

Research Article

Course-Related Student Anxiety During COVID-19: A Problem and Some Solutions

Roger Brown^a, Steve Buck^a, Michelle Kibler^b, Jerrod Penn^c, and Na Zuo^d^aUniversity of Kentucky, ^bIllinois State University, ^cLouisiana State University, ^dUniversity of Arizona

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Abstract

We examine the prevalence and sources of student anxiety during the rise of the COVID-19 pandemic (March 23 to May 10, 2020) and the implications for online course design and delivery. Using a standard screening tool (GAD-7) with supplemental open-response questions, we show that students had relatively high levels of anxiety based on a convenience sample of 266 undergraduate students enrolled at four U.S. institutions. In this sample, we find that 58 percent of students had clinically significant levels of anxiety in one or more weeks of the seven-week study period. Thirty-six percent of students sustained this level of anxiety on average over the entire period. These rates are high compared to published rates for the general population (1.6 percent to 8.5 percent) and even among college students (17 percent to 40 percent). Using content analysis, we identify five primary sources of student anxiety: traditional academic concerns (72 percent), online learning (67 percent), general uncertainty (38 percent), health and safety (27 percent), and financial issues (12 percent). We similarly identify four ways that students say instructors can help them reduce their anxiety: improve the course structure and organization (36 percent), improve communication (35 percent), improve course materials and assignments (33 percent), and continue expressions of care and support (27 percent). Finally, we look at how these four student recommendations connect more broadly to (1) the published academic literature, (2) our own experiences as instructors, and (3) suggestions from other practitioners.

1 Introduction

In the spring of 2020, college instructors across the United States were abruptly challenged mid-semester to convert their in-person courses to fully online distance learning courses. Instructors had to change their syllabi, change subject matter content, and change their lecture structures and modalities. They had to change the type, length, and due dates for assignments; change exams and other graded items; and change communication methods (e.g., email, phone, Canvas/Blackboard, and course webpage). Instructors also had to find new or additional ways to elicit feedback and monitor students' progress, including online surveys that ask students about course content, their access to technology, and their well-being.

At the same time that instructors were forced to adjust their courses, students were making significant adjustments to their personal and academic lives. Students faced stressful concerns such as moving away from campus, finding employment, caring for themselves, and caring for family members and friends who were also threatened by adverse health and economic risks. The conversion to distance learning during the COVID-19 pandemic required instructors to make radical and sudden pedagogical changes to their courses while students were dealing with major well-being challenges.

The concept known as "Maslow before Bloom" posits that basic physiological and safety needs must be met before a student can attempt even the first and most basic cognitive step (Mullen 2020). If students' responses to the COVID-19 pandemic elevated their stress and anxiety, instructors faced a

mixed task, demanding that instructors not only convert their courses to online delivery, but also do so in ways that are appropriately sensitive to students' mental health needs and anxiety. Further, when the sources of student anxiety are more course-related (e.g., focused on the course structure, organization, and conversion to distance learning), the instructor's responsiveness to student mental health issues is more complex than if the sources of student anxiety were more extracurricular (e.g., focused on financial issues or health concerns). If student anxiety is driven mostly by extracurricular concerns, instructors may respond to students simply by referring them to external resources such as the campus counseling center, career center, or student health center. When extracurricular sources of anxiety unexpectedly increase, they can crowd out student capacity to handle the academic stress normally associated with being a student.

Drawing on the "Maslow before Bloom" reasoning, we recognize that the optimal design and delivery of distance learning courses likely varies depending on the level and sources of student anxiety. If true, instructors and administrators need to know the level and sources of student anxiety in order to respond optimally. This need to know motivates our analysis. For example, an instructor's effort to provide flexible due dates will likely benefit students more if students have higher versus lower anxiety. Likewise, an instructor's decision to check-in with students each week—a costly activity for both instructors and students—may still nonetheless make sense if students are suffering from high levels of mental health impairment or anxiety. In short, if instructors can ascertain student conditions, instructors can design more appropriate learning experiences, determining the right mix, for instance, of high-level concepts versus technical details. If instructors do not, however, perceive or appreciate student stress and anxiety levels, instructors will not respond appropriately. Therefore, research like ours that provides empirical evidence on whether undergraduate students are experiencing elevated levels of anxiety provides a basis for instructor action or inaction.

An important motivation of our analysis is to establish empirically whether or not and to what extent undergraduate students experienced elevated levels of anxiety during the rise of the COVID-19 pandemic. Though not common in economics, descriptive research like ours that collects data and estimates a prevalence rate is both common and critical in many scientific disciplines. In public health, for instance, the collection of data to estimate a prevalence rate for health problems is used to inform public health guidance on whether or not to recommend a certain public health response or intervention (Hoelscher et al. 2004). According to the Centers for Disease Control, surveillance data are "crucially important to inform policy changes" and "guide new program interventions" (2018, p. 10). Our research on the prevalence of student anxiety provides an evidence-based justification for instructors to take action (or not) to address student anxiety when converting their in-person courses to distance learning, especially when coupled with adverse events. At the organizational level, evidence of student anxiety informs whether university administrators, committees, and department heads should have asked instructors to give greater priority to address student anxiety. If student anxiety is not elevated, then suggestions to prioritize that as a course design criterion are misguided.

Though the most dramatic institutional responses to COVID-19 may end in 2021, the prospect of other adverse and anxiety-provoking events will surely persist. Such events will continue to impact students' ability to learn. Our research study informs instructors who are considering whether adaptations to their pedagogy to address students' well-being is merited as well as what form such a response might take in their classrooms. Even though our sample of students from land-grant and regional colleges is not random, we document empirically that students have elevated anxiety levels, and we document the sources of that anxiety. These are the first steps in documenting the presence and severity of a problem and, therefore, the need for instructor action and further study to identify efficient and equitable responses.

Our study has three objectives. The first research objective is to estimate the prevalence of anxiety in our sample of agricultural economics students and compare it to anxiety levels measured among college students during nonpandemic times. The second research objective is to document the various

sources of student anxiety and, specifically, whether distance learning was a source of anxiety. A third objective is to offer commentary on, and discussion of, student suggestions for how instructors can help them be successful in times of heightened anxiety. We consult guidance from the literature, from our own experiences teaching these students, and from other practitioners to support our discussion and put student suggestions from the survey in context.

2 Context and Research Significance

The rise of COVID-19 in spring 2020 left many instructors with about 10 days to convert their courses from in-person delivery to distance learning. With this time constraint, instructors were forced to allocate their limited time between many competing tasks. A natural question is whether instructors' efforts to identify and accommodate student mental health challenges in their redesigned courses were justified given their associated costs. If students experienced only slightly higher anxiety, then the justification for an administrative mandate for instructors to prioritize and enact mental health accommodations would be weaker.

While most instructors may agree that COVID-19 increased student anxiety, the degree to which student anxiety increased and whether it merited significant attention from instructors is difficult to know. Even without empirical evidence, it seems reasonable to expect that the worst pandemic in 100 years and the unprecedented decision to force all students off-campus and all classes online in a matter of weeks could heighten anxiety among at least some students (Lazarevic and Bentz 2020). However, the revealed actions of some colleges and instructors to focus their course redesign efforts solely on technical considerations (e.g., how to deliver content and assess students remotely) suggests a different viewpoint or at least an under appreciation for how heightened anxiety limits student engagement and learning. But reasonable expectations can be wrong. Some evidence, for instance, suggests that mental health concerns among college students during COVID-19 were less severe than one might imagine (McMurtrie 2020). Additional evidence is needed to help colleges and instructors estimate more accurately student anxiety levels, so they can design and deliver optimal online learning experiences.

Anecdotally, Roaya Higazi, student government president at the Ohio State University states, "A lot of faculty members are coming from a good place, but there's still not that understanding of the scope and to what degree students are struggling right now" (McMurtrie 2020). Besides the regular stress of school, some students may face housing and food insecurity; increased social isolation; potential quarantine and isolation orders for themselves or peers; and greater uncertainty related to civil unrest or the economic outlook. Students like Higazi say that taking multiple classes online adds to student stress and anxiety, and that "in an effort to 'get back to normal,' faculty members are overlooking how abnormal it is for students to take an entirely online course load" (ibid). Such claims indicate discord between instructor and student expectations. They also indicate a likely benefit of additional empirical evidence and clarity about levels of student anxiety.

A related issue is, if anxiety levels are elevated, how should instructors respond? There is some guidance from studies evaluating student mental health and management responses. Huckins et al. (2020) report in their sample of 217 undergraduate students "a significant deterioration in mental health" with increased sedentary behavior and screen use (para 27), and they suggest increasing awareness to reverse such outcomes. In the late 2020 spring term, Perz, Lang, and Harrington (2020) found clinically significant anxiety (CSA) in 33 percent of their convenience sample of college students ($n = 237$), and they suggest interventions such as relaxation training and cognitive-based treatments. Ardan, Rahman, and Geroda (2020) surveyed 248 students between March and April 2020, and found 40 percent suffered from moderate to severe anxiety. They call for more crisis-oriented counseling to help students better manage their psychosocial well-being.

Although these studies suggest relevant practices for managing student mental health challenges, the suggestions do not help instructors make better decisions about the design and delivery of their distance learning courses. Letting students know about resources for crisis-oriented counseling and other

forms of therapy (e.g., exercise and relaxation techniques) is not the only action instructors can take to address student anxiety. Turning again to the interview in the *Chronicle*, Higazi says about instructors, “Students say they need help ... and they hear, ‘OK, go to therapy, go to counseling.’ That’s all good. But how does that show up directly in the classroom?” (McMurtrie 2020).

To our knowledge, there are no widely adopted or agreed upon best practices on how to reduce anxiety in the classroom. We seek to help fill this gap. Our first two objectives are to document the levels and sources of student anxiety using data we have collected. This serves as a starting point for our third objective, which draws upon qualitative research and our own expertise to provide a literature- and profession-based context for understanding student suggestions for how instructors can address student anxiety in their online courses.

3 Data Measurement and Collection

Numerous instruments exist to measure anxiety. These include the State Trait Anxiety Index instrument (Ramanaiah, Frazen, and Schill 1983); the Beck Anxiety Inventory instrument (Ulusoy, Sahin, and Erkmen 1998); the anxiety portion of the Hospital Anxiety and Depression Scale survey (Rose and Devine 2014; Julian 2011); and the GAD-7 survey (Spitzer et al. 2006). In general, each instrument generates a measure of anxiety by asking a series of Likert-type or similar questions. An overall score indicative of anxiety levels is typically generated by taking the sum of each question’s assigned point values. Researchers have used several such anxiety measures to examine anxiety levels among university students (Beiter et al. 2015) and the effects of COVID-19 on anxiety (Lee et al. 2020; Ardan, Rahman, and Geroda 2020).

3.1 GAD-7 Measurement and Survey Design

In this study, we use the GAD-7 survey screening tool to measure anxiety. The standard GAD-7 survey was developed by Spitzer et al. (2006) and has been widely used by others (e.g., Perez, Lang, and Harrington 2020 and Cao et al. 2020) to screen for generalized anxiety disorder (GAD). GAD is a clinical term defined in part as “anxiety, worry, or physical symptoms [that] cause clinically significant distress or impairment in social, occupational, or other important areas of functioning” (American Psychiatric Association 2013). The GAD-7 questions ask respondents if they have been “bothered” over the past 2 weeks by various issues (e.g., “feeling nervous” or “trouble relaxing”). Each question has four answer choices (“not at all,” “several days,” “over half the days,” and “nearly every day”), and responses are scored on a scale of zero to three, respectively. Thus, GAD-7 scores range from zero to 21 with higher scores indicating more anxiety. Anxiety levels are categorized into four levels, “minimal” (0 to 4), “mild” (5 to 9), “moderate” (10 to 14), and “severe” (15 to 21). Any GAD-7 score that is 10 or greater is considered clinically significant (Löwe et al. 2008).

The GAD-7 instrument has several advantages, including its consistency in the general population (Löwe et al. 2008), its consistency across demographic groups, its correlation to other measures of health (Löwe et al. 2008; Spitzer et al. 2006), its widespread adoption in psychiatric research and clinical practice (Johnson et al. 2019), and its simplicity and ease of use. The reliability of the GAD-7 is enhanced by its relatively short completion time versus other measures since it consists of only seven questions (Rose and Devine 2014). For these reasons, GAD-7 has been used in several other studies of COVID-19 (Huang and Zhao 2020), including studies of university students (Perz et al. 2020; Cao et al. 2020). These advantages consequently led us to select and use the GAD-7 to measure anxiety.

The first seven questions of our survey (Table 1) reflect the standard GAD-7 screening tool identical to that developed by Spitzer et al. (2006). Our survey concludes with three additional open-response questions that ask students about their access to online course materials, their biggest current challenge or concern, and what their instructors could do to help them be more successful. We made these final three questions open-response rather than closed-response (e.g., multiple-choice) questions because we were unsure of what answer choices would match students’ experiences and feedback. We

Table 1. Survey Questions^a

- (1) Over the last 2 weeks, how often have you been bothered by feeling nervous, anxious, or on edge?
- (2) Over the last 2 weeks, how often have you been bothered by not being able to stop or control worrying?
- (3) Over the last 2 weeks, how often have you been bothered by worrying too much about different things?
- (4) Over the last 2 weeks, how often have you been bothered by trouble relaxing?
- (5) Over the last 2 weeks, how often have you been bothered by being so restless that it's hard to sit still?
- (6) Over the last 2 weeks, how often have you been bothered by becoming easily annoyed or irritable?
- (7) Over the last 2 weeks, how often have you bothered by feeling afraid as if something awful might happen?
- (8) How difficult will it be this week for you to access online materials for this course (e.g., PDF documents, lecture videos, Canvas, etc.)?
- (9) What is your biggest challenge or concern right now?
- (10) What can I do—suggestions, requests, or questions—to help you be more successful?

^aThe first seven survey questions are taken from the GAD-7 screening tool for GAD. Those seven questions each have four answer options: "Not at all," "Several days," "Over half the days," and "Nearly every day." The last three questions allow students to give open responses.

also wanted to have the opportunity to receive more nuanced responses with more specific details about how we might make meaningful contemporaneous changes in our courses.

3.2 Student Sample and Survey Implementation

We administered surveys weekly to students enrolled in seven agricultural economics courses at four universities (University of Arizona, University of Kentucky, Louisiana State University, and Illinois State University). The courses were taught at three land-grant universities in their colleges of agriculture and one other state university in its department of agriculture. The seven courses surveyed included two introductory, two mid-level, and three upper-level courses, including topics in agricultural economics, agricultural marketing, technical communication, world commerce, and natural resource economics. All seven courses were moved fully online during the spring semester with five courses taught asynchronously and two taught synchronously. Course titles, number of enrolled students, and course level details are provided (Table 2).

We surveyed a sample of students weekly during a 7-week period from March 23 to May 10, 2020.¹ This period corresponds with the initial and dramatic rise in COVID-19 cases nationally, a peak, and then a gradual decline.² We administered our surveys online via our institutions' learning management systems (e.g., Canvas, Moodle, Blackboard, and Desire2Learn). We provided marginal rewards (bonus points) to students who attempted each survey; students who elected not to participate were not penalized. In total, there were 278 students in the survey pool. Of these, 266 students

¹ The instructor at the Louisiana institution did not survey students in the first week (March 23 to March 29) because those students were on academic holiday. For all four institutions, the last week of the survey period was final exam week (May 4 to May 10).

² For context, the day the survey period began, the S&P 500 reached a local minimum (2,237 points). At that time or soon thereafter, governors of the four states in our analysis (IL, LA, KY, and AZ) issued statewide stay-at-home orders on March 21, 23, 26, and 31, respectively, pushing unemployment to Great Depression levels (Kochhar 2020). In the third week of our survey period on April 11, the United States reached a local maximum 7-day average number of new COVID-19 cases (Centers for Disease Control and Prevention 2020).

Table 2. Courses Surveyed

Course	Students Enrollment	Course Level ^a	Modality
Introductory Agricultural Economics	45	Introductory	Asynchronous Online
Agricultural Marketing	44	Upper	Asynchronous Online
Agricultural Marketing Technical Communication	73	Mid-Level	Asynchronous Online
Introduction to Resource and Environmental Economics	32	Upper	Asynchronous Online
Introduction to the World of Commerce	28	Upper-Level	Synchronous Online
Natural Resource Economics	17	Introductory	Asynchronous Online
	38	Mid-Level	Synchronous Online

^aIntroductory—primarily freshman/sophomore, Mid-Level—primarily sophomore/junior, Upper-Level—primarily junior/senior

(96percent) answered all 10 questions on at least one weekly survey. Students on average completed 5.2 weekly surveys (*SD* = 1.35) out of seven possible surveys.

4 Methods

In this section, we present the statistical methods used to analyze student GAD-7 data and the multistep content analysis methods used to analyze quantitatively two open-response survey questions.

4.1 Methods for Analyzing GAD-7 Data

To analyze student anxiety levels and rates, we calculated five descriptive measures of student anxiety: (1) mean GAD-7 score across weeks; (2) median GAD-7 score across weeks; (3) max GAD-7 score across weeks; (4) a binary variable designating whether a student ever had a GAD-7 score indicating CSA;³ and (5) the percentage of completed surveys for which a student registered as having CSA. For all measures, we ignored weeks that a student did not complete all of the GAD-7 questions. Using the average of each student’s weekly GAD-7 scores, we then identified the percent of all students and the percent of students by institution who had GAD-7 scores indicative of CSA (Table 3).

4.2 Methods for Analyzing Student Open Responses

We use content analysis methods to analyze students’ open responses to two survey questions. The first of these questions asked students indirectly about the sources of their anxiety (i.e., “What is your biggest challenge or concern right now?”). The second survey question asked students to suggest ways that their

Table 3. Levels of Student Anxiety^a

Location	N	Using Average of All Weekly Scores	Using Only Single Week Maximum Scores
Arizona	13	38	46
Illinois	89	49	64
Kentucky	131	31	58
Louisiana	33	22	42
All Four	266	36	58

^aPercentage of students with CSA measured by GAD-7 scores (≥ 10).

³ Löwe et al. (2008) define any GAD-7 score greater than or equal to 10 as clinically significant.

instructors could help them (“What can I do—suggestions, requests, or questions—to help you be more successful?”).

Identification of the sources of anxiety is a challenge because sources and their effect on individual anxiety levels cannot be directly observed. We used a content analysis approach described by Morgan (1993), Ryan (1999), Mayring (2004), and Donath et al. (2011) for this analysis. The approach generally requires a pair of researchers, after training, to categorize independently each student response following clear rules that are exactly documented in advance. In cases of divergence, the two researchers must reach consensus on how to code the student’s response.

More specifically, we began the analysis by collating each student’s open responses over the entire survey period. We then entered the full text of all students’ responses into an online text analysis application to identify frequently used words and phrases.⁴ As a coauthor team, we discussed this frequency data and identified five major sources of student anxiety: (1) traditional academic issues, (2) online learning, (3) general uncertainty, (4) health and safety, and (5) financial issues. We then used comments from five students selected at random to train pairs of researchers who practiced binary coding (i.e., “Was this concern evident in the student’s comments or not?”). After this training, each researcher individually coded all the remaining student responses to that question, then the pair jointly discussed and reconciled any coding differences. This process created a list of all students ($n = 266$) and a count of the number of students who expressed concern (1) or not (0) about each of the five identified sources of anxiety. Finally, we tallied the percent of all students and percent of students by institution who expressed concern about each of the five anxiety sources (Table 3).

In our coding of this question, we characterized *traditional academic concerns* as those relating either to in-person learning specifically or not unique to online learning (e.g., final exams). We characterized *online learning concerns* as academic concerns relating specifically to changes in course design, expectations, or learning environments associated with online learning and study from home. We characterized *general uncertainty concerns* as those relating to an unknown future outcome but not specifically related to another category of concern. We characterized *health and safety concerns* as those relating to the mental or physical health or safety of the students or the student’s family or close friends and arising from or exacerbated by the pandemic. Finally, we characterized *financial concerns* as those relating to employment, employment opportunities, and payment obligations (e.g., utility and loan bills) and arising from or exacerbated by the pandemic. Using the coded responses for each of the five sources of anxiety reported by students, we identify the percent of all students reporting concerns in each category (Table 4). We also perform the same calculation for each institution.

Similarly, we used the same content analysis method to analyze students’ weekly survey responses to the question: “What can I [the instructor] do—suggestions, requests, or questions—to help you be more successful?” Our objective was to identify ways that instructors could help anxious students. Students often responded to this question by thanking their instructor who was administering the survey

Table 4. Sources of Student Anxiety^a

Location	N	Traditional Academic	Online Learning	General Uncertainty	Health and Safety	Financial
Arizona	13	54	62	31	31	8
Illinois	89	72	64	42	29	15
Kentucky	131	72	70	40	30	11
Louisiana	33	79	67	21	12	15
All Four	266	77	67	38	27	12

^aPercentage of students expressing concern about particular sources of anxiety.

⁴ Text Analyzer. <https://www.online-utility.org/text/analyzer.jsp> Accessed: August 23, 2020.

and by describing what more they wished their other instructors would do to help them be more successful. We treat all responses to this question as signals of how to help.

We coded responses to this survey question using the same method that we used to code the previous question. From the word and phrase frequency data and subsequent coauthor discussion, we identified four major ways to help anxious students: (1) improve the course structure or organization, (2) improve communication, (3) improve course materials or assignments, and (4) continue expressions of care and support. Following the process described previously, we created a list of all students ($n = 266$) and a binary indication of whether each student suggested help strategies (1) or not (0) in each of the four identified categories of help. We then tallied the percent of all students and percent of students by institution who offered suggestions in each of these four areas (Table 5).

In our coding of this question, student suggestions to *improve course structures or organization* included calls for changes to assignment deadlines and expectations, course format or delivery, and ease of finding course materials. Student calls to *improve communication* included improvements to the frequency or clarity of verbal or written communication not related to changes or improvements in other categories. Student calls to *improve course materials or assignments* included changes to or improvements in the quality, number, or length of handouts, video lectures, exams, homework, and quizzes and instructor feedback on the same. Student calls to *express care and support* included requests for instructors to provide understanding, flexibility, or extra assistance not related to changes or improvements in other categories and student expressions of thanks or appreciation for the same.

5 Results

This section presents the GAD-7 survey results and summarizes the responses from students to the two open-response survey questions. Those two questions asked students about the challenges they faced in spring 2020 and about how instructors could help them be more successful.

5.1 How Anxious Were Students Based on GAD-7 Scores?

Figure 1 shows the distribution of student average GAD-7 scores in a histogram. The mean student average GAD-7 score was 8.2 ($SD = 4.2$). The median student average GAD-7 score was 7.5. Overall, using students' average weekly GAD-7 scores, 36 percent of students in our sample had CSA. Average scores for individual students over multiple weeks can mask weeks when an individual student might have a GAD-7 score that is higher or lower than that student's mean score. Therefore, we measure the proportion of all students who experienced CSA at any time during the survey period using students' lowest weekly scores (minimum) and their highest weekly scores (maximum). Looking at students' minimum weekly GAD-7 score, 20 percent of sampled students presented with CSA sustained throughout the 7-week period. Using

Table 5. Ways to Help with Student Anxiety^a

Location	N	Improve Course Structure or Organization	Improve Frequency or Clarity of Communication	Improve Course Materials or Assignments	Express Care or Support of Student
Arizona	13	8	15	15	8
Illinois	89	49	37	43	18
Kentucky	131	32	38	27	37
Louisiana	33	30	27	33	18
All Four	266	36	35	33	27

^aPercentage of students suggesting particular ways for instructors to help them.

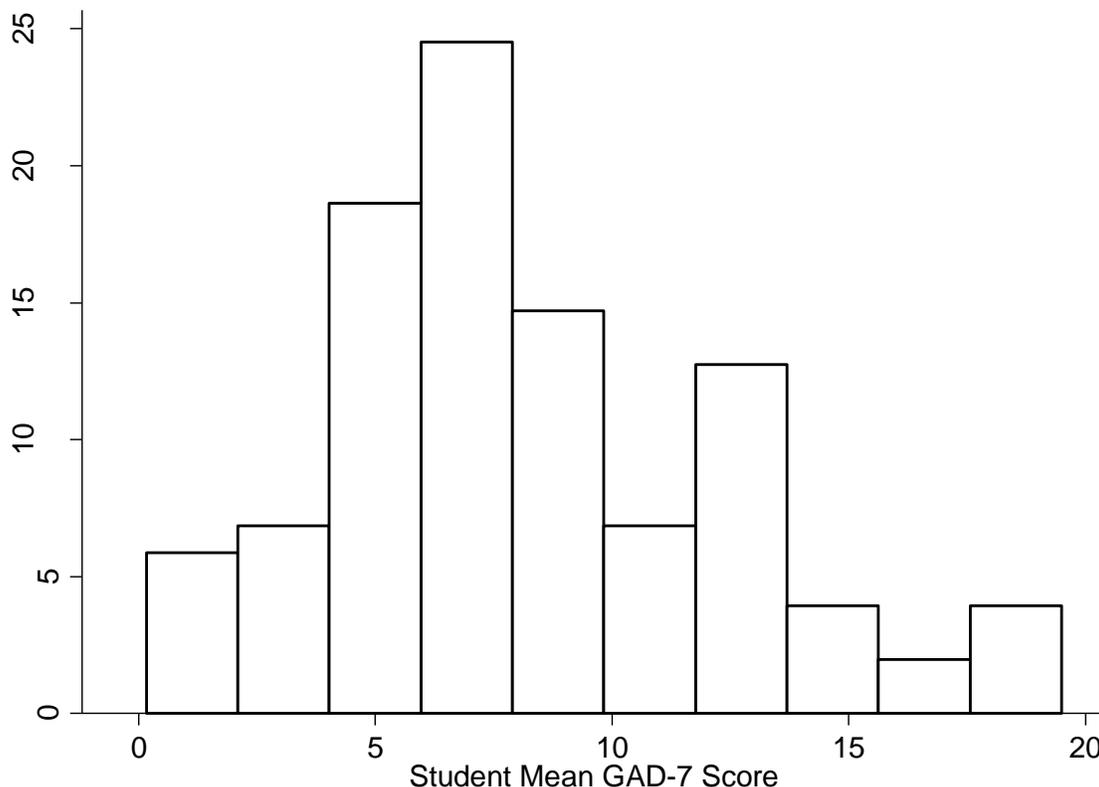


Figure 1. Histogram of Student Average GAD-7 Scores

the latter measure, 58 percent of students in the sample reported CSA at some point during the 7-week study period.

Rates of CSA in our sample are higher than those from the existing literature. Spitzer et al. (2006) report that rates of CSA typically range from 1.6 to 5.0 percent in the general population and 2.8 to 8.5 percent in general medical practice. Among first-year college students at 19 colleges and universities in eight mostly high-income countries ($n = 14,373$), Auerbach et al. (2018) report a one-time CSA rate of 17.7 percent. CSA rates from the existing literature that utilize data from single institutions often have greater variation, mirroring our findings.. From a random sample of 328 undergraduate and graduate students at one Australian university, Farrer et al. (2016) report a one-time CSA rate of 17 percent. At a single university in Ohio, Beiter et al. (2015) report a one-time CSA rate of 25 percent among a sample of 374 undergraduate students. Duffy et al. (2020) examines 1,530 entering undergraduate students at a single Canadian university and reports a one-time CSA rate of 33 percent. Perz, Land, and Harrington (2020) found—during COVID-19—the same CSA prevalence (33 percent) in their sample of students at a small public university ($n = 237$). Ardan, Rahman, and Geroda (2020) also surveyed students ($n = 248$) during COVID-19 at an Indonesian university and found a one-time CSA rate of 40 percent. And, surprisingly, Cao et al. (2020) report without explanation an unexpectedly low one-time CSA rate of 3.6 percent among medical students at a single university in China during COVID-19.

Table 3 summarizes levels of student anxiety across institutions using the percentage of students with CSA measured by GAD-7 scores greater than or equal to 10. We report these percentages using three different GAD-7 statistics: (i) a student's average GAD-7 score across all weeks, (ii) a student's minimum GAD-7 score across all weeks, and (iii) a student's maximum GAD-7 score across all weeks. Using the first measure, 36 percent of students in our sample experienced CSA. Looking at single week minimum GAD-7

scores reveals that CSA percentages were not uniform across institutions during the study period. For example, many more students from Arizona (31 percent) experienced CSA every week they responded to the survey, while many fewer students from Louisiana (3 percent) persistently experienced CSA throughout the study period. Looking at single week maximum GAD-7 scores reveals that 58 percent of students in our sample met the definition of having CSA at some point during our study window. Even in Louisiana, which had a very low percentage of students exhibiting persistent CSA, had 42 percent of their students experience CSA at least one week during the study period.

Beyond this descriptive presentation, we formally test for temporal and spatial heterogeneity in students' weekly GAD-7 scores using regression analysis (full regression results are not reported to save space). Using a student fixed effects estimator, we regress students' weekly GAD-7 scores on week dummy variables excluding Week 1. Based on Huber-White robust standard errors, we find no statistically significant variation across weeks, although there was a general downward trend in GAD-7 scores with the Week 7 average GAD-7 score being 1.09 points less than the Week 1 average. On an overall sample average GAD-7 score of 8 points, Week 3 is 0.57 points lower than Week 1 with marginal statistical significance; however, a joint F -test fails to reject the null hypothesis that all weeks are equal with an F -statistic of 0.80. In contrast, we find evidence of spatial heterogeneity across students from different states. Using an Ordinary Least Squares (OLS) estimator with week dummy variables and no intercept, we find that in Week 1 students from Louisiana, Kentucky, Illinois, and Arizona have average GAD-7 scores of 6.84, 8.21, 8.61, and 9.31, respectively. We re-estimate this OLS estimator removing the Kentucky dummy variable and adding in a constant to conduct hypothesis tests between the GAD-7 scores of students from Kentucky and each of the other states. Louisiana has an average GAD-7 score that is 1.38 points (s.e. 0.50) lower than Kentucky; Illinois has an average GAD-7 score that is 1.09 points higher (s.e. 0.35); and Arizona's average GAD-7 score is 0.39 points higher, though statistically insignificant. A joint F -test rejects the null hypothesis that all states are equal with an F -statistic of 7.57.

Consistent with all of the above regression results, we observe no qualitative differences in our results when we estimate a limited dependent variable model using a student's weekly CSA designation (i.e., CSA or not) as the outcome variable instead of a student's GAD-7 score. Overall, we observe statistically significant spatial variation across states in student anxiety, though not across time. However, the most significant finding from our data collection efforts was the high prevalence rate of CSA, namely that 58 percent of students in our sample experienced CSA at some point during our study period.

5.2 What Were Potential Sources of Student Anxiety?

Table 4 summarizes the results of the content analysis for the question, "What is your biggest challenge or concern right now?" Overall, sources of student anxiety from most to least prevalent are traditional academic concerns (72 percent), online learning (67 percent), general uncertainty (38 percent), health and safety (27 percent), and financial issues (12 percent). Looking at individual institutions, there was remarkable congruity with a few exceptions. Students in Illinois and Louisiana were relatively more concerned about financial issues (15 percent) than students in Kentucky (11 percent) and Arizona (8 percent). Students in Louisiana were relatively unconcerned about health and safety (12 percent) compared with students in Arizona (31 percent), Kentucky (30 percent), and Illinois (29 percent). Students in Louisiana were also relatively unconcerned about general uncertainty. Students in Arizona were relatively unconcerned about traditional academic issues (54 percent) compared to students in Louisiana (79 percent), Kentucky (72 percent), and Illinois (72 percent).

Our findings match evidence from the pre-pandemic literature showing that students are anxious at modest levels about financial issues and health concerns. From a sample of 374 undergraduates at one midwestern U.S. university, Beiter et al. (2015) found that 26 percent and 23 percent of students were anxious about financial and health issues, respectively. Our students reported anxiety about those two concerns at similar rates (12 percent and 27 percent, respectively). This comparison suggests that students have a fairly stable baseline of concern in these two areas that is relatively unresponsive even to

significant changes in external factors, including near-record unemployment and a global pandemic.

However, regarding their academic lives, students seem far more sensitive to pandemic-related disruptions. The existing literature suggests that less than one-third of students are typically concerned about online learning. Kira, Nebebe, and Saadé (2018), for example, find in a sample of 1,365 first-year undergraduate business students at one university in Canada that 29 percent of respondents either “agreed” or “strongly agreed” that “I am anxious while taking an online course” (p. 84). By contrast, as all of their classes suddenly switched to online delivery, a much higher proportion of our students (67 percent) reported in at least one week that online learning was their “biggest” concern.

Consistent with observed heterogeneity in our estimates of student anxiety, heterogeneity in potential sources of anxiety also exists across institutions in our sample. Students in Arizona, for instance, were relatively less concerned about traditional academics (54 percent) and financial issues (8 percent) while students in Louisiana were relatively less concerned about general uncertainty (21 percent) and health and safety (12 percent).

5.3 What Help Did Students Suggest?

Looking at all students together, we find (Table 5) that, to be more successful, students want their instructors to improve the course structure or organization (36 percent), improve communication (35 percent), improve the course materials or assignments (33 percent), and increase expressions of care and support (27 percent). Looking at student suggestions for help by institution, we find that students in Arizona were relatively less likely to suggest improvements to course structure or organization (8 percent) or to course materials or assignments (15 percent) compared to other institutions (27 percent to 49 percent). Students in Kentucky most often highlighted the value of communication (38 percent) and caring (37 percent). In Illinois, students emphasized the benefits of thoughtful course structures and organization (49 percent), course materials and assignments (43 percent), and communication (37 percent). In Louisiana, students focused on the usefulness of course-related features, namely materials and assignments (33 percent) and structure and organization (30 percent).

Students most frequently offered suggestions for improvements about course organization and structure (36 percent). Chief among students’ requests in this area was for instructors to be flexible about due dates. “If you can just bear with us students as we try to gather supplies, rehome ourselves, and find employment throughout this crisis it would be greatly appreciated,” wrote one student. Students said that the course layout online is critically important. Students recommended using online “checklists,” making sure the “videos and assignments are super organized,” and “ensuring every assignment is easy to find and clearly marked with a due date.” Students also desired consistency. One student, over a 4-week period, commented only, “Just keep everything routine,” and the next week, “Just keep everything routine,” and then, “Just keep the routine,” and last, “Keep everything structured and routine.” Another student said similarly, “Keep everything the same from week to week as far as the layout, when things are due, and types of assignments.” Students had some very specific suggestions too, like posting assignments online “early and ahead makes me less stressed and worried” and “posting video lectures or having Zoom meetings” is better than “just giving us stuff to turn in and expecting us to figure it out on our own.”

The second-most popular category of suggested improvements was communication with recommendations from 35 percent of our survey respondents. Students wanted communication, especially via email, that was frequent (daily is good, but at least weekly), regular (same time and same format), specific (e.g., a list of tasks), concise, and personal. “Continuously send out emails,” one student advised, “Fill them with reminders, encouraging words, or suggestions on what you have done to cope with what has been happening.” As due dates approached, students wanted more frequent emails. One student requested “as many emails as possible to help remind us when things need to be done,” while another wrote, “It would be helpful if you emailed us with more reminders; there’s a lot going on, a lot to keep track of.” Most campus learning management systems allow students to indicate their preferences for how to receive course announcements, prompting one student to write, “I get them as notifications to

my phone, helping me to stay on track.” During this time, one student said, “I have been checking my email every couple of hours to see if anything has changed.” However, clear and concise messaging, even if less frequent, is preferred by other students. One wrote, “I feel like you are communicating with us clearly [which] helps me; some professors have been sending me what feels like 20 messages per day so please don’t do that.” Students also frequently commented on the benefit of quick responses to their questions. In one representative comment, a student wrote, “I am beyond pleased with the way this class has been set up. I am good with everything, as long as I know you are just an email away if any issue arises.”

Unsurprisingly, many students recommended improvements to course materials and assignments related to grades or grading (33 percent). This finding is consistent with our other observation that the greatest number of students were anxious about traditional academic concerns (72 percent), chiefly their grades. “Be understanding and lenient,” one student said, “Many students have families going through this, and our main concern isn’t school right now, hate to say it, but it’s not.” More substantive suggestions included practices with clear parallels to in-person teaching. “Post the lecture slides online” as opposed to distributing them in class. Send me “a recorded audio critique of my paper” instead of meeting with me in your office. “Make the video clips shorter and more numerous” like when instructors take breaks during their 50-minute in-person lectures. “Do a Zoom session every once in a while” rather than having on-campus meetings “just so we can ask questions and catch up with the entire group.” Students were clear that lecture videos do not need to be highly produced; students instead liked “the stories that make professors seem more real and approachable.” Many other student comments in this category would seem commonplace in any semester, such as “give us a really good study guide for the final exam.”

The final category of recommendations revealed that students (27 percent) desired and appreciated expressions of care and support from their instructors. Some comments highlighted the therapeutic value of the survey itself, noting for instance, “Thanks for letting me rant and ‘listening’ to me. I didn’t realize I needed that!” A second student similarly wrote, “It is nice to ‘talk’ things out and have a professor who cares about their students during this weird time,” while a third wrote, “I just wanted to thank you for taking time to give these surveys. It shows us students you actually care, and we are not just a number in a class.” Even a student who had nothing to suggest, “Honestly, I have no idea,” still valued the instructor’s interest, “but I appreciate the concern!” One student said it most succinctly perhaps, “Thank you for really genuinely caring.”

6 Discussion

Our analysis provides empirical evidence of heightened student anxiety during the shift to distance learning at the start of COVID-19. This evidence should help college administrators and instructors justify consideration of student anxiety from all sources when teaching. Our analysis also provides evidence that distance learning was a likely source of anxiety. Taken together, this evidence supports the adoption of actions to address course-related student anxiety when there is an abrupt and mass conversion of in-person courses to a distance learning format. We find that student anxiety levels were high during COVID-19 and see that as justification for instructors to take this concern seriously specifically when designing and teaching online courses.

Beyond measuring the level of student anxiety, we also sought to identify the sources of this anxiety and to understand the kinds of help students wanted. This raises a natural question, “What should instructors do to respond to student anxiety?” We have presented the content analysis results of student responses and a selection of individual student comments, but these are only able to hint at answers to this question. Indeed, our analysis was neither designed nor intended to answer this question.

In the remainder of the discussion, we aim to place these students’ suggestions for help in a more comprehensive and professional context. As a starting point to inform this discussion, we searched the literature and found no clear evidence-based summary to guide instructors in how to respond to student

anxiety. We do find some guidance from the general literature on distance learning, which might also help address student anxiety in online courses. We also find relevant to our discussion a webinar panel discussion with faculty and students published in the *Chronicle* (McMurtrie 2020). This webinar and its summary details how instructors can improve the distance learning experiences under mass conversion to distance learning in response to COVID-19. A third source we draw on is our own instructional experiences teaching during COVID-19. Finally, we draw on guidance from a popular mental health first aid curriculum (Kitchener and Jorm 2002). Table 6 summarizes what we see as the important best practices from each of these sources.

6.1 Context for Improving Course Structure and Organization

In a review of predictive factors for student success in and satisfaction with online learning, Kauffman (2015) describes “course/instructional design” being “of great importance” (p. 2). Eom, Wen, and Ashill (2006) find in a survey of 397 university students that course structure is the most significant determinant of student satisfaction in online courses with instructor feedback also being statistically significant. Van Wart et al. (2019) also stresses the importance of pre-planning so the course structure is clearly organized and consistent. According to Van Wart et al. (2019), students prefer online course organizations that are modular and repetitive. McMurtry (2016) echoes this stating, “Exemplary online instructors also maintain a clearly structured environment that is logically organized, delivered in small chunks, and sufficiently repetitive to keep each student focused on the content.” Jung (2011) points out that while online courses are much more challenging to organize, students tend to be very critical of what they perceive as any confusion or unclear structure in the distance learning setting.

An overarching theme in the webinar panel is that anxiety occurs when students experience uncertainty. Course structure and organization is an avenue through which instructors can work to reduce uncertainty. Organizational consistency is key. Panel members encourage instructors to post assignments and grades at the same times each week and align due dates where possible to help reduce uncertainty. Regarding asynchronous versus synchronous activities, one recommendation was to pre-record lectures for asynchronous learning in order to leave synchronous class time for discussion, office hours, and other activities that require students to engage with one another in real time.

As a coauthor group, we also have insights from our experiences teaching during COVID-19 about how instructors can respond to students with elevated course-related anxiety. At the onset of COVID-19, we all revised our syllabi in significant ways to accommodate the switch from in-person instruction to distance learning. To provide transparency, one instructor posted their new syllabus using “track changes,” so students could clearly identify the course changes. While we each made our own revisions, we all built additional flexibility into our revised syllabi and course schedules.

6.2 Context for Improving Communication

Moore (1993) calls for online instructors to reduce the “transactional distance” between them and their students by increasing the instructor’s social presence. Kucuk and Richardson (2019) say that social presence, in fact, is the “dominant determinant of the satisfaction of teaching” in online courses. Van Wart et al. (2019) suggest approaches to reduce transactional and social distance may include prompt responses to email questions, increased communication frequency and quality, hosting video conference office hours, posting grades quickly, providing customized feedback on assignments using audio, video, or text responses, and providing an ungraded social forum on a course discussion board. Consistent with this, others in the literature suggest posting grades and feedback on assignments in a timely manner, emailing students frequently, holding regular online office hours, and developing personal touches in the online environment (Jackson, Jones, and Rodriguez 2010; Shook, Greer, and Campbell 2013). Even using the learning management system software to provide automatic class notices either to individual students or groups of students can increase social presence (Oncu and Cakir 2011).

Table 6. Summary of Sources on Practices to Address Student Anxiety in Distance Learning Courses

Content Analysis of Student Suggestions	Literature on Distance Learning	Webinar Panel (McMurtrie 2020)	Coauthor Practices	Mental Health First Aid (Kitchener and Jorm 2002)
<ul style="list-style-type: none"> - Improve materials or assignments. - Improve course structure and organization. - Improve communication. - Offer expression of care and support. 	<ul style="list-style-type: none"> - Clarify course structure. - Invest time in pre-planning. - Build Flexibility into the course. - Reduce transactional and social distance. - Check in on mental health and safety, and that basic needs are being met. - Support growth mindset. 	<ul style="list-style-type: none"> - Eliminate significant group projects. - Utilize group work in small, synchronous doses. - Flip the classroom with feasible. - Use consistent mode(s) and frequency of communication. - Use consistent deadlines, grading style, and timing. - Establish connections between instructor, student, and class to ensure accessibility 	<ul style="list-style-type: none"> - Invest more time and effort in course. - Relax group project requirements. - Emphasize quality over quantity. - Offer flexibility in deadlines, grading schemes. - Codify communication frequency, regularity, and style. - Offer expressed concern for student well-being. - Remind students of mental health resources. - Offer encouragement and optimism. - Acknowledge the circumstances. - Seek feedback. 	<ul style="list-style-type: none"> - Assess risk of self-harm. - Listen without judgement. - Give reassurance and information. - Encourage appropriate professional health help. - Encourage self-help.

In the webinar panel, members also touched on the importance of communication in the distance learning setting under COVID-19. According to McMurtrie (2020) who provides a summary of the webinar, if instructors make a connection with their students through regular outreach via email, virtual office hours, and some synchronous class time, then this establishes trust among students that instructors are accessible when uncertainty arises. Panel members likewise noted that consistency in communication frequency, content, and style can reduce uncertainty.

As a coauthor group, we believed communication was so important that we codified communication style, frequency, and regularity into our revised syllabi and schedules for our courses. For example, more than one of us modified our course homepage to make it easier to find and access links to lecture videos, readings, and assignments. Similarly, instructors posted materials for their courses at the same time each week and alerted students with an email announcement that explained any new materials and reminded students of upcoming deadlines. Our announcements were often formatted to highlight key information (e.g., using bold red text for assignment names and due dates and using hyperlinks to help students easily locate assignments and related materials). These weekly emails also served as touchpoints for instructors to offer encouragement and remind students of their availability and accessibility. These touchpoints were another opportunity to remind students about the importance of mental health and the availability of campus-based counseling resources.

6.3 Context for Improving Course Materials or Assignments

From the literature on distance learning, instructors should when possible design their courses to have flexible due dates for assignments and exams. Distance learners face a unique set of hurdles, and online courses tend to attract students who have relatively high time and financial constraints (Xu and Jaggars 2014). “The stress, disconnection, and technical difficulties associated with the online classroom require unique accommodation and understanding from instructors,” writes Raley (2016, p. 52).

The webinar panel members made more explicit and substantive recommendations on course materials and assignments. They suggested that instructors avoid significant group projects because, they said, coordinating group work time outside of class is a notoriously difficult and stressful task. At the same time, the panel indicated that small group work for short discussions or exercises can be beneficial if scheduled during synchronous learning times.

Consistent with these remarks, we modified our planned group projects, either eliminating them or reducing them to smaller disparate exercises. In the latter case, students worked together during class time in synchronous online meeting spaces (i.e., Zoom breakout rooms). We also either reduced the number of assignments and the length of assignments, or gave students significantly more time to submit their assignments by adjusting deadlines. We justified these course changes, in part, by indicating to our students that we preferred quality over quantity.

6.4 Context for Increasing Expressions of Care and Support

Mullen’s (2020) teaching mantra “Maslow before Bloom” states that even the first and most basic cognitive step (i.e., knowledge) described by Bloom requires that students must first meet Maslow’s physiological and safety needs (e.g., for food, water, shelter, and security). In a traditional classroom setting, the instructor can visually observe students to perceive mental health warning signs and respond directly in real time (Barr 2014). As a substitute, online instructors should make regular inquiries or “check-ins” with their students (Sitzman 2016; Qadir 2020). Young (2006) finds in a survey with 199 respondents that anxious students, in particular, desire regular expressions of care and support from their online instructors. To communicate caring in online courses, Plante and Asselin (2014) recommend that instructor messages be “respectful, positive, encouraging, timely, and frequent” (p. 219).

Relatedly, Xu and Jaggars (2014) find that all types of students suffered decrements in performance in online courses. Invoking Dweck (2006), students’ can have a “fixed mindset” (e.g., “I can’t possibly do this class online”) regarding distance learning rather than a “growth mindset” (e.g., “I can be

successful doing this class online”). One way to support a growth mindset is to make the course schedule and assignments clear so that students see the way forward for them to be successful, which we cite as an example of how implementing a suite of practices can synergistically enhance student benefits versus employing practices in isolation.

Members on the webinar panel emphasized making connections with students through consistent interactions or even directly asking students what is working and what is not. According to the panelists, if students do not have regular opportunities to check in with their instructors, express their concerns and challenges they are facing, and ask questions or provide feedback on what is working and what is not in a course, then significant sources of course-related uncertainty and anxiety will persist.

Our actions and experiences as instructors to express care and support during the rise of COVID-19 largely conform to those described in these other sources. We may have actually emphasized the role of expressing support and concern to an even greater degree. For example, more than one of us signaled our availability and accessibility through individualized outreach. We did this through personalized email messages with each student. Our email content sought to reassure students that they were performing well in the course. Some email check-ins referenced personal details that the student shared during class introductions (e.g., “I recall you are an ice skater. Have you been able to keep going or find some other exercise or stress release?”). Other emails followed up on students’ questions from a synchronous class or poor performance on a homework assignment and ended by offering the student a supplemental resource related to the concept. Besides email, some instructors requested phone or video call appointments if a student appeared to have a particular need, for example, if a student missed class due to illness. One instructor offered an extra credit assignment inviting students to meet with the instructor for a 15-minute advising appointment to discuss the student’s concerns or advising needs related to the course, professional development, or even listening to challenges at home or work that were impacting the student’s school or professional development.

Perhaps the most significant way we, as a co-author group, expressed concern to our students was sending our students a weekly survey inquiring about their mental health (the GAD-7 questions), their access to internet and technology for coursework, and the challenges they were facing. We asked them what we could do to help them be more successful. This was a salient, concrete action that we all took to express our concern for our students.

Many of our students specifically expressed appreciation to us for our interest in their mental health. They commented positively about our regular expressions of care and support. One student wrote that the instructor’s “concern and caring-ness has really been comforting during these past few weeks.” Some student comments highlighted the therapeutic value of the survey itself, noting for instance, “Thanks for letting me rant and ‘listening’ to me. I didn’t realize I needed that!” A second student similarly wrote, “It is nice to ‘talk’ things out and have a professor who cares about their students during this weird time,” while a third wrote, “I just wanted to thank you for taking time to give these surveys. It shows us students you actually care, and we are not just a number in a class.” A student who had nothing to suggest wrote, “Honestly, I have no idea, but I appreciate the concern!”

In addition to finding support for expressions of care and support in the distance learning literature, the webinar panel, and our own classroom experiences, expressing care and support is a key element of the mental health first aid curriculum developed by Kitchener and Jorm (2002). This 9-hour training aims to increase mental health literacy and responsiveness (2002). Their program identifies five key steps: (1) assess risk of suicide or harm, (2) listen nonjudgmentally, (3) give reassurance and information, (4) encourage the person to get appropriate professional help, and (5) encourage self-help strategies. These experts call for instructors, as first responders, to listen carefully to students’ concerns, reassure and encourage students, and help them find ways to help themselves. This guidance provides a succinct summary not only of these authors’ mental health first aid curriculum; it also nicely summarizes how, in part, instructors should respond to students who are experiencing heightened anxiety in any instructional setting, remote or in-person. However, compared to the other sources of guidance

considered here, the mental health first aid curriculum offers relatively little specific guidance about how instructors can design and teach their courses.

7 Conclusion

The significant shift toward online learning prompted by COVID-19 will doubtlessly usher in many pedagogical improvements, particularly as instructors gain more experience with that modality, learn more, and have more preparation time. Student anxiety will likely remain a part of what we do as instructors. However, we hope that the lessons from this unique time will strengthen the foundation from which we launch new efforts and fine-tune the directions we need to go in higher education.

In our view, one direction we likely need to go is to encourage instructors to do more than just recognize that students are struggling with mental health issues with a referral to the campus counseling center. Specifically, we encourage instructors to consider student mental health concerns when instructors are designing and adapting their courses, particularly for online delivery. Emblematic of this, we see an important distinction between the guidance given by Kitchener and Jorm (2002) on mental health first aid and the other sources of guidance we reviewed in the discussion. The mental health first aid guidance is oriented toward crisis management and directing students to professional help. We do not want to underestimate the importance of this advice, but in our view, it represents the minimum action instructors should take given our survey findings on student anxiety levels and the likely sources of student anxiety. The other three sources examined, namely the published literature on distance learning, comments made in the *Chronicle's* webinar panel, and our own instructional experiences provide (1) corroboration of the student feedback on what we, as instructors, can do to help our students be successful in their courses, and (2) potential responses geared toward anxiety management through actions in the course.

While we were unable to assess directly the effectiveness of individual practices in this study, we believe that the weekly survey helped increase our general awareness of student concerns and that the student feedback we received did positively affect our subsequent instructional choices during distance learning. Based on our own personal experience, we recommend this survey practice to other instructors if they are concerned about elevated sources of stress and anxiety or as a way to express additional concern with a concrete action. In general, we received positive feedback from students on how we responded to their feedback; indeed, this demonstrated responsiveness may have reinforced the value of our efforts to improve the course structure, organization, communications, materials, and assignments. Going forward, we, as instructors, can use what we learned from this study and ongoing surveys to communicate to students that we are proactively working to address student concerns and, notably, student anxiety. Importantly, we can acknowledge that a significant basis for our efforts has been and will continue to be student feedback.

A concluding remark, even if only an anecdotal one, is that the practices that we adopted to target students experiencing heightened anxiety helped all students. This suggests to us that, whether during a pandemic or not, whether for distance learning or in-person instruction, adopting these practices is a promising way to add value to our courses.

About the Authors: Authors are listed alphabetically based on last names with Roger Brown and Steve Buck as leading authors and Roger Brown also as corresponding author. Roger Brown is an Assistant Professor in the Department of Agricultural Economics at the University of Kentucky (Corresponding author: rogerbrown@uky.edu). Steve Buck is an Assistant Professor in the Department of Agricultural Economics at the University of Kentucky. Michelle Kibler is an Assistant Professor in the Department of Agriculture at Illinois State University. Jerrod Penn is an Assistant Professor in the Department of Agricultural Economics and Agribusiness at Louisiana State University. Na Zuo is an Assistant Professor of Practice in the Department of Agricultural and Resource Economics at the University of Arizona.

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