DEFENSE CENTERS OF EXCELLENCE
For Psychological Health & Traumatic Brain Injury

Defense Centers of Excellence for Psychological Health and Traumatic Brain Injury (DCoE) Webinar Series

August 13, 2015, 1-2:30 p.m. (ET)

"Returning to College After Concussions and Mild Brain Injuries"

Thank you. Good afternoon for those of you on the East Coast, and good morning for those who are in a different Time Zone joining us today. Thank you for joining us for the Defense Center of Excellence Traumatic Brain injury August webinar, titled "Returning to College After Concussions and Mild Brain Injuries. My name is Dr. Scott Livingston. I'm the Director of Education for the Defense and Veterans Brain Injury Center, and I will be your moderator for today's webinar.

Before we begin, we're going to review some of the webinar details. If you experience any technical difficulties, please visit dcoe.mil/webinars to access troubleshooting tips. Please feel free to identify yourself to other attendees by the chat box. But please refrain from marketing your organization or any products that you might be affiliated with.

Today's presentation's references, resources, and continuing education accreditation statement are available for download from the files pod and will be archived in the online education section of the DVBIC website.

Now for some continuing education details, this continuing education activity is provided through collaboration between the Defense Centers of Excellence and the Professional Educational Services Group. If you preregistered for this webinar and want to obtain CE credit or certificate of attendance, you must complete the online continuing education post-test and evaluation. After this webinar, please visit dcoe.cds.pesg -- put my glasses on for this -- pesgce.com. Once again that's dcoe.cds.pesgce.com to complete the online CE evaluation and post-test and to obtain your CE certificate or certificate of attendance. The evaluation will be open Thursday, 27 August, so for two weeks from today.

Next item to mention, throughout the webinar you're welcome to submit technical or content-related questions via the Q&A pod located on your screen. All questions will be anonymous. Please do not submit technical or content-related questions via the chat pod. We'll now move on to the webinar itself, a little bit of an introduction, and I'll review the objectives before handing things over to our speaker for today.

Our webinar, once again is, "Returning to College after Concussions and Mild Brain Injuries." Increased awareness, improved treatment, and greater access to educational supports have proffered a rise in interest about the effects of concussions and other forms of brain injuries on the pursuit of post-secondary education.

Many students with mild brain injuries experience minimal effects after the first few weeks or months, thus making the impact on academic performance almost negligible. However, there are a small percentage of students, as well as people who experience a good recovery or positive recovery from more severe initial injuries that experience chronic cognitive, physiological, and psychological impairments that may negatively impact academic performance and overall life satisfaction. So this webinar will present recent research and explore strategies and accommodations that contribute to the achievement of educational goals of college students who have sustained a brain injury.

The objectives for today's webinar are stated at the bottom of your slide. At the conclusion, you will be able to articulate note-taking challenges of college students with brain injuries and describe support strategies and accommodations available to them, describe the challenges and efficient strategies for maximizing reading comprehension of college students with brain injuries, and lastly, examine the importance of balancing educational, social, and daily living activities for college students living with chronic brain injury conditions.

I would now like to introduce our presenter, Dr. Karen Hux. Dr. Hux is currently serving as Professor in the Department of Special Education and Communication Disorders at the University of Nebraska Lincoln. She is a certified and licensed speech language pathologist. Her teaching and research interests focus on the language and cognitive challenges of people with communication deficits, or aphasia, secondary to acquired brain injuries.

Dr. Hux has published extensively about cognitive communication challenges associated with neurological impairments, and we welcome Dr. Hux today, and thank you for joining us.

Okay, thank you very much. Welcome to everybody who's here already. I see people are still joining us, but we'll get started, and let them continue joining as they get here.

Okay, first, I need to go through these disclosures, so I don't have any relevant relationships to disclose, so I really have no -- I'm not going to be talking about specific products today or off-label use of specific products, so there's really nothing to disclose here.

I want to start with a polling question. So if you could all just take a minute to answer this question about what your primary discipline is. Primary care providers, rehab providers, so FLTs, OTs, PTs psychologists, nurses, social workers, or academic advisors, administrators. I'll give you just a minute to get these results in so I can see who I'm talking to.

Okay, it's looking like we've got a large percent of rehab providers, so speech language pathologists, occupational therapists, physical therapists, and a lot of people selecting "Other." So I don't know what the other category is. Okay. Okay, that helps me.

Okay, I want to start by just talking a little bit about mild traumatic brain injury and how often it may occur, what we know about them. So mild brain injuries are much, much more common than most people realize. About 30% of people have sustain a brain injury by the time they're a young adult. So most of these injuries are relatively mild and don't have a long recovery pattern, so most people are going to recover and not have long-term consequences from these injuries.

So two to six weeks the average recovery period, and, again, this is when people stop complaining about their basic symptoms. There is, however, a subset of people who have persistent problems, and there's some interesting research coming out about this. 12% of children remain symptomatic three months post injury. So that sounds like what we would expect. We expect most mild injuries to be just that, they're mild, and so it's not a -- we don't expect long-term problems, but there are going to be a few people who have them.

But there's also a study out that shows that 50% of people are reporting long-term consequences three years post-injury and then again 11 years post mild brain injury, and these numbers are so much -- the 50% is so much higher than the 12%, that this is surprising statistic that's come out. I believe what's going on here is that those acute symptoms that people talk about in the 12% who remain symptomatic three months post-injury, those are symptoms like still having headaches or still feeling like I can't concentrate quite as well, or maybe there's some fatigue, some vision problems.

But what people don't realize are the concentration problems, the memory problems, the learning problems until considerably longer time has past. And so then after a year has past, two years have past, people are say, oh, yeah, I still can do what I used today be able to do. So there's that initial hope that, okay, the symptoms have resolved in the early months post injury, but then it turns out that there are

some long-term considerations that we need to be a aware of. And so there, we get this huge number of 50% of people complaining about problems years post-injury.

Well because of that, we have to think about what are the implications for this for college students? Because if we've got a third of our people sustaining injuries and half of them complaining about long-term problems, then that's a lot of college students who are going to be struggling with brain injury issues.

The chronic problems that interfere the most with college performance center around learning, obviously, learning, and remembering information, executive functioning, planning activities, organizing your activities, managing your time, doing prospective planning of what's going to happen in the future, following through with tasks, and then finally, balancing leisure and work activities. There needs to be a recognition that you can't just work all the time. You have to also have a balance in your life of work and enjoyable activities, leisure activities, and we need to start paying some more attention to that, because brain injury has some substantial consequences on that as well.

So I want to start today by talking about learning and remembering new information, and some of the specific challenges that brain injury survivors have regarding this. There are some persistent physical and cognitive complaints that people complain about after brain injury, and this is like a cycle of problems, because one problem contributes to another problem, which contributes to another problem, and so they build on each other.

Many survivors complain about a sensitivity to light and sound. This is a bit of an unusual characteristic. Most people don't complain about sensitivity to light and sound but it is quite common among brain injury survivors, so when you've got somebody complaining that the lights bother them, lights in the classroom or the colors on slides, something like that, then that's a clue that there may be something going on brain injury oriented.

Associated with that are vision problems. There's a whole host of vision problems that we don't really understand very well at this point, but they are definitely a consequence of mild injury that can interfere with learning. The vision problems cause headaches. Headaches cause concentration problems. Concentration problems cause processing information. All of these contribute to memory problems and all of these contribute to fatigue, which, again, going to turn and make the vision problems and the sensitivity to light and sound worse, and the headaches worse. So they all -- as I said, they all cycle, and are interrelated.

For college students, and high school students as well, any students, there are a cluster of accommodations that are very commonly used for these individuals. Some of them are classroom accommodations, some them specifically studying accommodations, and some testing accommodations. Within the classroom, it's very common to have a note taker assigned to a student with a brain injury, so you may have a peer taking notes for that individual. You may have the faculty member or the teacher presenting copies of presentation slides, and we're going to talk a little bit more about that later on, about how well that does or doesn't work.

Audio recordings of lectures is often done so the person can listen to the lecture a second time later, and get anything that they missed the first time. Environmental accommodations, preferential seating, lighting accommodations, wearing sunglasses or wearing visors to deal with the glare in a classroom. Course substitutions would be another classroom accommodation, and this might be things like a student not having to take a foreign language class, so being able to substitute one class for another.

For studying accommodations, we have some accommodations for reading issues. There are electronic versions of many books now, and so that allows us to use text-to-speech technology have books read aloud to an individual instead of the person having to read themselves. There's often extended times on assignment, as well as extended time on testing. There might be a delay of immediate testing.

One of the problems that survivors of brain injury have is that they can't process the information quite as quickly as it sometimes is presented in the classroom, so if a teacher wants to present the information

and give a quiz the same day over that same information, that would be problematic for a brain injury survivor, and you might want to delay that immediate testing.

And then, of course, tutoring is available as a studying accommodation, and tutoring is available for lots of students. Many colleges make this available for students regardless of whether they have a specific disability. But it may be particularly important for that student with brain injury.

Regarding testing, as I mentioned, extended time is very often. This is usually one and a half or two times the length of time that's usually allowed, although that's varies. Sometimes it's an unlimited amount of time. It's going to be different for different individuals. Reduced distraction environment is very common. This means the student may be taking the exam in a separate classroom, a separate office, or even in the student's Services for Students with Disabilities office, rather than taking the test in the regular classroom. And occasionally there are different test formats given. So a student might have an oral test instead of a written test, or might be able to type their responses into a computer rather than having to hand write them. So those are some examples of some of the commonly used accommodation.

Unfortunately, we have almost no research that actually addresses the effectiveness of accommodations. So we apply these accommodations but we don't know whether those accommodations are actually effective or not. And that's what some of the research is that I'm going to talk to you about today, some that I've been doing with my students in our laboratory trying to look at what actually is effective.

One of the issues with accommodations that we need to be aware of with survivors of brain injury is the risk of over accommodating. A terrible thing has happened to these individuals. It's not fair. There's nothing fair about brain injury, but there's also nothing positive about over accommodating an individual.

This quote was from a manuscript that we wrote several years ago, "Success in college resulting from extreme accommodations might lead to misperceptions about the adequacy of a survivor's preparation for assuming competitive employment and succeeding in the real world."

So what happens is the student makes it through the class, or makes it through college even, but then can't get a job in the real world. So I used to have -- oh, I have a friend who used to say brain injury survivors would pass rehab but fail life. Well now that's becoming they pass college but fail life. They get through college, they get a degree, but that doesn't mean they're successful in getting and holding a job, and so there's a real risk here. We don't want to exacerbate the unreal expectations. At the same time we want to give people the support they need.

This is an example of a quote that shows you how over accommodation happens. This was a student with a brain injury, and she had a lot of problems in this particular class, so the teacher actually said, "Despite inadequate completion of course requirements because of memory limitations, the professors plan to give FM a passing grade." One professor said, "We know FM is working as hard as she can, we're not going to fail her." And while this is understandable, you feel compassion for this individual, when the student is not doing the work that's required to get a passing grade in a class then the question is, really, should we be passing the student.

So there needs to be a balance between appropriate accommodations and over accommodations. We want to provide access. Students should always have accommodations that allow them access to the materials that they need. We want to teach people strategies so that they can be successful, and those strategies should be ones that the student can implement him or herself. So it's not strategies that somebody else is doing for the student, it's ones that they can do for themselves, because that way they're going to be able to use those strategies when they leave as well. But at the same time, don't decrease expectations, and don't shift the responsibility away from the students. The student still needs to be able meet certain standards and do the work that is required.

Okay, to be successful in academics, basically you have to be able to listen to verbal presentations and take notes on those presentations, and figure out what information is important from it, and get that information written down so that you can study it later. And you have to be able to read written information

from textbooks, from articles, from materials from class, and understand that material. Those are probably the two basic characteristics of what a student needs to do in order to be successful.

So let's talk, first, about note-taking strategies and accommodations for that, and later on we're going to talk about the reading strategies. For those of you who are following along with the written handouts, we are on slide 24 now. So we're talking about qualities of good note takers.

Taking notes is really a very difficult task. You have to be able to attend to what's going on and not attend to the distractions in the room at the same time. You've got to encode what's being said and then store that information in working memory, and then retrieve it from working memory. You've got to manipulate that information to figure out what's important and what's not important, so what do I need to be writing down and what can I ignore. Or what's old information to me and what's new information. And then simultaneous to all that, you've got to be writing down that important stuff very rapidly and very fluently, and listening to what's happening next. So it's a very difficult task. Taking notes is a very complicated task.

There are a lot of accommodations available, as I said earlier, for survivors of brain injury, as well as students with other kinds of disabilities. One of them is having peer note takers, so somebody else in the class takes note. There's a problem here, because there's often a time lag between when the student hears the lecture and when they actually receive the notes. It may be a week passes between actually hearing the lecture and receiving the notes from another student. There's also no control that ensure the quality of the student's notes. So the peer who is taking notes might be a fabulous student, might be an average, might be a weak student, but those are the student notes you're getting, so those are all issues we need to be aware of.

Record lectures is another common accommodation. Sometimes faculty object to this. They don't like having their lectures recorded. And there's another problem, which is the time that it takes to review a recording. If you're going to review a tape-recorded lecture or digitally-recorded lecture, well you've got to go through that entire lecture to get to the point where you missed, or you've got to fast forward and go back to find the point that you're trying to get clarification on, so that's a lot of time demands there.

And finally, there's an accommodation, which is to provide the student with copies of presentation slides. This is something that I do. You're looking at my presentation slides right now. So I routinely do this in all of my classes, and I believe that it's generally a good idea; however, there are some problems with it that we've discovered as we started doing research on this. One is that it discourages attention. You don't have to pay attention if your notes are all taken for you. And so there tends to be not quite as much active learning involved on the student's part if all the notes are provided for them, and we'll talk in more detail about that in just a minute, as we get to those studies.

So the first study that I want to talk to you about is one where we said, okay, let's look at these peer notes. Since this is such a common accommodation for brain injury survivors at the college level, let's look at peer notes and find out what kind of information we're getting from them, what's the quality of them and how can people with brain injury use them. So we had three students with mild brain injuries, undergraduate students, who we had listen to anatomy and physiology lectures. This was not their major. They were short lectures. Each was nine-and-a-half minutes. And they were at relatively good rate of speech 100 to 150 words per minutes not a bad rate of speech for a lecture.

And so we had these lectures that we modified slightly to meet those parameters, and then we made up quizzes for each lecture that included true/false questions, multiple choice questions, and open-ended questions with single-word responses or short-phrase responses. We did an alternating treatment design with these three individuals. I should say here, we also had a group of students without disabilities who were our peer note taker, who did the exact same thing. So we had peers taking the notes as well and taking the quizzes so we just couldn't do a comparison of performance.

But this slide shows you what our design was for the study. We actually had six sessions for each student with brain injury, so you can see that subject one on lecture one started with self-generated notes, and

then on lecture two of session one had peer notes, and then lecture three of session one had no notes. So they were doing three lectures in each session, a total of six sessions, a total of 18 lectures total, and every session would have one with self notes, one with peer notes, one with no notes. But we alternated the order to control for order effects on them.

For our dependent measures, we looked at what the students wrote down in their notes, and we did that in terms of information units. Information units are individual bits of information that you can say yes or no about. So an information unit, if I just give you an example of, I say the cat walked down the street. Well was it a cat? Yes. That's an information unit. Did the cat walk? Yes. That's an information unit. Did the cat walk down the street or around the block? Down the street. So down the street is an information unit.

So we were tallying the number of total information units that students recorded in their notes, and then we also tallied the number of critical information units. And a critical information unit was an information unit that related to something on the quiz. So it was something that we had already decided this is a major point in this lecture, we're going to include this on the quiz, and we think that students should be writing this down in their notes.

And then we also had a dependent measure of the percent correct items on the quizzes. In order to motivate students to perform well on these quizzes and not just blow this off since these weren't real classes, this wasn't a real class in anatomy and physiology for them, we paid them, but we paid them based on the number of correct answers they got on the quizzes, so there was some motivation to perform well.

Okay, this slide, what I want to talk about first, are the paler slides here. So if I can use my drawing pen here. This is subject one. In the blue is the brain injury survivor, and in the green is the peer survivors, the number of information units they generated. This is subject two. This is the number of information units they generated in their notes, and this is subject three. The dark lines are the critical information units and we'll talk about those in just a minute. But let's start with the overall information units first. Well, no, let's look at the typical peers first.

So the typical peers are in green, so right here, this is a typical peer. And you can see that about 30% of the information units included in a lecture would be recorded by the typical peers when thaw were doing it. This is consistent with other research. Students get about 30 to 40% of the content of a lecture in their notes. You have to realize that information units are little tiny bits of information, so you don't get everyone written down.

Now this is very interesting. The first participant with brain injury who we used in the study, you can see that she actually recorded 42%, about, of the information units in her notes. So she was actually doing better than her peers, than the typical peers as far as getting notes down, and that was a significant difference.

The same thing with participant three. Her difference was not significant. It did near significance but it didn't reach significance, but she was recording more notes than the peers, the typical peers.

Now subject two is the opposite. He was getting less note down than his peers in his notes. But then we look at the critical information units, so are they able to pick out the information that's really important. Well, here there's very little difference between subject one and subject three on what they did versus what the typical peers did. So even though they had more notes written down, the amount of critical notes that they had was the same as what their peers were writing.

Look at subject two. Subject two, we've got a significant difference. He's got much, much less of the critical information than his peers did. So we see different patterns for different people. This immediately tells us that we have to consider this on an individual basis, and also there are -- you can't just say how much did they write in their note and that's what's going to tell you what they do.

Let me go on and show you the quizzes. So remember, subject one and three are the ones who had good notes but they did worse on the quizzes than subject two. Now on this slide we have, in the dark blue here, we have those are self-generated notes. Here are the peer notes, when they were taking the quizzes after using the peer's notes. Okay. And there's no difference. This is not significantly different for any of these three people. This blue line across here is the average score of the peers on the quizzes, and you can see it's about 72%, and that's exactly how subject two performed. Again the same with both the self-generated notes and the peer-generated notes. So it didn't matter whether you gave the person peer notes or not, their performance was essentially the same. And the fact that the performance here for subject one and for subject three is really quite low. It's 40 to 50% accuracy, 40 to 55% here, this is what's of concern. So there's something besides jus what's get written down in the notes.

So to summarize that information, quality of notes is not the only factor. We had one in three with good notes but poor quiz performance. We had participant two with poor notes but average quiz performance. We have several possible explanations. We did immediate testing, so they didn't have to remember this until the next day. They had to study for a few minutes right after listening to the lecture and then take the quiz immediately. So delaying the testing to another day would have been more ecologically valid. It would have been more real life. And maybe it was reading comprehension, maybe it was word retrieval problem on the quizzes that would have affected their performance.

We didn't measure their reading comprehension skills of these people. We're going to talk about reading comprehension in a minute, but we didn't do it of these people. So that could definitely have been an issue. And some of the quiz items required recall of specific words, so that could have been an issue.

We asked those students about the peer notes and what their concerns were about using peer notes. The things that they complained about -- oh, and we took the average peer notes, so we had peer notes from lots of peers. We figured out what was the average number of information units recorded and took an average. So we weren't giving the perfect peer notes and we weren't giving horrible peer notes, so it was just average.

The brain injury survivors complained that the peers used abbreviations they weren't familiar with and so they couldn't interpret the notes, that the peers often shortened or omitted explanations for things that the peers may have known about, but the brain injury survivor didn't know about. They complained about the organizational strategies, that it didn't match the way they would have taken notes, and they complained about legibility of the notes. So those are issues we need to take into account.

Now another study that we've done on note taking that we're just in the process of doing now, so I can give you preliminary data. We wanted to look at this idea of, okay, what about giving PowerPoint slides to people, does this really help? Again, it's something that we do. I do it. I know a lot of other faculty members who do it. Does it really help?

We use the same anatomy and physiology lectures as we did before, so ten-minute lectures short lectures, ten-minute objective quizzes to go with them. We also had the students do verbal summaries of the information in case we were losing information from the quizzes. And in this case we used an ABA design. We did three lectures where they had no PowerPoint slides. They were just taking their own notes. We then did three lectures in which we gave them the PowerPoint slides, and they could take notes in addition to that, so they could write on the PowerPoint slides or they could write on another piece of paper. And then we went back to the A condition where there were no PowerPoint slides and did one final lecture.

Okay, we recorded, again, for dependent measures, the number of information units recorded in their notes. We also did the number of information units they were able to recall verbally, and, again, this was an immediate recall. So we have that same problem of this was immediate testing after a study period. And we did the quizzes, the percent of items corrected on the quizzes.

Okay, now on this slide -- let me get my pointer her -- we have participant one here on this side and participant two over here on this side. Now participant one, the blue lines, this is what participant one

included in his notes, and you can see that for the first three lectures where there were no PowerPoint slides, he included more information in his notes than he did when we gave him PowerPoint slides. And this is including also everything that was in the PowerPoint ewes as information units; okay? So it's including everything. So he actually got less information.

The same thing happened with the second participant, more information without the slides than with the slides. And this was particularly striking on the very last session, where we got a big bump in what was included. And notice, again, that this second participant in particular is right around that 30% mark on their own notes, which is where we would expect most students to be, maybe slightly higher than that, but it's not too far off.

But now look at the verbal summaries. The verbal summaries are these red lines; okay? The verbal summaries of participant one were horrible. He could basically tell us one thing that the lecture was about. So this was a lecture about cell division, period, that's it. He couldn't tell us anything else. So he was getting no content that he could verbal -- and this was after studying. So he would listen to the lecture, he would have a study period, and then we would say, okay, summarize what you heard in the lecture. And that's all he was able to come up with. So we know we've got a may major learning problem here. There's information that he's getting in his notice but he's still not learning it. And, again, this is immediate learning, so we were asking for that immediate ability to master this. But that was really striking.

Now, participant two chose a different picture. Now here, without the PowerPoint slides, he was able to verbalize a fair amount of information that he had gotten down in his notes, certainly not more than what he had gotten in his notes, but comparable. But then look what happens with the slides, it's not that there's a different amount. If we took the average of these red bars it would probably be about the same across these cells, but he's actually got more verbal content than what was written in the notes. And so it was some unusual findings here. So we went and we asked these people -- oh, wait a minute. I need to tell you about the quiz scores first.

Okay, we did pre- and post-quizzes. So we had to make sure that students didn't know all this information ahead of time. And so, again, the blue is the pre, and where there's no blue it means they got a zero percent on the pre-test. So the blue is the pre-test and the red is the post-test, and, again, we have participant one here and participant two here. Okay, the number of items correct, there were ten items on the quiz. Well pre-test to post-test, yes, there is an improvement. But we're talking about getting 50%, getting 10%, and getting 0% correct on a post-test quiz without PowerPoint slides. It goes up slightly. It was an average of about 30% with the slides.

And, again, for participant two, without the slides, about 65% accuracy on the post-quizzes. So this was an individual who was learning but actually did worse with the PowerPoint slides. So this, again, made us question, really, are the PowerPoints slides helpful or are they hurting the individual more than they're helping.

We then talked with these participants and said, "What's going on here". And what we found was, in looking at their notes, that there was a tremendous tendency for the students to only write down what the instructor wrote on the slides. So if the instructor wrote something on the slides, they wrote it down, they copied it down verbatim. But if the instructor didn't write anything, they didn't write anything. So they were totally dependent on the instructor to say, "This is something important, write it down. See, I'm writing it down."

Other than that, when they had the PowerPoint slides, they weren't making any attempt to do that interpretation on their own. Okay? So it suggests it provides a little bit of backing for that notion that there isn't active engagement of the student when you provide the PowerPoint slides. They actually did better without the PowerPoint slides.

So where do we go next with this? Well maybe we have to provide partial PowerPoint slides, something that will encourage the person to be an active participant in the class still, so we give them guides rather than copies of the slides. We haven't looked at that yet.

I would like to look at Smart Pen technology. We haven't looked at this yet. Smart Pens are devices that will record lectures as you go, and the difference between this and just an audio recording is that the Smart Pen will allow you to -- you use special paper to take the notes, and you can just touch on the paper of, oh, this is the point in the lecture that I didn't understand, and it will play back that particular spot in the lecture. So you don't have to search for the right spot in the lecture, you take your own notes, but you can go back and say, I missed this word or I missed this concept, I need to hear this part again. So I think we need to take a look at that and see what that does for our students. But we really have a lot of work to do to boost the learning potential of these students with regard to what they're getting out of classroom lectures.

Okay, next, I want to talk about reading issues, because reading I said was the really big issue for brain injury survivors. Qualities of good readers, well you have to have good vision. You have to be able to decode words quickly and accurately. You've got to be able to comprehend factual information, as well as comprehend inferential information and you've got to be able to synthesize that information with your existing knowledge about that topic.

For students with brain injuries we know we have a lot of vision problems. There's a sensitivity to light. There's eye fatigue. Some people are going to complain about blurred vision. Some people are going to have double vision. There may be motor control problems, so the person has trouble scanning with their eyes. Some people say that it looks like the text is pulsating in and out of focus for them. So we know that there's lot vision problems with students with mild brain injuries, and we need to pay some attention to that.

Just as an example, I'm not going to talk about this study but this was a study that my colleague did with eye tracking technology, and what you're seeing here is a grid that we had people look at this grid and search for a specific word. In this case they were searching for the word that was here. The word was sandals. And they needed to find that word sandals. They had ten seconds to search the grid to find it, and we always had them starting in the middle. They would focus on a dot in the middle first. So they would start here, and then this blue line shows you the scan path, shows you where this person looked in order to find this word "sandal," okay? This it was an adult without brain injury.

This is an adult with brain injury. The same thing. We've got ten seconds, they're starting in the middle. So, again, you can see that -- let me get my pointer back -- you can see here they're starting in the middle, but now I can't even follow these numbers. They go all over the place, back and forth and back and forth, up and down in an attempt. And they actually never found the word sandals in ten seconds. You can see they skipped over it a couple of times, but they never landed on that cell.

Well this is fascinating information to me. This really highlights what some of the vision issues are for brain injury survivors. You can't even find a word on a page, sometimes, and so this is a major, major concern, and then we just think about reading and what implications this has for reading.

Okay, another major issue for reading, characteristics of brain injuries [indiscernible] is the speed at which they do the reading. We know that typical adult readers read at 250 to 350 words per minute. It depends on what you're reading for how fast you read. It's going to slower if it's something complicated. And then finally there's reading comprehension, and we know that brain injury survivors have some comprehension problems that we're going to have to address.

The accommodations, again, there are a lot of electronic versions of textbooks but their availability is inconsistent. We have some text-to-speech technology. The speech quality is variable. Sometimes the text has to be in digital form, it has to be an electronic test, so a computer file, in order for the system to read it. Other times it doesn't, but it just depends which technology you're using and how good that technology is.

We wanted to look at this idea of text to speech support. Would that be something that would help brain injury survivors, college students with brain injuries, improve their comprehension and reading efficiently. And we also wanted to get them basic measures on what that comprehension and efficiency abilities are of brain injury survivors. We used text to speech, TTF. I've used an abbreviation of TTF here; right here. TTF is text to speech. So we used text to speech support and we looked at reading rate, comprehension, and efficiency by individuals with brain injury.

We used passages from GED study guides, and comprehension questions from there, and the comprehension questions, though, would be three factual questions and three inferential questions about each passage that they read, and passages would be a few paragraphs in length. We would do six passages in every session, two from each condition, and the conditions were that we had reading only, so the person would just read themselves, listening to the text-to-speech presentation only, so we had a listening-only, an auditory-only condition. We thought maybe it would be better if they don't read it, if they just listen; and we had a combined listening and reading condition.

Our dependent measures were reading rate. Comprehension accuracy and comprehension rate -- comprehension rate is a combination of your accuracy in answering comprehension questions and how fast you read the material, so it really combines the two things together. It's an efficiency score.

Okay, now on this slide, this the reading rate, and top blue line here was the average reading rate of these materials in order to answer comprehension questions by our control participants. So these were typical readers, and they read at 220 words per minute for the purpose of being able to answer questions. That contrasts with our brain injury survivors. 150 words per minute was the average. And you'll see here, if you notice the blue lines again, the blue lines are the read-only condition, so it's the blue lines, the blue bars that we're interested in looking at here for the reading rate. The two orange bars, those are the text-to-speech conditions, and so then it was auditory. We were presenting it out loud. And notice that the text-to-speech conditions hovered right around that 150 words per minute, because that's a good speaking rate for books on tape, for listening to books, and so that was the rate that we chose for that.

But, here, the blue line, the blue bars are the rate that the brain injury survivors are reading at by themselves. Sometimes it was astonishingly low, 75 words per minute; okay, 110 words per minutes, sometimes up to 150. We have one survivor out of ten who approached normal, was about 200 words per minute. Everybody else was really, really slow. So the first thing is just the time involved in reading.

Next issue is the comprehension accuracy. So this is how many comp comprehension questions did you get correct, and this is all subjects combined for the factual questions. And for the inferential questions, over those three conditions, read only, listen only, read/listen. And you can see there is no difference in the three conditions. There's no difference between inferential and factual questions. But look at what the percent correct is. We're averaging 50% correct, and this is high school GED material; okay? So the reading comprehension is really poor. We have a major issue with reading comprehension for these students.

Then if we look at comprehension rate, which, as I said before, is the combination of how many questions you get correct and how fast you read, so this scale on the Y axis here is a little bit hard to interpret, but if you had somebody who got a hundred percent correct and was reading at 200 words per minute the score would be 200. If they were reading 140 minutes per minute and they got a 100%, their score would be 140. Look where our scores are. Our scores are down around 70, if they read it by themselves; 80 if they listened to it and don't read it, and maybe 90 if they do the combined. It looks like we have slightly better performance in the combined modality, but it's not a really striking distance. We have to do more with this.

Now if you look at individual differences, we do have some individual differences that are important to note. The first two participants here, participant two and participant six, these are individuals who actually did best in the read/listen condition. So this dark orange bar was substantially better than what they would

do with the blue bars when they would just read it themselves. But we've really had a situation where it looks like, yeah, they're benefitting from the read/listen condition.

But then look at participant eight. Participant eight is an example of an individual whose worst performance was in the read/listen condition, and who actually did better in a single modality condition, so either reading himself or listening himself. And then we had some participants who there really was no difference. You couldn't tell. There was nothing substantially differentiating the three conditions. So, again, very individualized. While reading, while listening might help some people, it's not going to help everybody and it may actually hurt some people, like this one, like this participant. So in is an individualized decision that needs to be made about whether text-to-speech support would help.

Okay. Now, text-to-speech support, yes, it makes you faster. You can do it a whole lot faster. You can get through the material faster. It doesn't -- increasing that speed did not positively or negatively affect comprehension accuracy. The read-while-listen condition did give us higher comprehension rate scores than the read-only condition, but there were those individual differences that we need to look at.

And, really, the big message is this final point, this last point down here, that text-to-speech support needs to be combined with some other strategy that will get active involvement with the reading materials from the person in order to really be of benefit. So that's the next thing that we looked at. We wanted to know, well, okay, what other supports can we put in place to require more engagement with the text.

Our strategy that we tried first was repeated reading. We looked at reading while listening again, so we did the text to speech, and we did repeated listening -- I'm sorry -- repeated reading where the person would read it more than one time, and then we combined those strategies together. Again, we had three participants with brain injury. We used passages from the Info Mall reading inventory this time, and as you can see at the bottom of the page, there were four conditions, read only, read while listening, reading two times, and reading while listening, so that was text to speech, and then reading by yourself a second time; okay? So we have two repeated reading conditions and one read-only condition, and two reading while listening conditions.

Successions, we did four passages per session, one on each condition. We again measured comprehension accuracy and comprehension rate, so the same dependent measures. And here was our data for these three participants. Now in this instance the light blue line is the read-only, dark blue is reading twice. So reading it to yourself twice.

Now participant two, big improvement when he read it twice. So it really seemed that that worked for that person to improve his comprehension. But look at the accuracy. All of these people are below 50%. We barely get to 50% in the best conditions. So we still, even though participant two did a whole lot better with reading it twice, we still have this major problem of the comprehension is still really quite, quite poor. And the other participants, the participant one and participant three, there really was no difference across these conditions for which helped the most. So reading while listening, the text to speech didn't show up as, oh, this is the major improvement, and neither did the text to speech followed by reading it yourself. So, unfortunately, a failed attempt here to come up with an alternate strategy.

If we look at the same data with comprehension rate, so, again, saying how fast could the person do it and how accurate were they, we get, yes, reading while listening is a good way to go, because it saves you time and it doesn't hurt your comprehension. But I really am very reluctant to advocate for the text to speech and the reading while listening, because by itself, it's an insufficient strategy, because the comprehension is still so poor.

Okay, so reading while listening by itself is insufficient, repeated reading can improve comprehension for some people, but it doesn't for everybody. And it's not sufficient to yield even average comprehension scores. The combination of repeated reading and reading while listening increases the reading rate for some people, but it doesn't result in better comprehension, so we've got to find something else.

Okay, there's another research group that have come up with an alternative strategy that's called "STIR," Strategies To Improve Reading. This is a computerized system where you are reading the material on a device, on a computer device. They do a pre-reading period where they review the headings, say out loud all the headings, read out loud all the headings within the passage that they're reading and decide which ones interest them the most. Then they actually do the reading, and as they're doing that, they select what they think are the key ideas, and those key ideas, they highlight in order to put them into an outline that's on the same screen, so it's part of the screen that they're viewing.

Then they take those sentences -- after they've read the whole passage, they take those sentences that they've highlighted and put them into the outline and write summarization notes on the outline, so it's all done with a drag-and-drop technology to drag sentences over to the outline, and then they've got a little summary there that they haves. Then they do self texting by hiding the key ideas, saying them aloud, and then exposing them again to see what they can remember from the outline.

Now Felberg and her colleagues, some students looked like they could benefit from it, but not all of them. They were very different in how they responded to the strategy prompts. It became very clear that the strategies needed to meet the user's needs. Again, this is a small study, we have a small number of participants that they used in this study, so it's all very preliminary. But, again, it doesn't look like it's going to be a solution for everybody. It may work for some survivors, and that's really the message that you're getting here, is we have very individualized needs of these survivors. It's going to work for some people, certain strategies are going to work for some people but not for others. So we've got to keep working on this, keep exploring other ways to boost comprehension.

Okay, finally, balancing leisure and work activities, the last thing I want to talk about today. There's more to going to college than just studying. You have to study, but you have to do basic things to take care of yourself, like sleep and eat, and you have to socialize. You have to have a social life. You have to have things that you enjoy doing, have some sort of quality of life. So I call it playing with others. Exercising and relaxing are other critical issues involved in the college experience.

We are in the process of analyzing data from the study that we're involved in right now. This is a survey study of almost 3,000 college students, 2,796 students were surveyed. We had 423 surveys returned from that, so we've got a 20%, slightly under 20% of the surveys returned. These are not students with diagnosed brain injuries. We surveyed these students and asked them about their -- these are typical students. Every student in the college got the survey. We asked them about their daily habits and routines, their general health, and their academic performance. We didn't tell them that the survey had anything to do with brain injury, but we did ask brain-injury questions on the survey so that we could find out if there was a sub-group of these students who returned the surveys who actually had sustained one or more possible brain injury events.

Okay, our survey respondents, as I said, we had 423 undergraduates who returned the survey, so about 15%. Now 361 of them were female. 62 were males. That's because this was a college of education and human science and the population was predominantly female. So we have a biased sample here, biased towards females, and we know that males are more likely than females to sustain brain injuries throughout their lifespan so we should be getting low numbers, if anything, from these survey results.

Okay, from those students, those 423 surveys that were returned, we had 119 of them who had sustained a possible brain injury event. This meant that they had reported a concussion, a traffic accident in which there was a blow to the head, a hospitalization in which there was a blow to the head, an assault, or an abuse incident, possibly a medical incident, so we had people who had seizure disorders, falls, falls were big one, sporting injuries were very big, so these were self-reported events, 119 of students, that's 28%. Well that's right in line with that number that I started with at the very beginning of this lecture, the 30% of students by the time they're 25 have sustained a brain injury, a mild brain injury. Well, here it is, 28% of our sample. So that confirms that.

This was also interesting, that we ended up with 119 students but 240 events. So, many of these students didn't just experience one brain injury, they experienced two brain injury events. It's really a two-to-one

ratio. So we have most of the people who had sustained one brain injury had actually had two possible brain injuries across the period of their lifetime. Of those 240 events, possible brain injury events, 46 of them, there was a loss of consciousness reported. So we're talking relatively substantial events in some instances.

Then we surveyed these students about -- both the students who had -- we grouped the students, then, into two groups, the ones who had possible brain injury events and the ones who did not report any history of possible brain injury events, and we looked at their sleeping patterns and other daily habits with regard to sleep. We specifically looked at difficulty falling asleep, difficulty stay asleep, and not adhering to a set routine.

And what you see on these slides we have -- whoops, I see that this formatting is off a little bit. These two bars here are the no history of brain injury respondents, and these two bars are the history of brain injury respondents, and it's all done as percentages because it was an unequal end in those two groups obviously. We had 304 no-brain injury and 119 with possible brain injury. And then the red bars are the ones who reported sleep problems. The green bars are the ones who said they have no sleep problem. And what you see is the sleep problems in the students with no history of brain injury, about 30%, a little less than 30%. So maybe a third of the people complain about sleep problems, whereas in the population of students with possible brain injures, we've got 50% complaining about sleep problems. So significant difference there.

We did the same thing looking at eating schedules. So, again, this is just daily events, routine stuff, and we simply said, "How often do you eat three males a day". And the red bars are if you ate less than three meals a day, and the green is if you ate three meals a day on average, and this was the no-history of brain injury and this was the possible history of brain injury. And, again, you can see that it's about 25% of the students without a history of brain injury had trouble adhering to a three-meals-a-day schedule of eating, whereas about 40% of the people with a history of brain injury. So something's going on there.

With regard to studying, first I have some quotes of what students say -- students with brain injury say about their efforts involved in studying. One student said, "It takes me an hour to read one page," so we're back to that reading issue, reading comprehension and reading speed. Another student said, "All day long you could study and you could look up and not have anything in your head," and this is that I've got the information here, I can see it from front of me, I can read it, but I can't get it to stick.

There have been a lot of comments from [indiscernible] from qualitative study about the attitude brain injury survivors have to adopt in order to survive in school. One student said, "I willed myself through college. I'm going to do this. No matter what it takes, I am going to do this." A parent said she's the never-say-die poster child. I believe it was a parent. It might have been an advisor. This student was just tenacious. She would continue to try and try and try and try, and that's what it took to get through college.

And then there was this issue of self advocacy and a willingness to ask for help from others. The first quote is from a faculty member in a Service for Students with Disabilities Department said, "If there's no coach, if there's no mentor, if there's no parent, then they see failure." So the brain injury survivor has got to have somebody advocating for them to help them through the process. Many students talked about getting individual help from faculty or using study groups to use their peers to give them that assistance.

Okay, now let's look at the survey results. Here, we have the blue, is the students without brain injury, and the green is the students with histories of possible brain injury. Now the slopes look about the same. What's different here is that there is a significant difference in the amount of hours spent studying every day, and it is higher in this three-to-five and six-to-eight hour group, so that length of time studying is much higher for the students with possible brain injury than it is for the students without possible brain injury. There are more students without histories of brain injures who were down in this very low, zero to two hours of studying each day. So that's, again, testament to the amount of effort that goes into studying.

Grade point average: Okay, we have -- along the X axis here we have different categories of grade point averages, and you can see there's lots of good grades. Again, the blue is the no history of brain injury,

and the green is the possible brain injury. And what's important here is this spike right here. We've got a bunch of people with history of possible brain injury who are in this 2.75 to 3.0 grade point average, and also back here, you can see it here, they're in this low 3.0 or 3.25 to 3.5 grade point average, and they don't have the same spikes that you have in the blue for the no-history of brain injury with the really high grade points. So they have significantly lower grade points, although their overall grade point average is still very respectable.

You need to consider that we have only looked at this data in terms of all of those 119 people who said, okay, I've had an event. We haven't said did they say that there were long-term consequences of that event. We have that data. We haven't finished analyzing it yet. So probably there's a subgroup of this group with brain injury events. It's the group we really want to look at.

Okay. And then finally there's the social interaction piece. Relationships with others, I was surprised that college students would actually acknowledge problems in their relationships with others. I'm going to jump ahead to a slide here.

This is the survey data again, and you can see it's not common that our survey respondents were saying that they had problems interacting with others, have problems with relationships with others. It was only 5% of people with the no-brain injury. Possible brain injury, it's double that, though. So, again, it comes out as a significant difference. It's not huge, but there's an issue there still.

And if we go back a slide and talk about some of the qualitative findings that we have regarding relationships with others, survivors complain about having an invisible disability, that other people don't understand what they're going through, don't understand how hard they have to work. Their peers complain about having frustration with communication breakdowns, that they have difficulty in their communication efforts, and they feel uncomfortable because of pragmatic communication violations. And teachers and instructors are concerned that the student is, quote, playing the disability card, claiming they have a disability when they really are just trying to get out of work and they really don't need this extra help or whatnot, and so we have some issues there qualitatively that we know about.

Okay, the last thing on the survey that I want to talk about is the exercise schedule, and this is one where the group was with possible brain injury, a history of possible brain injury, the green, actually do more exercising on a more routine basis than the group that doesn't, the blue group, the group that doesn't have a history of brain injury. This may relate specifically to this sample and reflect why we had so many sporting injuries, because these people with brain injury, if you're involved a lot in sports, then, yeah, you're going to be exercising on a more routine basis, on a more daily basis, so that was interesting that that was the one thing that did come out significantly different, but it was actually better in people with a history of brain injury.

So, finally, again, just to reiterate this point that you can't just study, you have to have a balance in your college life so that, you know, all work and no play doesn't work. One of my favorite quotes comes from a children's book that says, One of the worst things you can do to a brain is to keep it away from other brains." Keeping yourself isolated and away from other people is disastrous to the brain, and so that's not something we want to encourage for our students with brain injuries. We can't say, "Oh, you've got to study. You got to study all the time. You've got to study more." No, they have to have a balance. There has to be a quality of life.

So, finally, to sum things up, we've got an increasing number of students with brain injuries who are going to be in college. They're in college now. We're just not recognizing all of them. Those students are going to need accommodations, some of them are going to need accommodations, and those accommodations are going to have to be tailored specifically to what the individual student needs. Sometimes those accommodations are going to be purely cognitive. Sometimes they're going to be more physiological and deal with vision issues perhaps or balance issues. Sometimes it's going to be socio-emotional, depression issues, isolation issues, relationship issues.

We need to really get down to the basics as far as figuring out what accommodations are going to work for reading, for note taking, and for new learning. We have some information about -- a little bit of information now about some things that work a little bit but don't completely answer the problem, solve the problem, so we need to be going further on that. We've got basic skills and planning, prospective planning, organization, time management that we need to address, and we need to be encouraging realistic life goals for these individuals not over accommodating them, yet giving them something to look forward to that they can achieve post-college.

And at this point, I'm going to turn it over, again, to Dr. Livingston. These next few slides are just the lists of my references, and you all have that available for you.

Thank you very much, Dr. Hux. Excellent presentation, certainly very timely with, as you mentioned, many college students returning to the classroom very soon, if not already back in the classroom. But very informative.

We want to encourage our participants, if you have questions that you would like our presenter to address, you can post those questions in the Q&A pod there on your screen. We'll give you a few minutes to -- we have a number of questions that have already come in, we'll give you a few minutes to post some additional ones, if anyone has questions, before we start going to the answer session for those.

What we will do in those few minutes is our DCoE, Defense Veterans Brain Injury Center product highlight for the monthly webinar. This month our highlighted resource is what you see here on the screen, it's Defense Veterans Brain Injury Center's Back to School Guide to Academic Success After Traumatic Brain Injury. This was formalized and published back in December of 2013. Hopefully it's a resource that many of you have used and accessed already. If not, hopefully you will following today's presentation.

Just a brief overview of that guide, the guide is designed for service members and veterans who have sustained traumatic brain injuries and are going to college, universities, or vocational schools. The guide is a excellent resource for how to navigate campus life, managing ongoing symptoms, learning strategies that they can employ for academic success, and tips on how to ease that transition from classroom to a civilian setting.

There's also some great resources in the back of that guide for student learners, as well as a very comprehensive reference list, especially for providers and clinicians, that would be of interest to you in terms of getting some additional references beyond the ones that Dr. Hux provided at the end of her presentation.

The guide offers strategies to overcome cognitive challenges, with attention and concentration, organization and planning, memory, thought processing, and self awareness. This comprehensive student resource provides web links that can help the student to answer their questions and connect them with people and resources that can help them.

This guide is also useful to providers and educators as a teaching tool to help their patients develop a list of helpful contacts, track their progress, and create a detailed schedule to manage their time in the classroom, and outside the classroom. The frequently-asked-question section quickly offers answers to common questions about accommodations, accommodation plans, financial aid, and assistive technologies. The Defense and Veterans Brain Injury Center worked with a panel of specialists representing the disciplines of counseling, neural rehabilitation psychology, occupational therapy, psychology, social work, speech language pathology from a variety of organizations; the Defense Center of Excellence, the Deployment Health Clinical Center, the Department of Veterans Affairs, as well as educators from the University of Minnesota and the Virginia Commonwealth University.

Again, this guide is available for free. It can be downloaded or print copies, bulk copies can be ordered. All you need to do is go to the DVBIC website, dvbic.dcoe.mil/material/back-school-guide, or you can

simply go to the DVBIC re resources page and do a search for back to school, and that resource guide will appear.

So hopefully we've given you a little bit of time to post some additional questions. We'll now go to the question-and-answer time and see how much time we have to get through a few of these questions. And, again, Dr. Hux, we received some excellent questions from our participants, so we'll try to pose some of those questions to you. The first question is combinations are achieved typically through an IEP or through other more formal mechanisms that typically require having a meeting convened. What is your suggestion in working with educators kind of during that intervening period, before an IEP can be scheduled, kind of the more formal process for identifying accommodations? What are your recommendations for that interval period?

Yeah, that's a really good question. This deals more with the elementary, middle school, and high school students than it does with college students. You don't have the IEP for the college students, but you certainly do for the primary and secondary students. And the accommodations that are formally established in an IEP or in a 504 plan have to be implemented by the teachers once that is established.

Prior to that is an excellent time to start experimenting to see what's going to work for an individual child. So that's the time when I would be trying different types of classroom settings, do we need to move the student to an isolated part of the classroom? Do we need to provide the student with a quieter distraction-free environment? Do we need to provide the student with an auditory form of the textbook materials? And start experimenting with that and see what's going to work, what's going to benefit that student the most. So I would use that time to do experimenting.

And these are things that teachers are really good at. Schools are a great place to do brain injury rehab, because teachers are really excellent at knowing these strategies. They have used them with students with other kinds of disabilities. They may not know about brain injury, per se, but they know about other students with disabilities, and so they can use some of those same strategies they've tried with other people to try with these students.

Great. Our next question for you, Dr. Hux, is how can educators and rehabilitation professionals ensure an appropriate balance between providing appropriate accommodations to students with brain injury and not over accommodating?

This is an excellent question. This is a major problem. You need to -- as I said in the presentation, you need to provide access. Access is an accommodation is if the student can't access the materials, they don't have a chance to succeed. And so access is always an appropriate accommodation.

But when you start changing requirements for students, that's when I get concerned, when we say, "Oh, well, okay, this student doesn't have to take this exam," or "This student doesn't have to do this assignment." That's when I get concerned that we are over accommodating, or saying, you know, I'm going to give the student a better grade than what they earned in the class, because then we're really setting it up that the student will pass the class but will not be successful in real life. So that's where my concern comes in.

Now there's nothing you can do if you have a faculty member who, as in that study that I did, said, "We're going to pass this student." That's their right. They can pass the student. So there's really -- you have to provide education at that point to the faculty members about what's appropriate and what's not appropriate. But on an individual basis, you can't say, "Oh, no, you can't do that."

Thank you for that response, and it looks like we have time for one more question that we're going to pull from our participant submissions here. Have you or your research team looked at the course load and what's kind of the optimal number of hours that a student with a brain injury should manage in a typical college environment?

Yeah, good question also. We did that in the survey. The last study that I was talking about, the survey study, we have looked at the number of credits that students were taking in those two groups, the students with a history of no brain injury and the students with a history of brain injury, and there's no difference. So they were averaging around 14 credit hours in both groups. There wasn't a statistically significant difference between the two groups.

Now that, again, is a group of people with self-reported possible brain injury events, not saying they have long-term struggles because of that brain injury. If you're just dealing with a group of people who you know, or a person who you know is saying "I've got learning problems," then you need to reduce the number of credit hours. For some people it's you take one class a time. And I've had many survivors who have gone through college taking one or two classes at a time and that's it. Sometimes they can handle three. It's unusual if they're handling more than three.

But, again, it depends if it's a mild brain injury and the brain injury just happened last semester, I would probably take a slightly reduced load the next semester to see how it goes. They may just be fine after that and then want to up it again. It depends how long they're experiencing problems. Again, I don't want to make it sound like everybody who has a blow to the head ends up with long-term problems. They don't. And so a lot of these students are going to be able to resume their normal course load again after a short period of time. But for those students who are experiencing chronic problems, then reducing the number of classes is crucial.

Great. Thank you again. In the effort of keeping us on schedule, just wrapping up our webinar today, a lot of great questions, unfortunately we're going to move on and kind of do our last housekeeping bit of information here.

A quick note about you can continue to submit Q&A questions. Next slide. Just a reminder again about obtaining continuing education credit. In order to obtain CE credit, you do need to go to this website to complete the online continuing evaluation component, and then you can download or print your continuing education certificate or certificate of attendance. The online continuing education evaluation remains open for two weeks, so that will be open through the 27th of August. Preferences is that you get that done and wrap that up as quickly as you possibly can.

To help us improve future webinars, we also encourage you to complete the feedback tool that's going to be open in a separate browser on your computer. That will enable us to utilize that feedback in future webinar planning. To access the presentation and resource list for this webinar, you can download them from the files pod on your screen or go to the DVBIC website, dvbic.dcoe.mil/online-education, and an audio recording and edited transcript of the closed captioning will be posted to that link in the next seven days approximately, so that you can access that as well.

The chat function, that will remain open for an additional ten minutes at the conclusion of the webinar. That will permit some of our attendees who have been actively networking in the chat pod to continue to do so. And we also want to encourage you to save the date for our next DCoE webinar. This is a psychological health webinar. You can see the title there, Health Care Management of Military Sexual Assault and Harassment. That will take place two weeks from now, August 27th, same time, 1:00 to 2:30 p.m. Eastern Time.

And please check the DCoE webinar page for more information about our webinars that will be coming up later this year, this fall, as well as information about our DCoE Psychological Health and Traumatic Brain Injury Summit that is coming up 9 to 11 September, and, again, the link is there for the DCoE website to get more information about our webinars, and then you can also use that to search for information about the DCoE Summit.

So we'd like to -- well last note here is our DCoE contact information that you can use to send us any comments or questions or concerns about the webinar, and we would like to thank both our presenter, Dr. Hux, again, from the University of Nebraska Lincoln for taking the time out of her schedule and providing

us an excellent presentation today. And thank you to all of our participants as well who participated in the event. We appreciate you participating and hope you have an enjoyable rest of the day. Thank you.

This does conclude today's conference. All parties may disconnect at this time.