

[COVID Information Commons \(CIC\) Research Lightning Talk](#)

[Transcript of a Presentation by Lindsey Richland \(University of California, Irvine\), May 5, 2022](#)



Title: *Impacts of COVID-19 Out-of-School Stressors on Executive Function and E- Learning*

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Transcript Editor: Lauren Close

Transcript

Lindsey Richland:

Slide 1

Great, ok, thank you so much. I'm really pleased to be here, it's really an exciting opportunity to talk about some of the work we've been doing and to talk about the different - and to, you know hear, about the different ways that the pandemic, the COVID-19 pandemic, has impacted our social systems. And I'm really going to talk in particular about our educational systems. But and I'm a psychologist, so I'm really looking at mechanisms of learning, so thinking about really specifically what kinds of ways might the anxiety, and sort of the feelings of worries and pressure, that could -that are impacting students lives and trying to think about how those might be impacting student learning. And I'm going to talk about sort of the - the sort of emergency moment we had when everything suddenly went online, but also insights, you know, more broadly for learning context.

Slide 2

So as you I'm sure recall about the spring of 2020 you know we had this emergency moment where everything had to move online. Higher education moved online. Schools, both K-12 and higher education, had to move to different sorts of online education. So at the - I'm talking in particular today about the higher education at the undergraduate level. And we moved, you know, very quickly to - I say Zoom here - but different sorts of technology-based instruction at home. Much of it included synchronous Zoom lectures so these were lectures that were very much like you would have gotten in the classroom but they're online. And the, you know, there are affordances there, right? You, sort of, have some real opportunities in that you have access for many students, you have a way to reach students, everyone has the possibility of engaging through chat, or through - you know - so it wasn't sort

of the kind of place where you suddenly had no connection to students. There were other, you know, ways that this was done. Having recorded lectures, which were very often posted so students could engage with them at their own time.

Slide 3

So this is a particular mode of doing online instruction, but as we know, you know, this kind of opportunity also is the direction that many think education is going. So higher education has a lot of flexibility when it's offered in an online forum and an online platform. Many affordances with flexibility. So these have these sort of big implications. But at the same time there also are concerns. At the moment when it was an emergency we had the unfamiliarity piece, but we also have, you know, this concern that we want to make sure we keep higher order thinking going. We want very strong lessons, right? We want to maintain sort of a quality in this instructional practice.

Slide 4

And so, in my lab, we think a lot - Science of Learning at UC Irvine - we think a lot about Higher Order Thinking in the 21st century. We want students to be doing, you know, sort of the top of Bloom's Taxonomy. For those of you guys who are familiar with this taxonomy - a lot of people use it in terms of thinking about quality of instruction. It was originally designed as a mode of analyzing assessment, but we think about, you know, sort of memorization as this bottom level here. And, you know, these - as you go up the rungs - you're talking about more complex cognitive work. Now, we want complex cognitive work for our students, but our brains and the parts of our brains that are in charge of doing this complex work are also the parts of the brain that are involved with things like worries, thinking about the world, thinking about, you know, the many demands on students.

Slide 5

And so if you're at a moment of a pandemic or you know other systemic things are going on for you, you may be really loading those resources. So mechanistically we can think about executive functions as this brain region. It's located in your frontal lobe that's involved in much of the higher order thinking that we do. And this is a limited cognitive resource system. We don't have unlimited ability to hold lots of things in mind and, you know, think about them and pay attention to [multiple] things at once. So these are involved in controlling attention, keeping ourselves, you know, focused on tasks inhibiting distraction. It actually takes work, right, to not attend to that, you know, flashing light or your dog barking, or you know something in the other room, right? It's involved with switching between tasks. So if you're thinking about one thing, you have to stop thinking about that and think about the new one. Also holding information in mind. So I'll give you just a very quick example so you can feel that feeling: Suppose five days after the day before yesterday is Friday. What day of the week is tomorrow, right? So it's kind of maddening, you know? You're like: five days after the day before yesterday - okay, so this is a lot of my mental work that you're doing. So think of a student in a classroom during your pandemic thinking about, you know, the many maybe home fears, maybe their health fears, maybe family things

going on, maybe fears of being suddenly online and their technology is, and you know and not too adequate, maybe their internet is making them anxious, right? So there's many things that can be going on at the same time.

Slide 6

Now one more mechanism I'll throw at you is the idea of mind wandering. And this, of course, is something that we think about colloquially. We talk about zoning out, right? This is something you're probably all familiar with and hopefully you're not doing right now. And it's, you know, very common, but cognitively it's really an interesting phenomenon. We think it may do some things for us for creativity purposes. But it really does a lot for us - for missing information - when it's being put out in front of us. And so we want to think about, you know, this is something that happens, but it's a mechanism that, sort of, if we don't have your executive function, sort of, highly engaged, you can see this mind wandering happen which might be reducing learning. So what we're interested in is thinking about inequities in anxiety and pressures and worries related to pandemic or related. But this has implications for our broader context in terms of the social inequities of anxiety and pressures. And looking at relationships to learning with mind wandering and load of executive function as potential explanatory factors for what that difference is.

Slide 7

So we wanted to know whether an environmental or context factor lead to distress and systematic changes? Okay, and I know I'm actually running out of time, so I'll get to the data.

Slide 8

So if we're talking about these kinds of systematic loads, we can think about this moving from distress to distraction.

Slide 9

Okay, so I'll talk about two studies with undergraduates. We have a large undergraduate students - student bodies - that were tested using survey data. And these are from public institutions in California. And we have students that were - these are coming from Hispanic Serving Institutions (HSIs) with high numbers of first-generation students. So we have a pretty diverse population in the sample.

Slide 10

And we gave a bunch of different measures to understand stress and anxiety relations and their feelings in that moment. And we had them learn from an e-learning instruction. So this was a controlled video which so that way we actually knew what they were all getting as their inputs, right? And then we did assessments of their learning and we assessed their level of mind wandering.

Slides 11-12

Basically what we see - this is from the first study we did. And we see a very interesting, large distribution. What you see here is the lighter color - percentage of -these are the percentage of students who were a little bit worried, but not too worried. The darker - as they get darker - you get, sort of, higher on the clinical scale of distress. And these very dark ones are very distressed. The sort of medium dark are much higher than we'd hope in an undergraduate population. And so this is from the first study that was collected in 2020.

Slide 13

And actually I'll show you in the second study that we ran, this was a much larger population that was run in the fall of 2021. You actually see this, you know, these numbers are getting higher. So stress was going up in our student population.

Slide 14

And importantly these were systematic. So what you see on the left here - this is the same - these are the same numbers, you know, in that stress - in that relationship in that from not very stressed to very stressed - broken down by categories of students. So we have men versus women. So women, we're showing a lot more higher in that worry index. Latinx versus non-Latinx - you see Latinx students being at a higher worry level. First generation college students versus continuing generation college students - first generation students were showing a much higher level at this more serious level. And then, when you put these intersectional inequities together, you have first generation Latinx women showing the highest level of anxiety and pressure.

Slide 15

And they were worried about lots of different things which I'll be happy to talk about in the Q&A - I don't have time to go through here. They were worried, you know, some about technology, many about the social obstacles to learning, not being with their peers, being separated. And really, then we looked at the relationship between all of these worries and their learning. And what we find is that this was this was systematic. And this was important.

Slides 16-17

So the level of worries that you had led to lower learning. The level of worries that you had led to higher mind wandering. And that actually mediated this learning effect. And what we see, as I showed you, is that these more intersectional identities had the highest level of worry, meaning that this would actually - could actually lead to, you know, systematic differences and who's learning what from the exact same lesson. Now we did a second study where we added the last piece which was mindfulness right before the instruction. So we added a prompt where we added a short video, this was again, this was two minutes and it was just a reminder, you know, to take a breath and sort of be mindful of one's thinking and one's attention.

Slide 18

And and really so in the second study, we wanted to see whether we replicated the same phenomenon or whether, you know, this was this - these original findings we saw were related to the rapid transition to online learning. And we wanted to see if we could ameliorate these a bit.

Slide 19

And basically in this one we have a larger sample, but we see really the same phenomenon.

Slide 20

And so I will just, you know, summarize to say that we saw that anxiety and situational worries, particularly related to the COVID-19 pandemic, led to higher mind watering, led to lower learning. We did find, and I didn't have time to talk about this last piece, but introducing reminders to be mindful and changing features of the learning setting. We also tried one with using more visual cues - all of that actually disrupted the relationship. So we saw we were able to reduce the amount of mind wandering when we added mindfulness, or added sort of extra support cues during the instruction and the lesson. So what this suggests to us is this is an important problem. It's important during the covenanting pandemic. It may have implications as we move forward into, you know, the the future world as we're still grappling with you know anxiety related to the pandemic and other systematic inequities, and equal access to health care, and you know funding, and all of these other social pressures we know about that may be leading to differences in learning outcomes.

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And I'll just thank my team, thank the funders, thank the National Science Foundation.