma History	.04	.07	.590	.08	.07	.284	-.02	.07	.815
W1 Disaster Exposure	-.05	.07	.528	-.06	.08	.403	.05	.07	.471
W1 Life Stressors	.01	.07	.934	.08	.08	.306	.01	.08	.848
W1 Anxiety	.33	.11	.003	-.18	.11	.110	.24	.11	.029
W1 Depression	-.09	.11	.451	.30	.12	.013	-.05	.12	.649
W1 PTSS	.15	.10	.131	.11	.10	.280	.16	.10	.121
Pandemic Risk Factors									
W3 Life Stressors	.20	.07	.006	.14	.08	.065	.27	.07	.000
W3 COVID-19 Fear	.15	.07	.033	.01	.07	.901	.20	.07	.005
W3 COVID-19 Experiences	.20	.07	.003	.09	.07	.173	.17	.07	.011
Pandemic Protective Factors									
W3 Social Support	.03	.07	.694	-.01	.07	.873	-.11	.07	.114
W3 Coping Self-Efficacy	-.13	.09	.131	-.37	.09	.000	-.22	.09	.014
W3 Self-Compassion	-.12	.09	.205	-.12	.10	.220	.09	.10	.337
	R^2	*SE*	*p*	R^2	*SE*	*p*	R^2	*SE*	*p*
Model Statistics	.58	.06	.000	.54	.07	.000	.57	.06	.000

Note. Three separate linear regressions were conducted for each MH outcome, with all 12 factors (pre-pandemic, and pandemic risk and protective) entered into the model at the same time.

Overall Patterns. In summary, hypotheses one through three were partially supported, as not all pre-pandemic factors and pandemic risk and protective factors were significantly associated with pandemic-MH. The only W1 pre-pandemic factors that were predictive of W3 pandemic-MH were W1 MH. Specifically, W1 anxiety predicted W3 anxiety and W3 PTSS, and W1 depression predicted W3 depression. In terms of W3 pandemic risk factors, W3 life stressors, W3 COVID-19 fear, and W3 COVID-19 experiences were all significantly associated with W3 anxiety and W3 PTSS, whereas no pandemic risk factors were associated with W3 depression. Most pandemic protective factors were not associated with pandemic MH at all. Social support and self-compassion were non-significantly related to all pandemic MH outcomes. Coping self-efficacy was the only protective factor negatively associated with W3 depression and W3 PTSS. No protective factors were associated with W3 anxiety. These results were surprising, as they differed from prior research supporting that prior trauma or disaster exposure can be associated with later MH outcomes, as well as research suggesting that social support and self-compassion could be protective in disaster contexts.

3. Post-Hoc Analyses Exploring Associations Among Pre-Pandemic Factors, Self-Compassion, and Post-traumatic Stress Symptoms

Several post-hoc linear analyses were conducted to further explore the associations among compassion and PTSS in effort to better understand why it was not a protective factor against increased risk for PTSS, as suggested by reviewed literature. First, W1 PTSS was found to negatively predict W3 self-compassion; as W1 PTSS increased, W3 self-compassion decreased. This may suggest that the more a young adult endorsed PTSS, the lower their self-compassion scores may be. Perhaps in this sample, individuals with high

levels of PTSS may already have low levels of self-compassion, at which it is not protective. A second post-hoc analysis examined the associations among pre-pandemic factors (prior trauma history, disaster exposure, W1 life stressors since disaster, and W1 MH) on W3 self-compassion. Disaster exposure significantly predicted W3 self-compassion, with greater disaster exposure levels associated with higher levels of W3 self-compassion. Perhaps higher levels of disaster exposure have influenced individuals to be kinder to oneself, or more accepting of themselves over time. These findings suggest that further analyses targeted at examining the associations among trauma exposure, self-compassion, and MH may be warranted.

C. Examining Mental Health Trajectories and Pre-Pandemic Predictors of Trajectories

Descriptive statistics and Pearson's correlations were conducted among pre-pandemic factors and Ws 1-4 MH (see Table 9 for anxiety, Table 10 for depression, and Table 11 for PTSS). On average, young adults reported experiencing at least two traumatic events in their lifetime ($M = 2.45$, $SD = 2.05$) and just under three life stressors since disaster ($M = 2.78$, $SD = 2.54$). The mean anxiety and depression scores across Ws 1-4 appeared to be relatively stable, with highest means observed at W3, during the COVID-19 pandemic. Mean anxiety and depression scores ranged from 6.66-7.27, and 7.63-8.30, respectively. Greater variation in PTSS scores across waves was observed, with the highest mean total PTSS Score at Wave 3 ($M = 20.66$), and lowest at W1 ($M = 10.14$).

Correlations revealed that most pre-pandemic factors and MH outcomes were associated. Female sex was only weakly positively related to region and W3 anxiety and PTSS. Region was strongly positively related to W1 life stressors since disaster, and weakly to moderately positively related to W3 anxiety, Ws 1-3 depression and Ws 1-3 PTSS. Past

lifetime trauma was weakly positively related to most MH outcomes across waves (r = .16 -.31 p < .05 -.01), and most strongly related to W1 PTSS. Disaster exposure was not related to MH across waves. W1 life stressors since disaster was weakly to strongly positively associated with MH across waves, ranging from r = .21-.27 for anxiety (p < .05 -.01), .27-.32 for depression (p < .01), and r = .24-.43 for PTSS (p < .001). All MH outcomes were highly correlated to each other, ranging from r = .50- .76, (p <.001), which was expected since the same individuals reported on their MH.

Table 9

Correlations and Descriptive Statistics of Level-Two Person Characteristics and Anxiety using a Longitudinal Subsample (n = 205)

Variable	1	2	3	4	5	6	7	8	9
1. Sex [a]	-								
2. Region [b]	.18*	-							
3. Prior Trauma History	-.01	.06	-						
4. W1 Dis Exposure	-.12	-.13	.22**	-					
5. W1 LS Since Dis	.10	.50**	.27**	.25**	-				
6. W1 Anxiety	.07	.16*	.20**	-.02	.21**	-			
7. W2 Anxiety	.05	.12	.13	.01	.21**	.59**	-		
8. W3 Anxiety	.24*	.23*	.19*	-.05	.24*	.63**	.67**	-	
9. W4 Anxiety	.18	-.01	.17	-.06	.27**	.53**	.50**	.47**	-
M	-	-	2.45	.12	2.78	6.66	6.69	7.27	6.37
SD	-	-	2.05	1.02	2.54	5.20	5.09	5.53	4.79

Note. DIS = disaster; LS = life stressors. Total scores were used for Waves 1-4 anxiety.
[a]0 = male and 1 = female. [b]0 = mainland U.S. and 1 = Puerto Rico.
* p < .05, ** p < .01.

Table 10

Correlations and Descriptive Statistics of Level-Two Person Characteristics and Depression using a Longitudinal Subsample (n = 205)

Variable	1	2	3	4	5	6	7	8	9
1. Sex [a]	-								
2. Region [b]	.18*	-							
3. Trauma History	-.01	.06	-						
4. W1 Dis Exposure	-.12	-.13	.22**	-					
5. W1 LS Since Dis	.10	.50**	.27**	.25**	-				
6. W1 Depression	-.01	.27**	.18**	-.01	.32**	-			
7. W2 Depression	.02	.16*	.27**	-.05	.27**	.63**	-		
8. W3 Depression	.10	.24**	.23*	-.05	.28**	.58**	.76**	-	
9. W4 Depression	.05	.15	.26*	-.02	.32**	.53**	.57**	.60**	-
M	-	-	2.45	.12	2.78	8.08	7.94	8.30	7.63
SD	-	-	2.05	1.02	2.54	5.90	5.93	6.31	5.50

Note. DIS = disaster; LS = life stressors. Total scores were used for Waves 1-4 depression.
[a]0 = male and 1 = female. [b]0 = mainland U.S. and 1 = Puerto Rico.
* $p < .05$, ** $p < .01$.

Table 11

Correlations and Descriptive Statistics of Level-Two Person Characteristics and Post-traumatic Stress Symptoms (PTSS) using a Longitudinal Subsample (n = 205)

Variable	1	2	3	4	5	6	7	8	9
1. Sex [a]	-								
2. Region [b]	.18**	-							
3. Trauma History	-.01	.06	-						
4. W1 Dis Exposure	-.12	-.13	.22**	-					
5. W1 LS Since Dis	.10	.50**	.27**	.25**	-				
6. W1 PTSS	.17*	.31**	.22**	.10	.33**	-			
7. W2 PTSS	.14	.23**	.19*	.14	.35**	.69**	-		
8. W3 PTSS	.20*	.08	.13	.14	.24**	.54**	.57**	-	
9. W4 PTSS	.07	.15	.20	.06	.43**	.47**	.62**	.55**	-
M	-	-	2.45	.12	2.78	10.14	10.46	20.66	17.91
SD	-	-	2.05	1.02	2.54	10.38	10.31	16.31	14.15

Note. DIS = disaster; LS = life stressors. Total scores were used for Waves 1-4 PTSS.
[a]0 = male and 1 = female. [b]0 = mainland U.S. and 1 = Puerto Rico.
* $p < .05$, ** $p < .01$.

1. Assessing Hierarchical Linear Modeling Assumption Results

First, adequate power was demonstrated to be able to conduct HLM analyses. To achieve a power level of .9, a sample of 198 participants was required, thus, the longitudinal sample of 205 young adults was deemed sufficient. All linearity and normality assumptions of level-one residuals were met. Initially, the assumption of homogeneity of level-one variance was met only for anxiety. Chi square statistics revealed significant differences in level-one variance for depression and PTSS. To account for unequal variance, a heterogenous variance model was created by incorporating sex as a predictor of the residual error term for depression and PTSS. Sex was chosen because the groups of males versus females was considered greatly uneven and a potential reason for differences. A second test of homogeneity of level-once variance was conducted for depression and PTSS, after which assumptions of homogeneity were adequately met; the level-one variance for depression and PTSS were now considered homogenous. All subsequent HLM models for depression and PTSS in the current study utilized this an adjusted heterogenous variance model with sex accounting for residual error.

2. Anxiety Trajectory

The intra class correlation coefficient (ICC) of the null anxiety model indicated that 58.9% of the proportion of variance in mean total anxiety scores was among level-two person or individual characteristics or differences. The deviance statistic = 3340.53 with two estimated parameters. Next, a second model was conducted, and a predictor of linear growth was added to level-one (time). Results revealed significant variations among the intercept, or W1 average total anxiety score at W1 ($\beta = 6.65$, $SE = .35$, $t = 18.98$, $p < .002$). The rate of linear growth in anxiety did not differ among individuals and was non-significant over time

(β = -.02, *SE* =.14, *t* = -.13, *p* = .897). The deviance statistic = 3344.13 with four estimated parameters and when compared with that of the null model, significant improvements in fit were not found (χ^2 = 3.60(2), *p* = .163). Due to these results, utilizing HLM was not necessary to examine anxiety trajectories, nor predictors of anxiety over time, since they were stable from pre-to during-pandemic. Hypothesis four, which postulated that Ws 1-4 anxiety outcomes would form a decelerating quadratic shape over time, was not supported for anxiety. Instead, the anxiety trajectory was flat over time and on average, did not change.

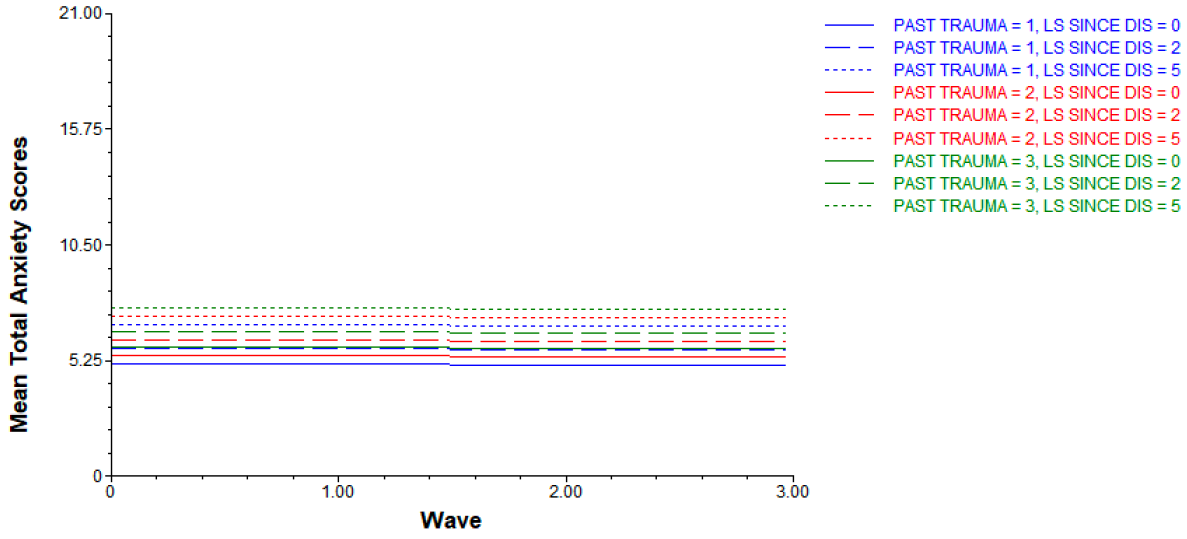
Despite this, person-level characteristics were entered into level-two to determine if they explained the variation among the intercept or starting point of W1 anxiety. The only significant person level-factors influencing anxiety at W1 (the intercept) were past trauma history (β = .39, *SE* =.19, *t* = 2.04, *p* < .042) and life stressors since disaster (β = .36 *SE* =.16, *t* = 2.23, *p* < .027). These variables did not have an influence in the change rates of anxiety across the trajectory. Comparing the current deviance statistic (3326.88, parameters = 4) with that of the previous model, an improvement in model fit was found (χ^2 = 880.08(7), *p* = < .001). Figure 3 reveals the trajectory of anxiety across waves, along with the influence of past trauma history and W1 life stressors since disaster on W1 anxiety level at W1. Hypothesis five predicted that the rate of acceleration of anxiety trajectories would differ for individuals with higher levels of prior trauma, disaster exposure, and W1 life stressors since disaster; however, this was not supported, and anxiety trajectories did not differ depending on the extent of prior trauma, disaster exposure, or W1 life stressors for anxiety.

Overall, pre-pandemic factors and person-level characteristics did not influence changes in anxiety over time from before to during the pandemic; however, one's past trauma history and the number of W1 life stressors experienced since disaster had an impact

on one's W1 anxiety level immediately post-disaster. Throughout the pandemic though, across Ws 3 and 4, none of these factors were associated with changes in anxiety, and anxiety remained stable over time. In sum, hypothesis five was not fully supported for the anxiety trajectory. The only pre-pandemic variables associated with W1 anxiety were prior trauma history and W1 life stressors since disaster. No pre-pandemic factors were associated with changes in growth rates of anxiety.

Figure 3

Anxiety Trajectory from Pre-Pandemic to During using a Longitudinal Subsample (n = 205)



Note. PAST TRAUMA = Prior trauma history. LS SINCE DIS = Life stressors since disaster. Wave 0 = Wave 1; Wave 1 = Wave 2; Wave 2 = Wave 3; Wave 3 = Wave 4.

3. Post-Hoc Anxiety Analyses

Overall, 23.7% to 30.8% of the current subsample of young adults utilized for the HLM analysis had total sum anxiety scores that were determined to be at or above the clinical cutoff scores for generalized anxiety. Frequencies of individuals who met the clinical cutoff for anxiety at each wave as follows: W1 (27.3%), W2 (26.1%), W3 (30.8%), and W4

(23.7%). The highest frequency of individuals at or above the anxiety clinical cutoff score was at W3 (about six months after the pandemic began in summer of 2020), while the lowest frequency was at W4 (about one year after the pandemic began in spring of 2021); although, this change in percentage was not significant. Throughout waves, average anxiety scores remained in the mild anxiety range which suggests that it may have been important for young adults with mild or greater anxiety symptoms to be screened by a MH professional or psychologist to determine if MH support would be appropriate to address anxiety symptoms both pre- and during-pandemic.

4. Depression Trajectory

Next, a null model for depression across waves was calculated. The ICC indicated that 61.27% of the proportion of variance in mean total depression scores was accounted for by level-two person characteristics. The deviance statistic = 3475.34 with two estimated parameters, and the homogeneity of level-one variance was significant, ($\chi^2 = 262.41(188)$, $p < .001$). Because of this, the next model ran incorporated sex as a possible variable accounting for the level-one variance. The heterogenous model with sex accounting for the error term met the assumption of homogeneity and was retained and used within all later HLM analyses.

To examine the trajectory of depression, a predictor of linear growth was imposed onto level-one (time) of the model. Like that of the anxiety model, results revealed that there was significant variation among the intercept, or W1 average total depression score ($\beta = 8.01$, $SE = .40$, $t = 19.96$, $p < .001$). The rate of linear growth in depression did not differ among individuals and was non-significant over time ($\beta = -.09$, $SE = .16$, $t = -.58$, $p = .560$). The deviance statistic = 3473.64 with eight estimated parameters and when compared with that of

the null model, significant improvements in fit were not found ($\chi^2 = 2.72(3)$, $p > .500$). Due to these results, utilizing HLM was not necessary to examine depression trajectories, nor predictors of depression over time, since they were stable from pre-to during-pandemic. Hypothesis four was not supported for depression.

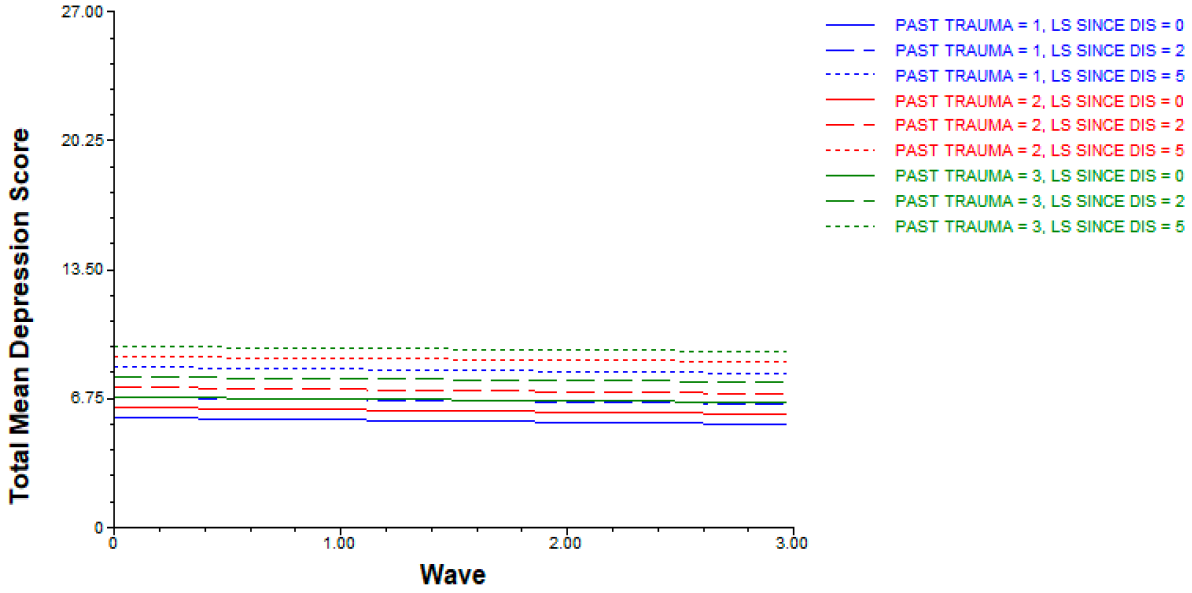
To understand the person-level influence on depression trajectory, region, past trauma history, disaster exposure, and life stressors since disaster were entered into the model. Similarly, to anxiety, significant differences were found among the intercept, and prior trauma history ($\beta = .55$, $SE = .21$, $t = 2.60$, $p = .010$), and life stressors since disaster ($\beta = .54$, $SE = .19$, $t = 2.87$, $p = .005$) were significantly associated with W1 depression post-disaster. No other factors had a significant impact. These factors also did not have an impact on the growth rate of depression throughout the trajectory. The deviance statistic = 3435.20 with 11 estimated parameters, and the current model fit was significantly improved in comparison to the previous model ($\chi^2 = 38.44(3)$, $p < .001$). Figure 4 displays the depression trajectory across waves, along with the influence of past trauma history and life stressors since disaster on depression levels at W1. Hypothesis five was not supported for depression.

In terms of the trajectory of depression, from post-disaster to during the pandemic, pre-pandemic factors and person-level characteristics did not influence changes in depression levels over time; yet one's past trauma history and the number of W1 life stressors experienced since disaster had an impact on W1 depression level immediately post-disaster, which remained stable across Ws 1-4. Throughout the trajectory though, none of these factors were associated with growth rates of depression, and depression appeared stable. Hypothesis five was partially supported, since prior trauma history and W1 life stressors

since disaster influenced the depression trajectory starting point, but not depressive symptom growth rates.

Figure 4

Depression Trajectory from Pre-Pandemic to During (n = 205)



Note. PAST TRAUMA = Prior trauma history. LS SINCE DIS = Life stressors since disaster. Wave 0 = Wave 1; Wave 1 = Wave 2; Wave 2 = Wave 3; Wave 3 = Wave 4.

5. Post-Hoc Depression Analyses

Over a quarter of young adults in the longitudinal subsample used for HLM remained at or above clinical cutoff levels for depressive symptoms across all waves. Frequencies of individuals who met the clinical cutoff for depression at each wave are as follows: W1 (30.7%), W2 (32.3%), W3 (35.9%), and W4 (34.4%). Additionally, the average depression score at each wave was between a score of five to ten, suggesting that overall, the sample experienced on average mild to moderate depressive symptoms throughout the study. This also indicates that there was a need for the young adults in the study to be screened by a

psychologist or mental health professional to determine if young adults did indeed meet criteria for depression or if MH supports were warranted, both pre- and during-pandemic.

6. Post-traumatic Stress Symptoms Trajectory

A null model revealed that the ICC for PTSS = 44.77%, which indicates the proportion of variance in mean total PTSS that is accounted for by differences among individuals (level-two). The null model also revealed that homogeneity assumption of level-one variance was not met. Because of this, a second model was conducted, with sex incorporated into the error term at level-one, creating a heterogenous covariance model. Female sex was associated with a slight increase in PTSS, and model two revealed a significant improvement in fit, and met the assumption of homogeneity test (see Table 12). For all subsequent models, sex was retained within the error-term. The PTSS null model with sex as an added error-term at level-one demonstrated a significant level two (person-level effect) on the level one (time) intercept of MH for the PTSS trajectory, which justified using HLM. SPSS plots suggested that PTSS appeared to decrease between Ws 1 and 2, sharply increase between Ws 2 and 3 and decrease slightly between Ws 3 and 4.

Table 12

Results of the PTSS Null and Heterogenous Model Accounting for Level-One Homogeneity by Sex (n = 205)

Fixed Effects (*M*)	Model 1- Null				Model 2- Heterogeneous			
	Coeff.	*SE*	*t*	df	*Coeff.*	*SE*	*t*	df
Initial Status	13.14***	.74	17.74	204	13.04***	.73	17.75	204
Level 1-Variance					*Coeff.*	*SE*	*Z*-ratio	df
Initial Status					3.96***	.21	19.25	-
Sex [a]					.65**	.22	2.96	-
Random Effects	Variance			df	Variance			df
Intercept	76.39***			204	74.52***			204
Level 1- Error	94.25			-	-			-
Goodness of Fit								
Deviance (Parameter)	4405.41 (2)				4396.80 (4)*			
Homogeneity Test, χ^2(df)	393.38 (189)***				86.73 (196)			

Note. Model 2 accounts for sex differences present within the level-1 variance and meets the assumption of homogeneity.
Coeff. = coefficient.
[a]0 = male and 1 = female.
* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 13

Parameter Estimates of Level-One Time Predictors of PTSS Trajectory Pre- to During Pandemic (n = 205)

	Model 3 – Linear Time			Model 4- Quad. Time			Model 5- Cubic Time		
Fixed Effects (*M*)	*Coeff.*	*SE*	*t*	*Coeff.*	*SE*	*t*	*Coeff.*	*SE*	*t*
Initial Status, β_{00}	9.25***	.70	13.25	9.31***	.72	12.93	10.04***	.72	13.87
Linear Growth Rate, β_{10}				3.12***	.94	3.32	-12.45***	2.36	-5.28
Quad Growth Rate, β_{20}				.11	.33	.32	16.20***	2.62	6.17
Cubic Growth Rate, β_{30}							-3.72***	.63	-5.88
Random Effects	Variance		*df*	Variance		*df*	Variance		*df*
Initial Status, r_0	47.47***		204	47.39***		110	80.55***		49
Linear Growth Rate, r_1	5.34			4.37		110	315.06**		49
Quad Growth Rate, r_2				.11		110	465.63***		49
Cubic Growth Rate, r_3							28.25***		49
Deviance Statistic (Parameters)	4287.94 (7)***			4287.82 (11)			4203.37 (16)***		
Comparison	Model 2			Model 3			Model 4		
χ^2(df)	108.87(3)***			11.65(49)			84.46(5)***		

Note. *Coeff.* = model coefficient. Quad = quadratic.

*$p < .05$; **$p < .01$; ***$p < .001$.

Next, level-one term predictors representing linear growth, quadratic growth, and cubic growth were entered one at a time in sequential order: model three included linear time, model four included linear and quadratic time, and model five included linear, quadratic, and cubic time considered simultaneously (see Table 13 for full model statistics). Model five revealed a significant improvement in fit, and all level-one MH over "time" variables were significant. The time-level predictors revealed that the PTSS overall growth rate was slowed (linear growth rate), accelerated in a positive direction (quadratic growth rate), and then slightly decreased. Overall, the trajectory shape across waves was cubic (e.g., S-shape). Model five best represented the PTSS trajectory out of the other models, and thus, these significant predictors were retained at level-one for subsequent model testing. Ultimately, hypothesis five was not supported, as the PTSS trajectory followed a cubic, rather than a decelerating quadratic shape, although significant increases and decreases were observed in PTSS from pre-to during-pandemic.

7. Pre-Pandemic Characteristics Predicting Change in Mental Health Trajectories

Significant differences in level-two variability were found among the initial PTSS status (intercept) and within the growth rates (random effects), which justified examining person-level factors as predictors. In a sixth model, pre-pandemic characteristics (region, trauma history, W1 disaster exposure, and W1 life stressors since disaster) were entered simultaneously into the model as level-two predictors (between individuals) to examine their influence on the initial status of mean PTSS at W1 (intercept) and the mean change rate throughout the model (growth rates).

Table 14 shows the fixed and random effects for all person-level predictors. Only region, trauma history, and life stressors since disaster significantly predicted W1 PTSS, and no person-level factors significantly predicted changes in linear, quadratic, or cubic growth rates of PTSS. The deviance statistic for model six indicated an improvement in fit above and

beyond model five with only level-one-time predictors. The random effects for the intercept, and linear, quadratic, and cubic growth rates were all significant, indicating that there was significant variability within the PTSS initial score, and the growth rates among person-level factors that were not accounted for or included in the model. These random effects were retained.

Table 14

Parameter Estimates of Level-Two Person Characteristics and Level-One Time Predictors of Post-traumatic Stress Symptoms (PTSS) Trajectory Pre- to During Pandemic (n = 205)

	Model 6- All Predictors				
Fixed Effects	*Coeff.*	*SE*	*t*	*df*	*p*-value
Initial Status in Model					
M of Initial Status	4.13	1.12	3.70	200	<.001
Region	4.62	1.69	2.74	200	.007
Trauma History	.71	.40	1.78	200	.078
Disaster Exposure	.38	.75	.50	200	.618
Life Stressors Since Disaster	.71	.37	1.89	200	.061
Change Rate in Model					
M of Linear Growth Rate	-14.07	3.84	-3.67	200	<.001
Region	1.91	5.38	.36	200	.723
Trauma History	.44	1.13	.39	200	.695
Disaster Exposure	1.85	2.50	.74	200	.460
W1 Life Stressors Since Disaster	-.28	1.10	-.26	200	.797
M of Quadratic Growth Rate	19.46	4.28	4.55	200	<.001
Region	-4.89	5.95	-.82	200	.413
Trauma History	-.63	1.19	-.53	200	.595
Disaster Exposure	-1.18	2.68	-.44	200	.660
W1 Life Stressors Since Disaster	.34	1.19	.28	200	.778
M of Cubic Growth Rate	-4.72	1.04	-4.54	200	<.001
Region	1.14	1.44	.79	200	.431
Trauma History	.17	.28	.61	200	.542
Disaster Exposure	.09	.65	.14	200	.889
W1 Life Stressors Since Disaster	-.01	.29	-.03	200	.977
Random Effects		Variance		*df*	*p*-value
Intercept		63.61		45	<.001
Linear Growth		306.25		45	.003
Quadratic Growth		462.10		45	<.001
Cubic Growth		28.28		45	<.001
Deviance Statistic (Parameters), Comparison		4141.84 (32)			
Comparison		χ^2(df)			*p*-value
Model 5		61.53(16)			<.001

Note. Coeff. = coefficient. Region (1 = Puerto Rico, 0 = mainland U.S).

A seventh model was conducted with only significant person-level factors (region, past trauma, and life stressors since disaster), as well as the significant random effects regressed onto PTSS over time (see Table 15 for full model statistics). The deviance statistic did not differ significantly in comparison to model six with all predictors, but model seven is

more parsimonious (e.g., less parameters), thus it was retained and chosen as the final model. In comparison to model five with level-one-time predictors, the model fit is still improved**.**

Table 15

Parameter Estimates of Level-Two Person Characteristics and Level-One Time Predictors of PTSS Initial Status and Trajectory (n = 205)

	Model 7- Predictors on Initial Status				
Fixed Effects	*Coeff.*	*SE*	*t*	*df*	*p*-value
Initial Status in Model					
M of Initial Status	4.13	1.03	4.00	201	<.001
Region	3.06	1.40	2.18	201	.030
Trauma History	.76	.37	2.04	201	.042
Life Stressors Since Disaster	.93	.31	3.01	201	.003
Change Rate in Model				199	
M of Linear Growth Rate	-12.65	2.34	-5.40	204	<.001
M of Quadratic Growth Rate	16.42	2.61	6.29	204	<.001
M of Cubic Growth Rate	-3.78	.63	-6.00	204	<.001
Random Effects		Variance		*df*	*p*-value
Intercept		64.00		44	<.001
Linear Growth		300.57		49	<.001
Quadratic Growth		452.93		49	<.001
Cubic Growth		27.68		49	<.001
Deviance Statistic (Parameters)		4162.76 (19)			
Comparison		χ^2(df)			*p*-value
Model 6		20.91(13)			.070
Model 5		40.61(3)			<.001

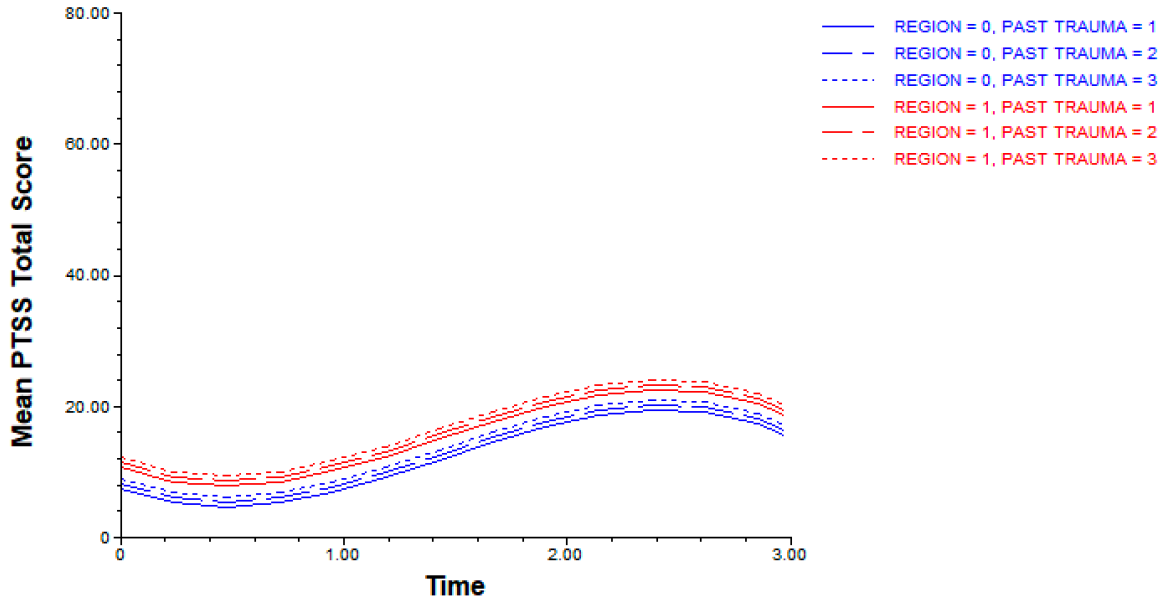
Note. Coeff. = coefficient. Region (1 = Puerto Rico, 0 = mainland U.S.); Sex (1 = Female, 0 = Male).

Specifically, at W1, the average PTSS Score for all study participants was 4.13, yet when considering region, participants from Puerto Rico on average had a total score that was 3.06 points higher than those in the mainland U.S. Past trauma history and life stressors since disaster were also positively related to higher levels of W1 PTSS (see Figure 5 depicting this trajectory). As the number of past traumatic events experienced, and life stressors since disaster increased, so did PTSS at W1 (the intercept) and remained high in comparison to those with lower levels.

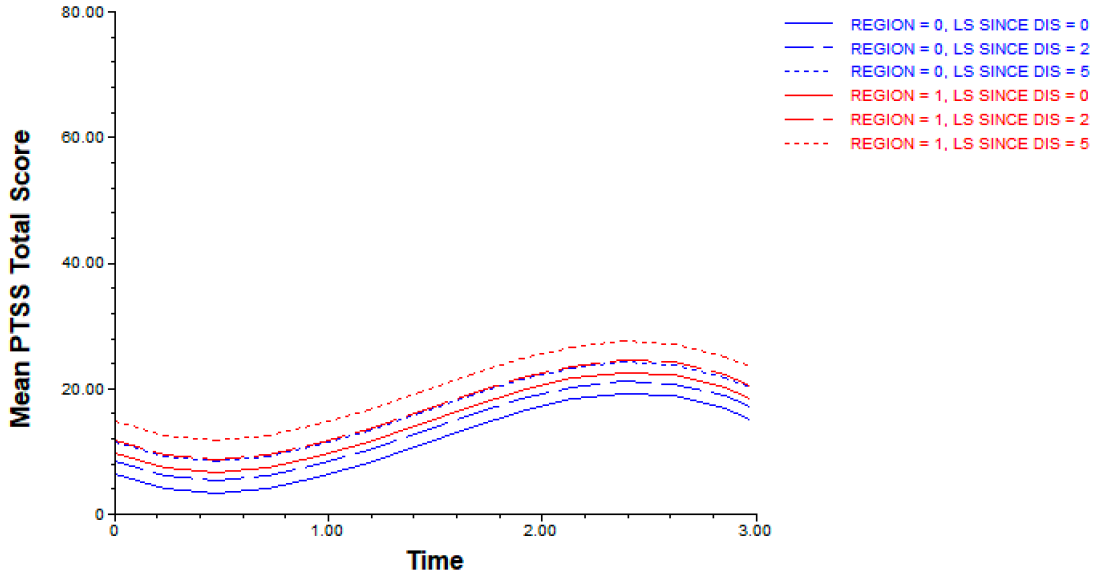
Region, past trauma history, and life stressors since disaster had no influence on the growth rates of PTSS across Ws 2-4 and were not associated with specific increases or decrease in PTSS. These factors only seemed to be associated with the starting point of PTSS, and its consistent trend over time (either higher or lower overall across time points), but not whether PTSS accelerated or decelerated between time points. The random effects revealed again that significant variation among individuals occurs at the initial status (W1 PTSS), as well as among the linear, quadratic, and cubic time rates that must be accounted for, but were not examined in the current study. In sum, hypothesis five was partially supported for the PTSS trajectory. Region and all pre-pandemic variables except for disaster exposure were associated with the PTSS intercept. No pre-pandemic factors, nor region, were associated with increases or decreases in PTSS over time, as the trajectory remained stable over time (e.g., those who had higher levels of W1 PTSS than others in the sample, were likely to continue to have higher levels of PTSS at each subsequent time point, despite general fluctuations in the trajectory cubic shape.

Figure 5

PTSS Trajectory from Pre-Pandemic to During the Pandemic (n = 205)



Note. Region: 0 = mainland U.S., 1 = Puerto Rico. PAST TRAUMA = Prior trauma history. Time 0 = Wave 1; Time 1 = Wave 2; Time 2 = Wave 3; Time 3 = Wave 4.



Note. Region: 0 = mainland U.S., 1 = Puerto Rico. LS since dis = life stressors since disaster. Time 0 = Wave 1; Time 1 = Wave 2; Time 2 = Wave 3; Time 3 = Wave 4.

8. Post-Hoc Post-Traumatic Stress Analyses

Across Ws 1 and 2, a minority of young adults in the current study met probable criteria for PTSD (percentage rates were 4.43% and 5.06% respectively); however, this greatly increased from W2 to 3 (pre- to during-pandemic). At W3, almost a quarter (22.32%) met probably criteria for PTSD, which reduced to 17.39% at W4. Average total PTSS scores for young adults in the current sample were as follows across waves: W1 (*M* = 10.14, *SD* = 10.38), W2 (*M* =10.46, *SD* = 10.34), W3 (*M* = 20.66, *SD* = 16.31), W4 (M =17.91, SD = 14.51). Because there was an average increase in PTSD scores of about ten from W2 to 3, this suggests that young adults experienced clinically significant increases in symptoms during this time point that may be attributed to the impact of the pandemic or other unexamined factors. Despite this, on average, most young adults did not meet the clinical cutoff for probable PTSD (e.g., a sum score of 33 or greater) and at W4, average PTSD scores appeared to be declining. These findings suggest that young adults' PTSS should be monitored over longer periods of time. It may be useful to observe symptom levels and assess for other concurrent experiences of trauma or stress that may influence potential increases in PTSS, while keeping the clinical cutoff score in mind, which would warrant further follow-up and may suggest probably PTSD.

9. Summary

In summary, average anxiety and depression trajectories remained consistent across waves without any significant changes observed, while the PTSS trajectory significantly changed across each time point. From Ws 1-2, the PTSS trajectory was observed to be linear and slightly decreasing, from Ws 2-3, the trajectory significantly increased (time points from pre-pandemic to during-pandemic) and from Ws 3-4, it gradually declined. In terms of pre-

pandemic factors associated with MH trends, young adults with higher levels of prior trauma history experiences and life stressors since disaster, were at risk of experiencing more severe W1 MH symptoms for all outcomes (e.g., anxiety, depression, and PTSS). Young adults from Puerto Rico were also found to have more severe W1 PTSS than those from the mainland U.S. These MH trends, on average, were more severe for those with greater trauma histories, life stress, and young adults from Puerto Rico, and sustained over time across waves. Pre-pandemic factors were not associated with changes (e.g., acceleration or deceleration) in MH symptoms across Ws 2-4, suggesting that as more time passed, prior traumatic events and life stressors since disaster may not have as great of an impact on later MH, even during the experience of another collectively experienced trauma, such as the pandemic. For instance, the increases in PTSS observed from Ws 2-3, could not be attributed to pre-pandemic factors such as prior trauma history, disaster exposure, or W1 life stressors, and likely other unexamined factors may have contributed.

V. Discussion

The association between disaster exposure and subsequent mental health (MH) problems in up to 30% of individuals has been well established in the disaster MH literature (Bonanno et al. 2010). However, additional research investigating risk and resilience factors associated with long-term patterns of MH is needed (Chen & Bonanno, 2020), particularly among young adult populations during the COVID-19 pandemic. Prospectively identifying pre-disaster factors that predict later MH outcomes (Bonanno et al. 2010) is challenging due to the unpredictable and sudden nature of disasters. It can also be difficult to retain disaster-exposed individuals in research, as they may be experiencing great instability and change during the post-recovery period. Disaster MH research has often studied the impact of

disasters on general adult populations, rather than focus specifically on young adults. Those aged 18-30 may be more vulnerable to the impacts of stress and trauma and have endorsed the highest levels of MH symptoms among older adults over the past decade and during the pandemic (Twenge et al., 2019; Twenge et al., 2020). This dissertation sought to fill the gaps and build upon existing knowledge while considering the impacts of both natural disaster exposure and the COVID-19 pandemic among young adults during emerging adulthood, using prospective and longitudinal data spanning four waves (two pre-pandemic and two during).

The three main aims of this current study were to: 1) identify pre-pandemic, and pandemic risk and protective factors predicting pandemic-MH; 2) examine the shape of MH symptom trajectories over time, from pre to during-pandemic; and 3) examine whether pre-pandemic factors are associated with differences in MH trajectory starting points or growth rates (e.g., increase or decreases) over time, among disaster-exposed young adults in the mainland U.S. and Puerto Rico. It is important to better understand how pre-pandemic factors, and understudied risk and protective factors pertinent to the pandemic may affect pandemic-MH in a potentially vulnerable group, as well as understand long-term patterns of MH amid multiple disasters. The results of this work will help identify the characteristics of individuals who may benefit from additional support post-disaster, and have implications for MH practitioners and treatment, as well as public policy, later discussed in greater depth.

The conceptual foundation for this study includes the integration of an empirically supported disaster MH model that identified risk and protective factors associated with PTSS among disaster-exposed youth (La Greca et al., 1996) with a transactional ecological model of development (Cicchetti & Lynch, 1993; Bronfenbrenner, 1977). Risk and protective

factors at various environmental ecological levels are conceptualized as interacting with one's own individual risk and protective factors, which influence the ability to cope post-disaster. Coping also reciprocally interacts with current functioning and post-disaster MH. A young adult can experience less risk for MH symptoms, depending on the interactions between, and the balance of, unique risk and protective factors. By examining both pre-pandemic factors and pandemic risk and protective factors, the current study explored how pre-pandemic history interacts with current contextual stressors to better understand the development of pandemic-MH outcomes. An individual's history of having higher levels of MH symptoms pre-pandemic may make it difficult to manage pandemic life stressors and COVID-19 fear, without adequate levels of support or coping practices to provide a buffer effect. In this way, multiple factors interact together to influence pandemic-MH.

The current study utilized a repeated-measures, longitudinal design and two different statistical methods to examine associations among pre-pandemic and pandemic risk and protective factors and MH during the pandemic. First, multiple linear regression analyses examined the first aim (e.g., identifying pre-pandemic and pandemic risk and protective factors associated with MH); however, the required assumption of independence among data points was not met. Since the study included the same participants, some of the factors (e.g., MH) were at risk of being too highly related, possibly contributing to risk of error or bias within results. Individuals who previously provided answers about MH at W1, were likely to respond in similar ways to the same questions at later waves. Despite this risk and clear limitation, the use of linear regression was deemed important in order to concurrently examine associations among multiple pertinent, contextual factors (e.g., pre-pandemic factors, COVID-19 fear, W3 life stressors, W3 social support, self-compassion) and MH. To

address the limitation of linear regression, hierarchical linear modeling (HLM) analyses were also conducted to account for the repeated-measures component of the current study data, reducing error and bias. With this analysis, MH was plotted over time and only a limited number of factors (e.g., pre-pandemic) could be examined for associations with MH trend lines and changes in MH symptoms. HLM granted perhaps a narrower perspective utilizing a more robust statistical method, while linear regression provided a more expansive examination of associations among multiple factors and pandemic MH, with risk of greater error. In combination, these analyses together contribute to a greater understanding of the risk factors associated with more severe young adult MH symptoms after collectively experienced traumas over time.

A. Associations Among Pre-Pandemic, and Pandemic Risk and Protective Factors Associated with Pandemic-Mental Health

The COVID-19 pandemic was a chronic, collectively experienced trauma that had inflicted a cascade of stressors affecting MH across the globe (Gruber et al., 2020; Pefferbaum & North, 2020), with significant impacts observed among young adults (National Center for Health Statistics, 2021). This current study sought to explore many critical pre-pandemic, and pandemic factors that may contribute to increased or mitigated risk for MH problems during the COVID-19 pandemic among a previously disaster-exposed group of young adults. Possible interpretations or explanations for why certain significant factors were or were not associated with pandemic MH are discussed in further detail.

1. Pre-Pandemic Factors

Pre-pandemic MH (W1) functioning was significantly associated with pandemic MH (W3), even when considering all other pre-pandemic and pandemic risk and protective

factors. The association between pre-pandemic-MH and pandemic-MH appeared robust and persisted over time. Specifically, W1 anxiety predicted W3 anxiety and W3 PTSS during the pandemic, and W1 depression predicted W3 depression. In each model, prior trauma history, level of disaster exposure, and W1 life stressors since the disaster did not significantly predict pandemic-MH, which contrasts with what was expected, given that these factors are usually strong predictors of PTSS (La Greca et. al., 1996). Based on these results, hypothesis one was not fully supported. The approximate two-to-three-year time gap between when W1 and 3 surveys were conducted may help to explain why all pre-pandemic factors were not associated with pandemic-MH. It is possible that too much time had passed and that prior trauma history, disaster exposure, and W1 life stressors were no longer significantly affecting W3 MH and other, current stressors were more strongly associated with risk of having more severe MH symptoms. The current results suggest that overall, pre-pandemic-MH appears to be a more robust predictor of pandemic-MH than prior lifetime trauma, disaster exposure, and W1 life stressors since the disaster, and that this association has persisted over several years (since W1 survey was disseminated 2017 in the mainland U.S. and in 2018 for Puerto Rico, and in 2020 for both regions). Several research studies have also reported strong associations among prior MH and post-disaster MH. For example, prior MH functioning was identified to be a robust predictor of subsequent MH among a sample of young adults previously exposed to an acute mass violence incident (Felix et al., 2018). Similarly, studies conducted during COVID-19 pandemic found that pre-pandemic MH is a robust predictor of pandemic-MH, over many other prospective factors (Holman et al., 2020; Hawes, Szenczy, Klen, et al., 2021; Hawes, Szenczy, Olino, et al., 2021; Shanahan et al., 2020; Zimmerman et al., 2020).

The significant associations among pre-and during-pandemic MH also suggest that a measure of prior MH pre-disaster may serve as a proxy for how well one may typically cope during future times of stress or disaster exposure. Other variables such as disaster exposure, or past lifetime trauma, may not be as closely reflective of how exposure affects one's MH. Directly measuring MH may better capture how these possible risk factors in combination may influence functioning. Prior MH functioning may also be reflective of long withstanding or existing MH conditions or symptoms for some individuals. It should be noted that in the current study, participants were not asked if they had been previously diagnosed with a MH condition prior to the experience of a natural disaster at W1, so there are limitations in knowing whether individuals with pre-existing MH conditions are more likely to continue to experience later MH symptoms. Essentially, these findings suggest that one's self-assessment of their prior MH functioning post-disaster, may be related to their MH after a later disaster. It may be helpful to know though that within a post-disaster context, one's prior MH functioning may predict later MH, as this information may be more easily obtained, rather than specific information about an individual's prior trauma history or disaster exposure. Using prior MH functioning as a possible predictor of later MH functioning in post-disaster contexts may help identify who may be at greater risk of developing more severe MH symptoms at a later time. This can assist in identifying who may benefit from access to MH support, and with triage, if psychological resources are limited.

Lastly, it is important to acknowledge the limitations of the multiple linear regression analyses. Similar response styles by the same participants across time may contribute to inflated associations among the results. W1 and W3 MH outcomes were significantly positively related (ranging from Pearson's r = .47 to .63). Despite these large associations,

multicollinearity and VIF statistics were evaluated for MH symptom variables and found to be within an acceptable range. With this knowledge in mind, the associations among pre-and during pandemic-MH should be interpreted with caution, as the influence of other pre-pandemic factors may be underestimated.

2. Pandemic Risk Factors

After examining associations among pandemic risk factors (W3 life stressors, COVID-19 related experiences, and COVID-19 fear) in conjunction with pre-pandemic and pandemic protective factors, hypothesis two was also partially supported. All three pandemic risk factors were significantly associated with W3 anxiety and W3 PTSS, but not W3 depression. As the degree of COVID-19 fear, and the number of pandemic-related experiences and life stressors increased, pandemic anxiety and PTSS also increased. These specific pandemic risk factors may be uniquely associated with anxiety or distress-related symptoms such as PTSS, rather than depressive symptoms because they are focused more on feelings related to personal safety, threat, or illness and experiences of stress. Instead, instances or experiences of loss, grief, boredom, or mourning may be more strongly related to depressive symptoms, which were not measured in the current study. Other studies found similar associations among pandemic-related risk factors (e.g., life stressors, major changes to one's life, beliefs that the COVID-19 virus was threatening to oneself) and unprecedented amounts of stress and increased severity of MH symptoms (Ettman et al., 2020; Holingue et al. 2020; Holman et al., 2020; Meda et al., 2021; Xiong et al., 2020).

While the current study did not find associations among pandemic risk factors and depressive symptoms, many others did. Ettman et al. (2020) specifically noted life stressors as a risk factor for pandemic-depression. Other specific factors associated with acute distress

and depressive symptoms during the pandemic were consuming large quantities of COVID-19 media related exposure, having little financial savings or financial strain, and being unemployed or a current university student during the pandemic (Holinque et al., 2020; Holman et al., 2020; Xiong et al., 2020). Severe depressive symptoms were also found to be associated with periods of implemented lockdowns and isolation, which lessened as lockdown was lifted among young adult university students in Italy (Meda et al., 2021). Unfortunately, current study participants were not asked if they were currently in a mandated or suggested lockdown or isolation period, so it was not possible to examine whether this was associated with depression but would have been important to consider, as these factors may be related.

Lastly, the associations found among W3 life stressors and pandemic-anxiety and PTSS are consistent with prior disaster MH research. Several studies found associations among life stressors since disaster and stress reactions, PTSS, or other MH symptoms (Goldmann & Galea, 2014; LaGreca et al., 1996); life stressors were found to explain associations among disaster exposure and PTSD and may magnify emotional responses, increase stress, and reduce the ability to effectively cope (Bonanno et al., 2010). It may be important to evaluate current feelings of fear, stress, and threat or loss during a drawn-out disaster, or post-disaster context, as higher levels of these factors may be related to increased risk of experiencing more severe anxiety or PTSS.

3. Pandemic Protective Factors

Hypothesis three predicted that pandemic protective factors (coping self-efficacy, self-compassion, and perceived social support) would be negatively associated with pandemic-MH problems, yet current study hypotheses were only partially supported. In

terms of protective factors, none were related to W3 anxiety, and only coping self-efficacy was negatively associated with W3 depression and W3 PTSS. The greater one's levels of coping self-efficacy, or their belief in their ability to cope with stressors amid the pandemic, the fewer depressive or PTSS symptoms they were likely to endorse. These findings are consistent with prior research that has found similar benefits of coping self-efficacy, also suggesting that it may be a buffering protective factor against MH amid collective trauma experiences (Luszcynska et al., 2009). Coping self-efficacy may be more protective against depressive or PTSS, rather than anxiety, because the COVID-19 pandemic was very likely a new experience and unfamiliar experience for young adults, with many unknowns and changes to society and life. Young adults may not have developed enough belief in themselves to endure through the challenges of the pandemic, whereas many young adults may have had prior experiences of grief or loss and trauma. Perhaps young adults could recall how they persisted and made it through other times, but struggled to do so when it came to unfamiliar, novel, or anxiety-provoking thoughts or situations that arose during the COVID-19 pandemic. Coping self-efficacy may also have been more protective for young adults during the pandemic than self-compassion or social support. At six months into the pandemic, many individuals were likely isolated and perhaps needed to rely more on internal resources (e.g., belief in oneself) to effectively cope with chronic stress during the COVID-19 pandemic. Coping self-efficacy may also be especially important and applicable during emerging adulthood, as many young adults may be actively working to develop greater self-efficacy, confidence, and independence. Since self-compassion and social support were not significantly associated with fewer pandemic-MH symptoms, it is important to consider why.

Self-compassion and social support were not associated with pandemic-MH, which conflicted with prior research suggesting that self-compassion and social support were associated with protection against MH symptoms post-disaster or after traumatic experiences (Thompson & Waltz, 2008; LaGreca et al., 1996; Goldmann & Galea, 2014; Chan et al., 2015; Sprague et al., 2015; Dar et al., 2018; Bonanno et al., 2010). There are many possible reasons why self-compassion was not supported as pandemic protective factor. Many study results conducted during the pandemic suggested that self-compassion may be protective against higher levels of COVID-19 stress, fear and uncertainty, and severe MH symptoms among individuals throughout the world (e.g., Vietnam, China, Italy, Turkey; Nguyen et al., 2021; Kavakli et al., 2020; Deniz, 2021; Cheli et al., 2020). Cultural differences in the experiences, familiarity, and understanding of self-compassion may exist among the U.S. and other countries, depending on how individualistic or collectivistic they may be. Current study participants may not be well-versed with the concept of self-compassion, as it is originally derived from Buddhist philosophy and religion. Further investigation of self-compassion as a protective factor among U.S. young adults during the pandemic is needed. There may also be potential limitations in measuring self-compassion as a stable trait of an individual's general ability to practice kindness toward oneself, de-identify with difficult emotions, etc. Perhaps studying the development of self-compassion skills through an intervention during the pandemic with guidance from a meditation practitioner or experienced MH provider would have demonstrated a greater protective impact.

It is also important to acknowledge that several prior studies conducted in the U.S. have examined self-compassion within a disaster recovery context (e.g., when the acute trauma or stressor referenced had fully or mostly resolved; Thompson & Waltz, 2008;

Tanaka et al., 2011; Vettese et al., 2011; Shebuski et al., 2020; Winders et al., 2021). In the current study, self-compassion was examined within the context of the COVID-19 pandemic at W3, during what may have been considered a stressful period with rising cases of the virus. It is possible that self-compassion may be more protective after an acute trauma has occurred and when immediate danger or threats have significantly reduced (e.g., during recovery or healing processes), although more research is needed. Examining associations among self-compassion and current MH several years after the start of the pandemic during a less acute phase, or in current time, may be useful to better understand whether self-compassion is protective after disaster in the way prior research has suggested.

Several post-hoc linear regression analyses were conducted to examine associations among W1 PTSS and self-compassion, and pre-pandemic factors and self-compassion. First, W1 PTSS was found to negatively predict W3 self-compassion; as W1 PTSS increased, W3 self-compassion decreased. Perhaps people who have experienced a higher severity of PTSS symptoms are more likely to be less self-compassionate to themselves over time. It may also be possible that individuals with higher levels of W1 PTSS may already have possessed lower levels of self-compassion to begin with, which may not be protective against risk of severe MH symptoms. Unfortunately, self-compassion was only measured during pandemic wavs, so this association cannot be explored. A second post-hoc analysis also examined the associations among pre-pandemic factors (e.g., prior trauma history, disaster exposure, W1 life stressors, all W1 MH outcomes and W3 self-compassion. Disaster exposure significantly predicted W3 self-compassion, with greater disaster exposure levels predicting higher levels of W3 self-compassion. Perhaps having gone through a prior collectively experienced trauma such as a natural disaster, may contribute to the development of self-compassion toward

oneself or kind and affirming adaptive internal coping strategies (e.g., modeled or demonstrated by others in community offering support or care) oneself over time, although more research is needed. Future exploration examining the associations among collectively experienced trauma exposure, self-compassion, and MH may be important.

Lastly, perceived social support was not found to be protective for any W3 MH outcome, which was surprising, since past disaster MH research has found this to be a robust predictor of resilient outcomes (Bonanno et al., 2010; Chan et al., 2015; Dar et al., 2018; Sprague et al., 2015). These non-significant findings may be explained largely by the COVID-19 pandemic context; social support may not have been associated with pandemic-MH, because usual ways of engaging socially in-person were largely disrupted. Another study examining associations among social support and increased risk of more severe MH symptoms among grocery store workers during the pandemic, also found that it was not protective (Janson et al., 2022). Within the mainland U.S. and Puerto Rico, social distancing was highly encouraged at W3 (summer of 2020), about six months into the pandemic. Some young adults may have chosen to socialize more infrequently than is typical, possibly disrupting the ability to obtain social support. Even though evidence suggests that perceived social support has been protective in disaster contexts, disasters also very often disrupt social networks (Bonanno et al., 2010; Kaniasty, 2020). During the COVID-19 pandemic, social networks were greatly impacted, thus likely disrupting the ability to obtain social support. Perhaps in a different disaster context, perceived social support may have been protective. It may have been useful to gather more specific information relating to reductions or increases in perceived social support, or various forms of obtained social support (e.g., in-person

interaction, over phone or video) during the pandemic, in order to better understand how it might be associated with pandemic-MH among young adults.

B. Assessing Mental Health Trajectories Pre to During Pandemic

1. Trajectory Shape and Mental Health Trends

A main aim of this dissertation was also to examine anxiety, depression, and PTSS across four waves (two pre-pandemic and two during), as well as pre-pandemic factors that may influence trajectory starting points and/or changes in trajectory shape. Hypothesis four predicted that each MH trajectory would follow a decelerating quadratic shape (i.e., in other words, MH symptoms would gradually increase and then gradually decrease again in a similar patter forming an upside-down *u*-shape). Hypothesis five predicted that higher levels of prior trauma history, disaster exposure, and W1 life stressors since disaster would be associated with higher initial levels of MH symptoms at W1, and accelerated changes in MH symptom changes over time (e.g., growth rates). HLM was used to examine these hypotheses, which was a well-suited and robust method for use with repeated measures. Results were different from what was expected, and study hypotheses were mostly unsupported, nevertheless, these findings provided important insight into pandemic adjustment among disaster-exposed young adults.

In terms of assessing MH trajectories, no changes were observed in anxiety and depression symptoms over time, and they exhibited stable, linear trajectories. The same initial levels of anxiety and depressive symptoms experienced at W1 (post-disaster) remained on average at the same level across all waves. Although there were very slight increases at Wave 3 in anxiety and depressive symptoms (approximately six months in the pandemic), they were not significant. These trends observed among anxiety and depressive symptoms

were surprising, because prior research has identified prototypical trajectories of MH post-disaster (e.g., chronic and sustained severe symptoms, delayed increase in MH symptoms, gradual reduction of symptoms, sustained low level of symptoms; Bonanno et al., 2004). These trajectories often include typically a portion of individuals that experience more severe MH symptoms post-disaster or trauma but have a continued decline in MH symptoms over time; however, this was not found for anxiety and depression.

The MH trajectories observed in the current study differed from extant research findings; Several studies identified significant increases in anxiety and depressive symptoms from measures recorded pre-pandemic and during pandemic, shortly after it began (Hawes, Szenczy, Klein, et al., 2021). Another study identified a decelerating quadratic trend, revealing gradual reductions among youth anxiety and depressive symptoms as the pandemic progressed (Hawes, Szenczy, Olino, et al., 2021). It is possible that perhaps immediately after the COVID-19 pandemic began, sharp increases in anxiety and depression may have occurred; however, since our first pandemic survey (W3) was administered six months into the pandemic, young adults in our current sample may had already adjusted, returning close to W1 baseline levels of anxiety and depression. The baseline levels of anxiety and depressive symptoms experienced among the current study's young adults may vary from other pandemic studies.

Post-hoc analyses revealed 23.7% to 30.8% of the current sample were at or above the clinically cutoff scores for generalized anxiety, and on average, anxiety scores were designated to be in the mild range. The lowest frequency of individuals meeting the clinical cutoff for anxiety (23.7%) was observed at W4, although this change was not significant. Despite this, anxiety scores on average seemed to remain within the designated mild anxiety

range, which is determined to be a score between five and nine (Kroenke et al., 2007). Similarly, about one-third of young adults in the current sample met the clinical cutoff for depression: W1 (30.7%), W2 (32.3%), W3 (35.9%), and W4 (34.4%). Across waves, young adults were likely experiencing on average mild to moderate. These findings suggest that within this sample, some trauma-exposed young adults may experience on average, mild and sustained anxiety and depressive symptoms.

A recent study utilizing a national sample of almost 2,809 young adults found that almost half (48%) of young adults had endorsed anxiety and depressive symptoms, which were sustained during the pandemic (Adams et al., 2022). The current study found that anxiety and depression levels were sustained pre- and during the pandemic. It is uncertain whether these MH symptoms persisted prior to W1, before disaster exposure, or resulted largely from disaster exposure. Unfortunately, we do not have measures of prior MH functioning before the natural disasters referenced in the current study occurred in 2017 and 2018. Despite this, our results are consistent with other research study findings observing increased levels of MH symptoms among young adults in comparison to older adults, over the past two decades (Twenge et al., 2019; Twenge et al., 2020).

Elevated levels of anxiety and depression among young adults may be due to possible existing vulnerabilities during emerging adulthood, and general increased stress and uncertainty in our world. During the past few years, the U.S. and Puerto Rico has been dealing with a series of cascading and intensifying collectively experienced traumas in addition to the COVID-19 pandemic, including continued natural disasters and adverse weather events (e.g., earthquakes, hurricanes, wildfires, heatwaves) other than the ones asked about in the current study. Some examples of these include the brutal murders of Black

individuals, such as George Floyd in May of 2020, highlighted economic and racial inequities and systemic racism, increasing political divisiveness and unrest, unemployment, Dengue fever and Zika virus outbreak in Puerto Rico, frequent acute mass violence and mass shootings, all of which can impact stress and MH (Silver et al., 2021).

While changes were not observed for the anxiety and depressive trajectories, significant changes were noted among PTSS over time. The PTSS trajectory formed a cubic or *S*-shape (slightly decreasing between Waves 1 and 2, which matches the recovery trajectory pattern), sharply increasing rising between Waves 2 and 3 (pre- to during-pandemic), and then gradually decreasing between Waves 3 and 4, (which may be following the delayed recovery pattern; Bonanno et al., 2004). Since the PTSS trajectory did not follow a decelerating quadratic shape, hypothesis four was not supported. As for PTSS trajectories, no other known studies have identified a cubic trend as the current study. Instead, research has identified general MH symptom increases during times of lockdown or rising levels of COVID-19-virus positivity rates cases (Meda et al., 2021). As lockdowns eased or positivity rates decreased, it is possible that other longitudinal investigations might have revealed a similar cubic trend to our results, with eventual decreases in PTSS. At W4, PTSS remained higher than Waves 1 and 2, but lower than Wave 3, indicating a newly emerging, slow decline in symptoms. This observed pattern may suggest that young adults in our sample had been gradually adjusting to the COVID-19 pandemic one year in, with slightly lower, levels of PTSS. It is also important to note that the current sample may have been predisposed to experience greater PTSS since they were previously exposed to a natural disaster, which may account for fluctuations in this pattern.

In sum, current study findings suggest that increases in PTSS among this specific young adult sample may be due to unexamined factors that were related to the COVID-19 pandemic, or contributing to PTSS at this time, since a significant increase in post-traumatic stress occurred in-between Waves 2 and 3 (pre- to during-pandemic). It is possible that many other unaccounted factors that may have contributed to increases in PTSS that were not measured in the current study. Overall, the current study findings suggest that anxiety and depression may be generally experienced among trauma-exposed young adults, and maintained during a subsequent traumas experienced trauma, while significant increases in PTSS may be more likely due to experiences during the COVID-19 pandemic, or other collectively experienced traumas.

2. Pre-Pandemic Factors Influencing MH Trajectory

HLM was used to examine whether pre-pandemic factors were associated with changes in MH trajectory starting point, or intercept, as well as MH trajectory growth rates (meaning acceleration or deceleration). Hypothesis five predicted that pre-pandemic, person-level characteristics (prior trauma history, disaster exposure, W1 life stressors since the disaster) would be associated with higher intercepts and greater accelerations and decelerations in MH symptoms. Region (mainland U.S. or Puerto Rico) served as a control variable. The use of HLM allowed for the opportunity to examine the influence of pre-pandemic functioning on MH over time, while accounting for changes within-person, due to the repeated measures design of the current study.

Overall, hypothesis five was partially supported. First, W1 life stressors since the disaster and prior trauma history were significantly associated with W1 anxiety and depression intercepts. No other pre-pandemic factors, nor region, were associated with

changes in anxiety and depressive symptom trajectory, as these remained stable across all four waves. As the endorsed number of W1 life stressors since disaster and level of prior trauma history increased, W1 anxiety and W1 depressive symptoms also increased. Anxiety and depressive symptoms on average, remained at similar levels as they were at W1, throughout the subsequent waves, including during the pandemic. These results suggest that prior trauma exposure and life stressors since disaster may be associated with initial anxiety and depressive symptom levels may be maintained during future disasters. People who have experienced fewer life stressors post-disaster and overall prior life trauma, may experience consistently lower anxiety and depressive symptom trajectory, in comparison to those who do not.

Level of disaster exposure was not associated with any MH trajectory or changes in MH symptoms over time, which was surprising and conflicted with research stating that disaster exposure is often strong predictor of post-disaster MH (La Greca et al., 1996). Perhaps disaster exposure was not as impactful in this particular sample, as the life stressors that were experienced after the disaster. Approximately three to six months (for young adults in the mainland U.S.) and one year (for young adults in Puerto Rico) had passed since many had experienced the natural disasters in 2017 or 2018 at W1; thus, participants may have been able to manage reactions to the disaster itself, but the additional life stressors that disasters can engender may have contributed more to W1 MH symptoms.

Pre-pandemic factors were also found to only be associated with the changes at the start of the PTSS trajectory, but not with PTSS growth rates over time. Specifically, region, which served as a control variable, and prior trauma history and W1 life stressors since disaster were associated with W1 PTSS (intercept of the trajectory). Participants from Puerto

Rico, and those who reported higher levels of prior trauma and W1 life stressors had higher levels of W1 PTSS, which remained high across waves. This pattern remained stable despite changes in the PTSS trajectory as it followed a cubic shape. In other words, individuals who had endorsed low levels of prior trauma history and W1 life stressors and were from the mainland U.S., likely had on average, lower levels of PTSS across waves, in comparison to those who did not. It is important to acknowledge that this group of young adults had been exposed to prior trauma before, and half of those who participated in the extended, longitudinal study indicated that they were from Puerto Rico. This region has endured severe natural disasters (e.g., earthquakes, hurricanes), political turmoil, economic instability, and much more, which may result in the experience of PTSS being more salient for this highly trauma-exposed group.

Because region, specifically, being in Puerto Rico, was considered a risk factor for experiencing greater PTSS compared to those in the mainland U.S., it is important to consider possible reasons why through a closer examination of the contextual factors and history impacting the region. Puerto Rico has been an unincorporated territory of the U.S. since 1898, and has experienced chronic, compounded effects of multiple disasters, specific to the island. These include economic difficulties and a debt crisis, which resulted from austerity policies implemented in 2016, sociopolitical tension, destruction and devastation caused by Hurricanes Irma and Maria in September 2017, and ongoing earthquakes since December 2019, which have caused displacement in southwest regions of the main island (Garriga-Lopez, 2020). Historically, Puerto Rico has had been reported to receive limited government and humanitarian aid during recovery periods (Garriga-Lopez, 2020), which many communities depend on for support post-disaster (Bonanno et al., 2010). After

Hurricanes Irma and Maria, many scholars perceived the U.S. government as having provided minimal help to Puerto Rico, believed to be due to the influence of colonialism (Garriga-Lopez, 2020). During the height of the COVID-19 pandemic, many Puerto Ricans reported concerns about receiving adequate aid from the U.S. government (Garriga-Lopez, 2020). Some local governments, hospitals, and community organizations had difficulties acquiring health supplies, which increased stress and reduced safety (Garriga-Lopez, 2020). Traditionally underserved communities, such as Puerto Rico, may experience increased burdens or recovery challenges post-disaster as individuals may be competing against each other for limited resources and support (Bonanno et al., 2010). Additionally, minority groups, like Black, Latinx, and indigenous communities have experienced injustices due to historical trauma, systematic racism, and poverty, which may contribute to a greater likelihood of adverse MH and physical health outcomes in comparison to White groups amidst repeated collectively experienced traumas (Silver et al., 2021). Research suggests that due to the chronicity of multiple, experienced traumas, strong emotional responses are likely with the occurrence of each new event (Silver et al., 2021), which may also explain why PTSS is higher for those in Puerto Rico, if they are continually exposed to new collectively experienced traumatic events.

Lastly, pre-pandemic factors did not have an influence on the acceleration or deceleration on MH symptoms. These factors were not as important in understanding changes in MH growth rates over time. Instead, some of these factors may be more impactful in determining the starting point of one's sustained, MH symptom trajectory. In terms of the PTSS trajectory, more research is needed to identify factors that may contribute to acceleration/deceleration. Other unmeasured factors may influence between-person

characteristics, due to significant random effects that are not accounted for by pre-pandemic factors.

C. Implications for Practice

Psychologists, MH or medical providers, emergency relief workers, university professors or staff, and even community members (e.g., coworkers, family, friends) who are located within disaster exposed regions or working closely with disaster-exposed groups can utilize the findings of this study to inform how they may identify young adults in need of psychological support. First, in terms of identifying young adults at greater risk of developing more severe MH symptoms after multiple disasters, it may be important to remember that prior functioning or prior MH may be a strong indicator of how a young adult might manage psychologically after a subsequent trauma or during an acute period of stress. Additionally, having experienced greater prior trauma history or life stressors after an initial trauma may be associated with risk of having sustained, higher levels of MH symptoms over time. Being aware of these specific risk factors can be useful for MH providers (e.g., who may already obtain information or screening on prior MH difficulties or past trauma experiences) and those in the community so that this can inform who might benefit from additional support. This can help to build awareness of who might be prioritized or triaged for psychological support in the aftermath of a disaster within MH or medical centers, universities), as well as facilitate information about helpful resources. Community members or neighbors may also feel compelled to check-in on one another or offer other forms of support or care if they are aware that a young adult is particularly affected by a collectively trauma. Also expecting possible increases in traumatic stress symptoms after another subsequent trauma may be helpful to be aware of for disaster-exposed young adults. Having

multiple members of the community possess this knowledge can hopefully encourage individuals to be aware of their own needs, watch for warning signs, and identify important medical or psychological supports that may be of use if needed in the future.

University staff, including affiliated MH providers can also aim to support young adults impacted by compounded traumas, whether through implementation of psycho-educational workshops, individual therapy, group therapy, or communal events or gatherings aimed at providing psychological support and promoting recovery post-trauma. Specifically tailored groups can discuss and learn skills pertaining how to manage and cope with life stressors after disaster, prior trauma, or existing MH symptoms. It may be important for young adults to have opportunities to connect and engage in social support, if possible and safe.

Additionally, protective factors, such as coping self-efficacy may be important to foster among young adults within the context of a future collectively experienced trauma or pandemic. It may be useful to develop psychological interventions aimed at bolstering feelings of coping self-efficacy or provide psychoeducation about the protective benefits of coping self-efficacy. This may help promote more resilient and adaptive ways of coping, ultimately reducing the likelihood that one may experience severe MH symptoms. Perhaps young adults can recall within therapy settings or through guided reflective exercises, specific times in which they managed difficult prior life events, stressors, or collective trauma. Young adults can make connections between these experiences and specific, unique strengths, or positive ways of thinking that led to increased ability to cope or persevere, despite adversity or stress. This can also be fostered in group settings if individuals relate or have shared experiences.

D. Strengths and Limitations

There are many notable strengths of this dissertation. First, this work consists of a multi-site, multi-disaster survey study focused specifically on young adults. Many studies tend to focus on the impact of one traumatic event in isolation but are often not accounting for other traumas or life stressors that may be chronically or concurrently experienced. In this current study, participants were exposed to a natural disaster in 2017 or 2018, and then experienced the COVID-19 pandemic in 2020, in addition to the potential traumas that they had experienced prior to the first disaster. Secondly, this work presented the opportunity to utilize prospective data to examine unique pre-pandemic predictors of MH during the COVID-19 pandemic. Initially at the start of the pandemic, many studies were cross-sectional, gradually, more longitudinal studies have emerged which allow more nuanced investigation of the long-term effects of the pandemic. In our study, we were able to better understand how the impact of a prior collective trauma (e.g., natural disasters) may affect later MH and MH trajectories over time after a second collectively experienced trauma (e.g., COVID-19 pandemic). Third, our work sought to increase knowledge pertaining to the risk and protective factors of disaster-exposed young adults, who may face greater vulnerabilities than older adults and included young adults from Puerto Rico through close collaboration with researchers in the region.

Several limitations exist within the current study. First, is the difficulty to retain participants across waves. W1 started off with a robust sample size and participants were all offered credit for participating in research at their respective universities. At W1, funding for later waves was not yet guaranteed, so participants were not provided definitive information relating to future participant incentives which may have impacted the decision to participate

in later waves. Several young adults who initially provided contact information were also hard to reach, as they had graduated and did not provide a personal email address, but rather, their university-affiliated email address, which they likely eventually lost access to.

Second, significant differences were found among young adults participated in the extended study, in comparison to those who only participated in W1. This suggests that there may be some bias in our current study subsamples consisting of both W1 and 3 participants, or those who completed at least W1 and one or more later waves. Young adults who participated in both Ws 1 and 2 reported higher levels of prior trauma history, W1 life stressors since disaster, and W1 MH symptoms, in comparison to those who only participated in W1; those with more significant prior trauma histories, or impacts caused by the natural disaster, may have been more motivated to continue participating in the extended study, than those who were not.

Third, the current study also omits important young adults that need to be included in disaster MH research. The subsamples used to conduct the current study analyses were mainly female and thus, conclusions cannot be made toward male, transgender, or other gender-diverse young adults. This study also included young adults who at W1 were attending a four-year university and completed at least some level of higher education, leaving out those who may be working or unemployed. Additionally, data collection was conducted in regions with warmer climates (e.g., California, Texas, Florida, Puerto Rico). Information is lacking pertaining to the experiences of young adult university students who may have lived in colder regions during the COVID-19 pandemic. During the winter seasons of the COVID-19 pandemic, many people had concerns about the risks of acquiring COVID-19 indoors and were less able to socialize outside to ensure ventilation or social distancing

practices; it may be worthwhile to explore potential differing impacts of the pandemic among various regions and climates. Sexual orientation was also not included as a primary risk or protective factor in the current study, and increased knowledge of how young adults with varied sexual orientations are impacted by exposure to multiple disasters is needed. There are also some limitations pertaining to how information was obtained relating to demographic characteristics in the current study. For instance, within the W1 survey, participants were given the opportunity to either select one specific ethnicity/race option, or a "Mixed or Other" ethnicity option. Because of this forced response, specific details pertaining to individuals of other ethnicities not listed or of multiple ethnic backgrounds are unknow.

Lastly, since we utilized a quantitative approach, we are lacking important contextual or specific types of information that may a provide richer, more nuanced understanding or explanations for our study findings. Incorporating a qualitative component to the current research could illuminate risk and resilience processes, experiences of MH symptoms, and the perceived impact and understanding of prior trauma or functioning on pandemic-MH among young adults. Also, specific questions about cultural or sociopolitical factors and their associations with MH during the pandemic could provide more information about the specific contextual experiences pertinent to Puerto Rico and/or the mainland U.S.

E. Conclusion

Considering several individual and environmental risk and protective factors can help to predict subsequent mental health (MH) outcomes after collectively experienced disasters. The current study results suggest that prior-MH functioning, COVID-19 fear, pandemic life stressors, COVID-19 related experiences, and coping self-efficacy may predict pandemic-MH outcomes among disaster-exposed young adults. Additionally, longitudinal anxiety and

depressive trajectories examined pre- to during-pandemic remained stable for disaster-exposed young adults, while significant changes were noted in the PTSS trajectory. PTSS significantly increased from pre-to during-pandemic time points and slightly decreased at the final time point. Lastly, young adults from Puerto Rico and with higher levels of prior trauma history and life stressors after an initial disaster, were found to have higher sustained MH trajectories throughout the pandemic, than those who did not. Disaster-exposed young adults may benefit from having increased psychological support in the long-term to manage possible sustained MH symptoms. Additionally, young adults may be at risk of experiencing increased PTSS after a subsequent collective trauma. It may be beneficial for MH professionals, university staff, and community members to identify, implement, or facilitate supportive psychological supports to young adults with increased risk of severe MH symptoms after multiple, compounded collectively experienced traumas to support recovery over extended periods of time.

References

Adams, S. H., Schaub, J. P., Nagata, J. M., Park, M. J., Brindis, C. D., & Irwin, C. E., Jr (2022). Young adult anxiety or depressive symptoms and mental health service utilization during the COVID-19 pandemic. *The Journal of Adolescent Health, 70*(6), 985–988. https://doi.org/10.1016/j.jadohealth.2022.02.023

Arnett, J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist*, *55*(5), 469-480. https://doi.org/10.1037/0003-066X.55.5.469

Arnett, J. (2004). *Emerging adulthood: The winding road from the late teens through the twenties*. Oxford University Press. https://doi.org/10.1080/14616730701349721

American Psychological Association (2019). *Stress in America: Stress and Current Events*. Stress in America™ Survey. https://www.apa.org/news/press/releases/stress/2019/stress-america-2019.pdf

American Psychological Association (2020). *Stress in America™ 2020: A National Mental Health Crisis*. https://www.apa.org/news/press/releases/stress/2020/sia-mental-health-crisis.pdf

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

Acierno, R., Ruggiero, K. J., Kilpatrick, D. G., Resnick, H. S., & Galea, S. (2006). Risk and protective factors for psychopathology among older versus younger adults after the 2004 Florida hurricanes. *The American Journal of Geriatric Psychiatry, 14*(12), 1051-1059. https://doi.org/10.1097/01.JGP.0000221327.97904.b0

Anderson, D. R. (2012). *Hierarchical Linear Modeling (HLM): An Introduction to Key Concepts within Cross-Sectional and Growth Modeling Frameworks* (Technical Report #1308). Behavioral Research & Teaching, University of Oregon. https://files.eric.ed.gov/fulltext/ED545279.pdf

Auerbach, R. P., Mortier, P., Bruffaerts, R., Alonso, J., Benjet, C., Cuijpers, P., Demyttenaere, K., Ebert, D. D., Green, J. G., Hasking, P., Murray, E., Nock, M. K., Pinder-Amaker, S., Sampson, N. A., Stein, D. J., Vilagut, G., Zaslavsky, A. M., Kessler, R. C., & WHO WMH-ICS Collaborators (2018). WHO World Mental Health Surveys International College Student Project: Prevalence and distribution of mental disorders. *Journal of abnormal psychology, 127*(7), 623–638. https://doi.org/10.1037/abn0000362

Bailey, H. N., Moran, G., & Pederson, D. R. (2007). Childhood maltreatment, complex trauma symptoms, and unresolved attachment in an at-risk sample of adolescent mothers. *Attachment & Human Development, 9*(2), 139-161. https://doi.org/10.1080/14616730701349721

Bandura, A. (1997). *Self-efficacy: The exercise of control.* W H Freeman/Times Books/ Henry Holt & Co.

Bareket-Bojmel, L., Shahar, G., Abu-Kaf, S., & Margalit, M. (2021). Perceived social support, loneliness, and hope during the COVID-19 Pandemic: testing a mediating model in the UK, USA, and Israel. *The British journal of clinical psychology*, *60*(2), 133–148. https://doi.org/10.1111/bjc.12285

Benight, C. C., Shoji, K., James, L. E., Waldrep, E. E., Delahanty, D. L., & Cieslak, R. (2015). Trauma coping self-efficacy: a context-specific self-efficacy measure for

traumatic stress. *Psychological trauma: theory, research, practice and policy*, *7*(6), 591–599. https://doi.org/10.1037/tra0000045

Bonanno, G. A., Galea, S., Bucciarelli, A., & Vlahov, D. (2007). What predicts psychological resilience after disaster? The role of demographics, resources, and life stress. *Journal of Consulting and Clinical Psychology, 75*, 671–682. https://doi.org/10.1037/0022-006X.75.5.671

Bonanno, G. A. (2004). Loss, Trauma, and Human Resilience: Have We Underestimated the Human Capacity to Thrive After Extremely Aversive Events? *American Psychologist, 59*(1), 20-28. https://doi.org/10.1037/0003-066X.59.1.20

Bonanno, G. A., Brewin, C. R., Kaniasty, K., & La Greca, A. M. (2010). Weighing the costs of disaster: consequences, risks, and resilience in individuals, families, and communities. *Psychological Science in the Public Interest, 11*(1), 1-49. https://doi.org/10.1177/1529100610387086

Bosmans, M. W., & Van der Velden, P. G. (2015). Longitudinal interplay between posttraumatic stress symptoms and coping self-efficacy: A four-wave prospective study. *Social Science & Medicine, 134*, 23-29. https://doi.org/10.1016/j.socscimed.2015.04.007

Bovin, M. J., Marx, B. P., Weathers, F. W., Gallagher, M. W., Rodriguez, P., Schnurr, P. P., & Keane, T. M. (2016). Psychometric properties of the PTSD Checklist for Diagnostic and Statistical Manual of Mental Disorders-Fifth Edition (PCL-5) in veterans. *Psychological assessment*, *28*(11), 1379-1391. https://doi.org/10.1037/pas0000254

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist, 32*(7), 513-531. https://doi.org/10.1037/0003-066X.32.7.513

Bronfenbrenner, U. (1994). Ecological models of human development. In T. Husen & T.N. Postlethwaite (Eds.), *The international encyclopedia of education* (2nd ed., pp. 1643-1647). Pergamon.

Cicchetti, D. & Lynch, M. (1993) Toward an ecological/transactional model of community violence and child maltreatment: consequences for children's development. *Psychiatry, 56*(1), 96-118. https://doi.org/10.1080/00332747.1993.11024624

Chan, C. S., Lowe, S. R., Weber, E., & Rhodes, J. E. (2015). The contribution of pre- and postdisaster social support to short- and long-term mental health after Hurricanes Katrina: A longitudinal study of low-income survivors. *Social Science & Medicine, 138*, 38-43. https://doi.org/10.1016/j.socscimed.2015.05.037

Charles, N. E., Strong, S. J., Burns, L. C., Bullerjahn, M. R., & Serafine, K. M. (2021). Increased mood disorder symptoms, perceived stress, and alcohol use among college students during the COVID-19 pandemic. *Psychiatry Research, 296*, 113706. https://doi.org/10.1016/j.psychres.2021.113706

Cheli, S., Cavalletti, V., & Petrocchi, N. (2020). An online compassion-focused crisis intervention during COVID-19 lockdown: a case series on patients at high risk for psychosis. *Psychological, Social, and Integrative Approaches, 12(*4), 359-362. https://doi.org/10.1080/17522439.2020.1786148

Chen, S., & Bonanno, G. A. (2020). Psychological adjustment during the global outbreak of COVID-19: A resilience perspective. *Psychological Trauma: Theory, Research, Practice, and Policy, 12*(S1), S51–S54. https://doi.org/10.1037/tra0000685

Chou, W.-P., Wang, P.-W., Chen, S.-L., Chang, Y.-P., Wu, C.-F., Lu, W.-H., & Yen, C.-F. (2020). Voluntary reduction of social interaction during the COVID-19 pandemic in Taiwan: related factors and association with perceived social support. *International Journal of Environmental Research and Public Health*, *17*(21), 8039. https://doi.org/10.3390/ijerph17218039

Cutrona, C. E. & Russell, D. W. (1987). The Provisions of Social Relationships and Adaptation to Stress. In W. H. Jones & D. Perlman (Eds.), *Advances in Personal Relationships* (pp. 37-67). JAI Press.

Dar, K. A., Iqbal, N., Prakash, A., & Paul, M. A. (2018). PTSD and depression in adult survivors of flood fury in Kashmir: the payoffs of social support. *Psychiatry Research, 261*, 449-455. https://doi.org/10.1016/j.psychres.2018.01.023

Deniz, M. E. (2021). Self-compassion, intolerance of uncertainty, fear of COVID-19, and well-being: a serial mediation investigation. *Personality and Individual Differences, 177*, 110824. https://doi.org/10.1016/j.paid.2021.110824

Duffy, M. E., Twenge, J. M., & Joiner, T. E. (2019). Trends in mood and anxiety symptoms and suicide-related outcomes among U.S. undergraduates, 2007–2018: evidence from two national surveys. *Journal of Adolescent Health, 65*(5), 590–598. https://doi.org/10.1016/j.jadohealth.2019.04.033

Enders, C. K. (2001). The performance of full information maximum likelihood estimator in multiple regression models with missing data. *Educational and Psychological Measurement, 61*(5), 713-740. https://doi.org/10.1177/0013164401615001

Ernst, A. F. & Albers, C. J. (2017). Regression assumptions in clinical psychology research practice-a systematic review of common misconceptions. *PeerJ, 5*, e3323. https://doi.org/10.7717/peerj.3323

Ettman, C. K., Abdalla, S. M., Cohen, G. H., Sampson, L., Vivier, P. M., & Galea, S. (2020). Prevalence of depression symptoms in US adults before and during the COVID-19 pandemic. *JAMA Network Open, 3*(9), e2019686. https://doi.org/10.1001/jamanetworkopen.2020.19686

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175–191. https://doi.org/10.3758/BF03193146

Felix, E. D., Binmoeller, C., Nylund-Gibson, K., Benight, C. C., Benner, A. D., & Terzieva, A. (2019). Addressing disaster exposure measurement issues with latent class analysis. *Journal of Traumatic Stress, 32*(1), 56–66. https://doi.org/10.1002/jts.22368

Felix, E. D., Dowdy, E., & Green, J.G. (2018). University student voices on healing and recovery following tragedy. *Psychological Trauma: Theory, Research, Practice and Policy, 10*(1), 76-86. https://doi.org/10.1037/tra0000172

Felix, E. D., Hernández, L.A., Bravo, M., Rafael, R., Cabiya, J., & Canino, G. (2011). Natural disaster and risk of psychiatric disorders in Puerto Rican children. *J Abnorm Child Psychol*, *39*, 589–600. https://doi.org/10.1007/s10802-010-9483-1

Felix, E. D., Janson, M., Fly, J., & Powers, J. (2022). Social-cognitive mediators of the relationship of media exposure to acute mass violence and distress among adolescents. *American Journal of Orthopsychiatry, 92*(1), 1-10. https://doi.org/10.1037/ort0000580

Felix, E. D., Nylund-Gibson, K., Kia-Keating, M., Liu, S. R., Binmoeller, C., & Terzieva, A. (2020). The influence of flood exposure and subsequent stressors on youth social-emotional health. *American Journal of Orthopsychiatry, 90*(2), 161-170. https://doi.org/10.1037/ort0000418

Felix, E., You, S., & Canino, G. (2013). School and community influences on the long term post-disaster recovery of children and youth following Hurricane Georges. *Journal of community psychology*, *41*(8), 1021–1038. https://doi.org/10.1002/jcop.21590

Furr, J. M., Comer, J. S., Edmunds, J. M., & Kendall, P. C. (2010). Disasters and youth: a meta-analytic examination of posttraumatic stress. *Journal of Consulting and Clinical Psychology, 78*(6), 765-780. https://doi.org/10.1037/a0021482

Gallagher, H. C., Richardson, J., Forbes, D., Harms, L., Gibbs, L., Alkemade, N., MacDougall, C., Waters, E., Block, K., Lusher, D., Baker, E. and Bryant, R. A. (2016). Mental health following separation in a disaster: the role of attachment. *Journal of Traumatic Stress, 29*, 56-64. https://doi.org/10.1002/jts.22071

García, C., Rivera, F. I., Garcia, M. A., Burgos, G., & Aranda, M. P. (2021). Contextualizing the COVID-19 era in Puerto Rico: compounding disasters and parallel pandemics. *The journals of gerontology. Series B, Psychological sciences and social sciences*, *76*(7), e263–e267. https://doi.org/10.1093/geronb/gbaa186

Garriga-Lopez, A. M. (2020). Compounded disasters: Puerto Rico confronts COVID-19 under US colonialism. *Social Anthropology, 28*(2), 269-270. https://doi.org/10.1111/1469-8676.12821

Ganson, K. T., Tsai, A. C., Weiser, S. D., Benabou, S. E., & Nagata, J. M. (2020). Job insecurity and symptoms of anxiety and depression among U.S. young adults during

COVID-19. *Journal of Adolescent Health, 68*(1), 53-56. https://doi.org/10.1016/j.jadohealth.2020.10.008

Gibbons, R. D., Roy, A., Kapur, K., & Jercan, M. (2015). *RMASS*. [Online software]. Center for Health Statistics. http://www.rmass.org

Gilbert, P. (2005). Compassion and cruelty: a biopsychosocial approach. In P. Gilbert (Ed.), *Compassion: Conceptualisations, research and use in psychotherapy* (pp. 9–74). Routledge.

Glowacz, F. & Schmits, E. (2020). Psychological distress during the COVID-19 lockdown: the young adults most at risk. *Psychiatry research, 293*, 113489. https://doi.org/10.1016/j.psychres.2020.113486

Goodwin, R. D., Weinberger, A. H., Kim, J. H., Wu, M., & Galea, S. (2020). Trends in anxiety among adults in the United States, 2008-2018: Rapid increases among young adults. *Journal of psychiatric research*, *130*, 441–446. https://doi.org/10.1016/j.jpsychires.2020.08.014

Goldmann, E. & Galea, S. (2014). Mental health consequences of disasters. *Annual Review of Public Health, 35,* 169-83. https://doi.org/10.1146/annurev-publhealth-032013-182435

Graupensperger, S., Cadigan, J. M., Einberger, C., & Lee, C. M. (2023). Multifaceted COVID-19-related stressors and associations with indices of mental health, well-being, and substance use among young adults. *International journal of mental health and addiction*, *21*(1), 418–431. https://doi.org/10.1007/s11469-021-00604-0

Gray, M. J., Litz, B. T., Hsu, J. L., & Lombardo, T. W. (2004). Psychometric properties of the life events checklist. *Assessment,11*(4), 330-41. https://doi.org/10.1177/1073191104269954

Grey, I., Arora, T., Thomas, J., Saneh, A., Tohme, P., & Abi-Habib, R. (2020). The role of perceived social support on depression and sleep during the COVID-19 pandemic. *Psychiatry Research, 293*, 113452. https://doi.org/10.1016/j.psychres.2020.113452

Gruber, J., Prinstein, M. J., Clark, L. A., Rottenberg, J., Abramowitz, J. S., Albano, A. M., Aldao, A., Borelli, J. L., Chung, T., Davila, J., Forbes, E. E., Gee, D. G., Hall, G. C. N., Hallion, L. S., Hinshaw, S. P., Hofmann, S. G., Hollon, S. D., Joormann, J., Kazdin, A. E., Klein, D. N., … Weinstock, L. M. (2020). Mental health and clinical psychological science in the time of COVID-19: challenges, opportunities, and a call to action. *American Psychologist*. Advance online publication. http://dx.doi.org/10.1037/amp0000707

Hamza, C. A., Ewing, L., Heath, N. L., & Goldstein, A. L. (2020). When social isolation is nothing new: A longitudinal study psychological distress during COVID-19 among university students with and without preexisting mental health concerns. *Canadian Psychology/Psychologie canadienne.* Advance online publication. http://dx.doi.org/10.1037/cap0000255

Hawes, M. T., Szenczy, A. K., Klein, D. N., Hajcak, G., & Nelson, B. D. (2021). Increases in depression and anxiety symptoms in adolescents and young adults during the COVID-19 pandemic. *Psychological Medicine*, 1-9. https://doi.org/10.1017/S0033291720005358

Hawes, M. T., Szenczy, A. K., Olino, T. M., Nelson, B. D., & Klein, N. D. (2021). Trajectories of depression, anxiety, and pandemic experiences: a longitudinal study of youth in New York during the Spring-Summer of 2020. *Psychiatry Research, 298.* https://doi.org/10.1016/j.psychres.2021.113778

Holingue, C., Badillo-Goicoechea, E., Riehm, K. E., Veldhuis, C. B., Thrul, J., Johnson, R. M., Fallin, M. D., Kreuter, F., Stuart, E. A., & Kalb, L. G. (2020). Mental distress during the COVID-19 pandemic among US adults without a pre-existing mental health condition: Findings from American trend panel survey. *Preventative Medicine, 139*, 106231. https://doi.org/10.1016/j.ypmed.2020.106231

Holman, E. A., Garfin, D. R., Lubens, P., & Silver, R. C. (2020). Media exposure to collective trauma, mental health, and functioning: does it matter what you see? *Clinical Psychological Science*, *8*(1), 111–124. https://doi.org/10.1177/2167702619858300

Holman, E. A., Thompson, R. R., Garfin, D. R., Silver, R. C. (2020). The unfolding COVID-19 pandemic: A probability-based, nationally representative study of mental health in the United States. *Science Advances, 6*, eabd5390. https://doi.org/10.1126/sciadv.abd5390

IBM Corp. (2021). *IBM SPSS Statistics for Macintosh* (Version 28.0) [Computer software]. IBM Corp.

Janson, M., Felix, E. D., Kaniasty, K., Lugo-Hernandez, E. A., Rosa-Rodríguez, Y., & Canino, G. (2023). Life stressors and posttraumatic stress symptoms mediate the association between disaster exposure and identity-related distress in emerging

adults. *Journal of American College Health*. https://doi.org/10.1080/07448481.2022.2155826

Janson, M., Sharkey, J. D., & del Cid, D. A. (2021). Predictors of mental health outcomes in grocery store workers amid the COVID-19 pandemic and implications for workplace safety and moral injury. *International Journal of Environmental Research and Public Health, 18*(16), 8675. https://doi.org/10.3390/ijerph18168675

Kaniasty K. (2020). Social support, interpersonal, and community dynamics following disasters caused by natural hazards. *Current opinion in psychology*, *32*, 105–109. https://doi.org/10.1016/j.copsyc.2019.07.026

Kapur, K., Jercan, M., Bhaumik, D. K., & Gibbons, R. D. (n.d). Repeated Measures and Sample Size (RMASS) Manual. http://www.rmass.org/RMASS_Manual.pdf

Kavakli, M., Ak, M., Uguz, F., & Turkman, O. O. (2020). The mediating role of self-compassion in the relationship between perceived COVID-19 threat and death anxiety. *Turkish Journal Clinical Psychiatry, 23*(1), 15-23. https://doi.org/10.5505/kpd.2020.59862

Keum, B. T., Miller, M. J., & Inkelas, K. K. (2018). Testing the factor structure and measurement invariance of the PHQ-9 across racially diverse U.S. college students. *Psychological Assessment, 30*(8), 1096-1106. https://doi.org/10.1037/pas0000550

Keyes, K. M., Gary, D., O'Malley, P. M., Hamilton, A., & Schulenberg, J. (2019). Recent increases in depressive symptoms among US adolescents: trends from 1991 to 2018. *Social Psychiatry and Psychiatric Epidemiology, 54,* 987–996. https://doi.org/10.1007/s00127-019-01697-8

Knight, B.G., Gatz, M., Heller, K., Bengston, V.L. (2000). Age and emotional response to the Northridge earthquake: a longitudinal analysis. *Psychology and Aging, 15*, 627–634. https://doi.org/10.1037/0882-7974.15.4.627

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of general internal medicine*, *16*(9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x

Kroenke, K., Spitzer, R. L., Williams, J. B., & Löwe, B. (2010). The Patient Health Questionnaire somatic, anxiety, and depressive symptom scales: a systematic review. *Gen Hosp Psychiatry, 32*(4), 345-59. https://doi.org/10.1016/j.genhosppsych.2010.03.006

Kroenke, K., Spitzer, R. L., Williams, J. B., Monahan, P. O., & Löwe, B. (2007). Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Annals of internal medicine*, *146*(5), 317–325. https://doi.org/10.7326/0003-4819-146-5-200703060-00004

La Greca, A. M., Silverman, W. K., Vernberg, E. M., & Prinstein, M. J. (1996). Symptoms of posttraumatic stress in children after Hurricane Andrew: A prospective study. *Journal of Consulting and Clinical Psychology, 64*(4), 712-723. https://doi.org/10.1037/0022-006X.64.4.712

Lai, B. S., Osborne, M. C., Piscitello, J., Self-Brown, S. & Kelley, M. L. (2018). The relationship between social support and posttraumatic stress symptoms among youth exposed to a natural disaster. *European Journal of Psychotraumatology, 9*(2), 1450042. https://doi.org/10.1080/20008198.2018.1450042

Lea, C. S., Littleton, H., Allen, A. B., & Beasley, C. M. (2020). Resilience, self-compassion, and mental health outcomes. *North Carolina Medical Journal, 81*(5), 315-319. https://doi.org/10.18043/ncm.81.5.315

Lee, C. M., Cadigan, J. M., & Rhew, I. C. (2020). Increases in loneliness among young adults during the COVID-19 pandemic and association with increases in mental health problems. *The Journal of adolescent health, 67*(5), 714–717. https://doi.org/10.1016/j.jadohealth.2020.08.009

Li, A., Wang, S., Cai, M., Sun, R., Liu, X. (2021). Self-compassion and life-satisfaction among Chinese self-quarantined residents during COVID-19 pandemic: a moderated mediation model of positive coping and gender. *Personality and Individual Differences*, *170*, 110457. https://doi.org/10.1016/j.paid.2020.110457

Lipson, S. K., Lattie, E. G., & Eisenberg, D. (2018). Increased rates of mental health service utilization by U.S. college students: 10-year population-level trends (2007-2017). *Psychiatric Services, 70*(1), 60-63. https://doi.org/10.1176/appi.ps.201800332

Liu, C. H., Zhang, E., Wong, G.T.F., Hyun, S & Hahm, H. C. (2020). Factors associated with depression, anxiety, and PTSD symptomatology during the COVID-19 pandemic: clinical implications for U.S. young adult mental health. *Psychiatry Research, 290*, 113172. https://doi.org/10.1016/j.psychres.2020.113172

Loades, M. E., Chatburn, E., Higson-Sweeney, N., Reynolds, S., Shafran, R., Brigden, A., Linney, C., McManus, M. N., Borwick, C., & Crawley, E. (2020). Rapid systematic review: the impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. *Journal of the American Academy of*

Child and Adolescent Psychiatry, *59*(11), 1218–1239.e3. https://doi.org/10.1016/j.jaac.2020.05.009

Luszczynska, A., Benight, C. C., & Cieslak, R. (2009). Self-efficacy and health-related outcomes of collective trauma. *European Psychologist, 14*, 51-62. https://doi.org/10.1027/1016-9040.14.1.51

Lynch, M. & Cicchetti, D. (1998). An ecological-transactional analysis of children and contexts: the longitudinal interplay among child maltreatment, community violence, and children's symptomatology. *Development and Psychopathology, 10*(2), 235-257. https://doi.org/10.1017/s095457949800159x

MacBeth, A. & Gumley, A. (2012). Exploring compassion: A meta-analysis of association between self-compassion and psychopathology. *Clinical Psychology Review, 32*(6), 545-552. https://doi.org/10.1016/j.cpr.2012.06.003

Maerten-Rivera, J. (2013). A piecewise growth model using HLM7 to examine change in teaching practices following a science teacher professional development intervention. In Garson, G. D. (Ed.), *Hierarchical linear modeling: Guide and applications* (pp. 249-272). SAGE Publications, Inc. https://www.doi.org/10.4135/9781483384450

Meda, N., Pardini, S., Slongo, I., Bodini, L., Zordan, M. A., Rigobello, P., Visioli, F., & Novara, C. (2021). Students' mental health problems before, during, and after COVID-19 lockdown in Italy. *Journal of Psychiatric Research, 134*, 69-77. https://doi.org/10.1016/j.jpsychires.2020.12.045

Muthén, L. K. and Muthén, B. O. (1998-2017). *Mplus User's Guide* (Eighth Edition) [Computer software]. Muthén & Muthén. https://www.statmodel.com/download/usersguide/MplusUserGuideVer_8.pdf

Mueller, A. L., McNamara, M. S., & Sinclair, D. A. (2020). Why does COVID-19 disproportionately affect older people? *Aging*, *12*(10), 9959–9981. https://doi.org/10.18632/aging.103344

National Center for Health Statistics. (2021, May 5). *Anxiety and Depression: Household Pulse Survey*. Centers for Disease Control and Prevention (CDC). https://www.cdc.gov/nchs/covid19/pulse/mental-health.htm

Neff, K. D. (2003a). The development and validation of a scale to measure self-compassion. *Self and Identity, 2*(3), 223-250. https://doi.org/10.1080/15298860309027

Nguyen, T. M. & Le, G. N. H. (2021). The influence of COVID-19 stress on psychological well-being among Vietnamese adults: the role of self-compassion and gratitude. *Traumatology,* 1-12. http://dx.doi.org/10.1037/trm0000295

Norris, F. H., Friedman, M. J., & Watson, P. J. (2002). 60, 000 disaster victims speak: Part II. Summary and implications of the disaster mental health research. *Psychiatry, 65*(3), 240–260. https://doi.org/10.1521/psyc.65.3.240.20169

Norris, F. H., & Elrod, C. L. (2006). *Psychosocial Consequences of Disaster: A Review of Past Research.* In F. H. Norris, S. Galea, M. J. Friedman, & P. J. Watson (Eds.), *Methods for disaster mental health research* (p. 20–42). The Guilford Press.

Office of Behavioral and Social Sciences Research (OBSSR). (2020, May 14). COVID-19 OBSSR Research Tools. *National Institute of Environmental Health Sciences (NIH). U.S. National Library*. https://www.nlm.nih.gov/dr2/COVID-19_BSSR_Research_Tools.pdf

Pan, Y. & McBee, M. T. (2014). A Flexible Method for Conducting Power Analysis for Two and Three-Level Hierarchical Linear Models in R. *Journal of Modern Applied*

Statistical Methods, 13(1), 30. Pan, Y. & McBee, M. T. (2014). A flexible method for conducting power analysis for two and three-level hierarchical linear models in R. *Journal of Modern Applied Statistical Methods, 13*(1), 30. https://www.doi.org/10.22237/jmasm/1398918540

Parslow, R., Jorm, A., & Christensen, H. (2006). Associations of pre-trauma attributes and trauma exposure with screening positive for PTSD: analysis of a community-based study of 2085 young adults. *Psychological Medicine*, *36*(3), 387-395. https://doi.org/10.1017/S0033291705006306

Platt, J. M., Lowe, S. R., Galea, S., Norris, F. H., & Koenen, K. C. (2016). A longitudinal study of the bidirectional relationship between social support and posttraumatic stress following a natural disaster. *Journal of Traumatic Stress, 29*, 205-213. https://doi.org/10.1002/jts.22092

Pierce, M., Hope, H., Ford, T., Hatch, S., Hotopf, M., John, A., Kontopantelis, E., Webb, R., Wessely, S., McManus, S., Abel, K. M. (2020). Mental health before and during the COVID-19 pandemic: a longitudinal probability sample survey of the UK population. *Lancet Psychiatry,7*(10), 883-892. https://doi.org/10.1016/S2215-0366(20)30308-4

Pefferbaum, B. & North, C. S. (2020). Mental health and the COVID-19 pandemic. *The New England Journal of Medicine, 383*, 510-512. https://doi.org/10.1056/NEJMp2008017

Raes, F., Pommier, E., Neff, K. D., & Van Gucht, D. (2011). Construction and factorial validation of a short form of the Self-Compassion Scale. *Clin Psychol Psychother 18*(3),250-255. https://doi.org/10.1002/cpp.702

Raudenbush, S.W., & Bryk, A.S. (2002). *Hierarchical Linear Models: Applications and data analysis methods* (2nd ed.). Sage Publications, Inc.

Raudenbush, S.W., Bryk, A.S, Cheong, Y.F. & Congdon, R. (2019). HLM 8 for Windows [Computer software]. Skokie, IL: Scientific Software International, Inc.

Sapra, A., Bhandari, P., Sharma, S., Chanpura, T., & Lopp, L. (2020). Using Generalized Anxiety Disorder-2 (GAD-2) and GAD-7 in a Primary Care Setting. *Cureus*, *12*(5), e8224. https://doi.org/10.7759/cureus.8224

Shahrour, G. & Dardas, L. A. (2020). Acute stress disorder, coping self-efficacy and subsequent psychological distress among nurses amid COVID-19. *Journal of Nursing Management, 28*, 1686- 1695. https://doi.org/10.1111/jonm.13124

Shanahan, L., Steinhoff, A., Bechtiger, L., Murray, A. L., Nivette, A., Hepp, U., Ribeaud, D., & Eisner, M. (2020). Emotional distress in young adults during the COVID-19 pandemic: evidence of risk and resilience from a longitudinal cohort study. *Psychological Medicine,* 1–10. https://doi.org/10.1017/ S003329172000241X

Shebuski, K., Bowie, J. A., Ashby, J. S. (202). Self-compassion, trait resilience, and trauma exposure in undergraduate students. *Journal of College Counseling, 23*(1), 2-14. https://doi.org/10.1002/jocc.12145

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med, 166*(10), 1092-7. https://doi.org/10.1001/archinte.166.10.1092

Sprague, C. M., Kia-Keating, M., Felix, E. D., Afifi, T., Reyes, G., & Afifi, W. A. (2015). Youth psychosocial adjustment following wildfire: the role of family resilience, emotional support, and concrete support. *Child Youth Care Forum*, *44*, 433–450. https://doi.org/10.1007/s10566-014-9285-7

Silver, R. C., Holman, E. A. & Garfin, D. R. (2021). Coping with cascading collective traumas in the United States. *Nat Hum Behav, 5*, 4–6. https://doi.org/10.1038/s41562-020-00981-x

Tabachnik, B. G., & Fidell, S. L. (2013). Multicollinearity and singularity. In Tabachnik, B. G. & Fidell, S. L. (Eds.), *Using multivariate statistics* (pp. 88-91). Pearson.

Tanaka, M., Wekerle, C., Schmuck, M.L., & Paglia-Boak, A. (2011). The linkages among childhood maltreatment, adolescent mental health, and self-compassion in child welfare adolescents. *Child Abuse Negl, 35*(10), 887-98. https://doi.org/10.1016/j.chiabu.2011.07.003

Tanner, J. L., Arnett, J. J., & Leis, J. A. (2009). Emerging adulthood: Learning and development during the first stage of adulthood. In M. C. Smith & N. DeFrates-Densch (Eds.), *Handbook of research on adult learning and development* (p. 34–67). Routledge/Taylor & Francis Group.

Terlizzi, E. P. & Schiller, J. S. (2021). Estimates of mental health symptomatology, by month of interview: United States, 2019. *National Center for Health Statistics*. https://www.cdc.gov/nchs/data/nhis/mental-health-monthly-508.pdf

Thompson, B., & Waltz, J. (2008). Self-compassion and PTSD symptom severity. *Journal of Traumatic Stress*, *21*(6), 556– 558. https://doi.org/10.1002/jts.20374

Trompetter, H. R., Kleine, E., & de Bohlmeijer, E. T. (2017). Why does positive mental health buffer against psychopathology? An exploratory study on self-compassion as a resilience mechanism and adaptive emotion regulation strategy. *Cognitive Therapy and Research, 41*(3), 459–468. https://doi.org/10.1007/s10608-016-9774-0

Twenge, J. M., Cooper, A. B., Joiner, T. E., Duffy, M. E., & Binau, S. G. (2019). Age, period, and cohort trends in mood disorder indicators and suicide-related outcomes in a nationally representative dataset, 2005– 2017. *Journal of Abnormal Psychology, 128*(3), 185–199. https://doi.org/10.1037/abn0000410

Twenge, J. M. & Joiner, T. E. (2020). U.S. Census Bureau- assessed prevalence of anxiety and depressive symptoms in 2019 and during the 2020 COVID-19 Pandemic. *Depression and Anxiety, 37*(10), 954-956. https://doi.org/10.1002/da.23077

Vernberg, E. M., La Greca, A. M., Silverman, W. K., & Prinstein, M. J. (1996). Prediction of posttraumatic stress symptoms in children after Hurricane Andrew. *Journal of Abnormal Psychology, 105*(2), 237-248. https://doi.org/10.1037/0021-843X.105.2.237

Vettese, L. C., Dyer, C. E., Li, W. L., & Wekerle, C. (2011). Does self-compassion mitigate the association between childhood maltreatment and later emotion regulation difficulties? A preliminary investigation. *International Journal of Mental Health and Addiction, 9*(5), 480– 491. https://doi.org/10.1007/s11469-011-9340-7

Vindegaard, N. & Benros, M. E. (2020). COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. *Brain, Behavior, and Immunity, 89*, 531-542. https://doi.org/10.1016/j.bbi.2020.05.048

Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (1993). *The PTSD Checklist (PCL): Reliability, validity, and diagnostic utility.* Paper presented at the 9th Annual Conference of the International Society of Traumatic Stress Studies in San Antonio, TX.

Weathers, F. W., Blake, D. D., Schnurr, P. P., Kaloupek, D. G., Marx, B. P., & Keane, T. M. (2013). *The PTSD Checklist for DSM-5 (PCL-5).* National Center for PTSD. https://www.ptsd.va.gov/professional/assessment/adult-sr/ptsd-checklist.asp

Weiss, R. (1974). The provisions of social relationships. In Z. Rubin (Ed.), Doing unto Others (pp. 17-26). Prentice Hall.

Williams, M. N., Grajales, C. A. G., & Kurkiewicz, D. (2013). Assumptions of multiple regression: correcting two misconceptions. *Practical Assessment, Research, and Evaluation, 18*, 11. https://doi.org/10.7275/55hn-wk47

Williams, N. (2014). The GAD-7 questionnaire. *Occupational Medicine*, *64*(3), 224. https://doi.org/10.1093/occmed/kqt161

Winders, S., Murphy, O., Looney, K., & O'Reilly, G. (2021). Self-compassion, trauma, and posttraumatic stress disorder: A systematic review. *Clinical Psychology & Psychotherapy, 27*(3), 300-329. https://doi.org/10.1002/cpp.2429

Xiong, J., Lipsitz, O., Nasri, F., Lui, L. M. W., Gill, H., Phan, L., Chen-Li, D., Iacobucci, M., Ho, R., Majeed, A., & McIntyyre, R. S. (2020). Impact of COVID-19 pandemic on mental health in the general population: A systematic review. *Journal of Affective Disorders*, *277*, 55-64. https://doi.org/10.1016/j.jad.2020.08.001

Yeung, N. C. Y., Lau, J. T. F., Yu, N. X., Zhang, J., Xu, Z., Choi, K. C., Zhang, Q., Mak, W. W. S., & Lui, W. W. S. (2018). Media exposure related to the 2008 Sichuan Earthquake predicted probable PTSD among Chinese adolescents in Kunming, China: a longitudinal study. *Psychological Trauma: Theory, Research, Practice, and Policy, 10*(2), 253-262. https://doi.org/10.1037/tra0000121

Zeller, M., Yuval, K., Nitzan-Assayag, Y., & Bernstein, A. (2015). Self-compassion in recovery following potentially traumatic stress: longitudinal study of at-risk youth. *Journal of Abnormal Child Psychology, 43*(4), 645-53. https://doi.org/10.1007/s10802-014-9937-y

Zimmermann, M., Bledsoe, C., & Papa, A. (2021). Initial impact of the COVID-19 pandemic on college student mental health: a longitudinal examination of risk and protective factors. *Psychiatry research*, *305*, 114254. https://doi.org/10.1016/j.psychres.2021.114254

Zhou, Y., MacGeorge, E. L., & Myrick, J. G. (2020). Mental Health and Its Predictors during the Early Months of the COVID-19 Pandemic Experience in the United States. *Int J Environ Res Public Health*, *17*(17), 6315. https://doi.org/10.3390/ijerph1717631