



MEET THE SCIENTIST WEBINAR NOVEMBER 2019

Integrating Virtual Reality into Psychotherapy for Anxious Youth

Presented by: Michelle Pelcovitz, Ph.D.

Moderated by: Jeffrey Borenstein, M.D.

- Dr. Borenstein: Good afternoon and welcome to the Brain and Behavior Research Foundation's Meet the Scientist monthly webinar series. I'm Dr. Jeff Borenstein, President and CEO of the foundation and your host for today's webinar. Today Dr. Michelle Pelcovitz will present Integrating Virtual Reality Into Psychotherapy for Anxious Youth.
- Dr. Borenstein: The Brain and Behavior Research Foundation funds the most innovative ideas in neuroscience and psychiatry to better understand the causes and develop new ways to treat brain and behavior disorders. These disorders include addiction, ADHD, anxiety, autism, bipolar disorder, borderline personality disorder, depression, eating disorders, OCD, post-traumatic stress, and schizophrenia. Since 1987, the foundation has awarded more than \$408 million to fund more than 5900 grants around the world. 100% of all donor contributions for research are invested in our grants to scientists.
- Dr. Borenstein: I'm delighted to introduce Dr. Michele Pelcovitz. Dr. Pelcovitz is Assistant Professor of Psychology in Clinical Psychiatry at Weill Cornell Medicine, NewYork-Presbyterian, and was a 2017 Young Investigator Grantee.
- Dr. Borenstein: Today's webinar will begin with a presentation. This will be followed by a question and answer period. To submit your questions, please use the questions tab on the control panel on your screen. Feel free to submit your questions at any time. Following the presentation I'll ask as many questions as is possible in the time allotted. And now I'm pleased to introduce Dr. Pelcovitz. Michele, the floor is yours.
- Dr. Pelcovitz: Thank you so much for that introduction Dr. Borenstein, and thank you to the Brain and Behavior Research Foundation for all their really important work and for inviting me to speak today. Today, like Dr. Borenstein said, I'll be talking about Integrating Virtual Reality into Psychotherapy for Anxious Youth, and in particular I'll talk about my ongoing pilot study that's funded by the Brain and Behavior Research Foundation looking at integrating VR into therapy for social anxiety.

View the webinar recording and download slide presentation at: bbrf.org/october-2019-webinar

Dr. Pelcovitz: Today's talk I will be talking first about anxiety disorders in youth, a little bit about prevalence and how it affects youth today. I'll talk about the state of treatment and I'll talk about what we've learned from animal research about how to treat anxiety disorders in teens and young adults. I'll talk about exposure therapy, what it is, and how we do it. I'll talk about virtual reality in the literature. I'll talk about my ongoing pilot study. And then we'll talk about next steps and take home messages. And hopefully I will allow ample time for questions because I love to hear and discuss with you.

Dr. Pelcovitz: Okay, so I'm going to start by describing a young man that I used to work with who I started seeing when he was on medical leave from his sophomore year of college. His name is Josh. He's 19 years old. And he struggled with anxiety since his early adolescence, particularly in social situations with his peers. Since he started college, his anxiety worsened. He felt anxious frequently because the campus he felt was full of potential opportunities to feel embarrassed or rejected. And he said he was particularly anxious in his large lecture classes where he was worried constantly that he would be called on spontaneously to answer questions that he didn't have answers to.

Dr. Pelcovitz: He did attend parties but after he actually asked a young woman out in front of his friends and he was rejected, he started to get very anxious when he was at parties and he spent all of his time either drinking heavily so that he wouldn't have to experience his anxiety or just standing in the corner on his phone. And eventually he stopped going to parties all together. Pretty soon he was avoiding classes too and he was really not interacting with his peers. He refused to leave his dorm room for days at a time and he was eventually forced to take a leave because his academic functioning was so heavily impacted by this.

Dr. Pelcovitz: Josh's story is really not uncommon. Anxiety disorders are the most common psychiatric diagnoses in the country, and I'll talk a little bit more about that in a minute. Anxiety can be natural and normal. It's a normal part of our experience of life. It's actually very important. You need anxiety in order to function. But it's when it leads to the kind of functional impairment that I just described Josh was experiencing is when it becomes a disorder and when it's something that we need to focus on.

Dr. Pelcovitz: Anxiety disorders often start young. They can be chronic, and they can really impact people's developmental trajectory. So how people sort of progress through development. It can result in an accumulated impairment and also is associated with a lot of co-occurring conditions. The lifetime prevalence of mental health disorders overall is 50%, but about half of them emerge by age 14 and 75% of them emerge by age 24.

- Dr. Pelcovitz: So that means that young adults and teens are really at this very critical period in their lives where a lot of mental illness can be emerging, and they can be experiencing a lot of new symptoms for the first time. This also means that anyone who will experience an anxiety disorder at some point in their life, will likely have first started to experience symptoms in youth. And as you can see, the median age of onset for anxiety disorders is 11, but many other disorders also emerge in the preteen, teen, and young adult age range. So this is a very risky time and can be a very difficult time for youth.
- Dr. Pelcovitz: Lifetime prevalence of social anxiety disorder in particular is 8.6% and it most commonly emerges more a little bit older, so in the teenage years. Social anxiety disorder is associated with a lot of functional impairment. It's including the risk for depression. There's a really high risk for substance use in this population, and there's also generally a failure to meet important academic, social, and occupational milestones for youth with social anxiety disorder. And this is when it goes untreated, but also sometimes when it is treated.
- Dr. Pelcovitz: So the good news is that we do have treatments that work. So the child/adolescent anxiety multimodal study or CAMS studied the treatment of children and adolescents with anxiety disorders, and it studied two different components of treatment: cognitive behavioral therapy or CBT and selective serotonin reuptake inhibitors medication and SSRI. So I'll describe. CBT is basically a psychotherapeutic intervention that focuses on developing coping skills, sort of focused on thoughts, feelings, and behaviors associated with any mental health challenges that someone might experience.
- Dr. Pelcovitz: In anxiety the active ingredient of CBT is exposure therapy. And I'm going to talk more about what exposure therapy actually is a little bit later. But wait, as you can see what CAMS found is that a combination of CBT and an SSRI is very effective. 81% of participants in their study responded. But as you also can see, with the frontline gold standard psychotherapeutic treatment, CBT alone, 40% of youth didn't respond, and even those that did respond, adolescents in particular were showing a less robust response to exposure, which as I mentioned is the kind of active ingredient of CBT.
- Dr. Pelcovitz: And if you also look at the long-term follow-up, so this is a very important study in our field, and this long-term follow-up found something that was pretty troubling, which was that even with this gold standard treatment and even with those high response rate, a significant number of patients didn't ... ended up experiencing relapse. So upon follow-up, they found that almost half of acute responders ended up relapsing. And this was actually a particular problem for patients with social anxiety disorder.

- Dr. Pelcovitz: So what we need to do is to come to understand what are the mechanisms of response to cognitive behavioral therapy and why are some people not responding. And to do that we actually can turn to the animal literature. So we want to see what can we learn from mice about treating humans, and particularly adolescents.
- Dr. Pelcovitz: I'm going to be sharing some of the literature from one of my mentors, Dr. Francis Lee. His lab has done a tremendous amount of work in using animal literature and animal research to help us understand human learning. I'll just sort of briefly describe that this is not my research. And there are certainly people in the audience that understand this better than I do, but I'll explain it as well as I can.
- Dr. Pelcovitz: The lab looked at fear acquisition and extinction in both mice and non anxious humans across the age span, using the principles of Pavlovian learning. Fear extinction learning paradigm was implemented whereby a non-threatening cue, which was a tone, was paired with an aversive stimulus, which I believe was a shock. So they paired a kind of neutral sound with a shock to the mice, and a fear response was learned. So the mice learned to respond to the tone as the same way that they would respond to the shock. And then that fear response was extinguished by presenting the neutral cue repeatedly without an aversive stimulus.
- Dr. Pelcovitz: And what you can see here in these charts is that adolescent mice and humans both show significantly attenuated fear extinction. So adolescents extinguished their fear of a conditioned stimulus less effectively than children and adults. You can see that the children learn not to be afraid of that tone, and the adults learn not to be afraid of that tone. But the adolescents are not learning quite as robustly. This is believed to be due to the lack of synaptic plasticity in the prefrontal cortex, which is also implicated in fear learning. Again, like I said, there are people in the audience that certainly understand this better than I do so I'll leave it to you to potentially ask any questions, and I'm going to talk a little bit about contextual extinction learning.
- Dr. Pelcovitz: So the difference was mitigated when fear extinction happens in the context in which the fear was acquired. So when the tone was presented to the mice in the cage where they originally acquired that fear, then that difference in extinction learning is gone. So adolescents learn the same way as adult and child mice when the fear extinction happens in the familiar context where the fear memories were acquired. And while this might not seem like it is so relevant to what we have been talking about, what we really learned here is that context really matters, particularly for adolescent mice and also we believe for adolescent humans.
- Dr. Pelcovitz: This is relevant to a human clinical population, because as I mentioned earlier, the most important component of CBT for anxiety is exposure therapy, and it's based on the principles of fear extinction learning. Individuals are repeatedly put in anxiety

provoking situations until those situations are experienced as safe. And then fear response and arousal are reduced over time.

- Dr. Pelcovitz: So given the mass literature it seems that realistic contextual exposures are particularly important for anxious adolescents, meaning that in exposure therapy we would do something like if somebody was afraid of dogs, we would repeatedly expose them to, of course we would probably start with a picture of a dog and then we would escalate to a video and then we would walk past the dog on the sidewalk and then we would walk past the animal shelter or go in and interact with the dog that's in a cage. And we would have opportunities to realistically expose them to the thing that they're afraid of. And with this repeated, gradual exposure, they would come to extinguish that fear.
- Dr. Pelcovitz: We also could do that with a contamination phobia. So we can expose the patient to the bathroom in our office. We can expose them to the garbage can. There are lots of different contaminants that we can expose patients to in an office. But with social anxiety, fear contexts are much more difficult to realistically replicate. I can ask the patient to suspend disbelief and pretend that I am playing the role of a peer while engaging in small talk, but they have to really sort of again suspend that disbelief. We can't gather their peers into a therapy office. We can ask them to do exposures at home, but we can't actually in an office replicate the realistic contexts that we need and that we're learning from the animal literature is very important.
- Dr. Pelcovitz: This is where virtual reality comes in. First, I'll just describe for those of you that don't know what virtual reality is. It's a computer-generated simulation using three-dimensional images and video. It uses special electronic equipment in the case of my study and most virtual reality. Now it's usually a headset, so it sort of looks like goggles, and most importantly, it's immersive. So you sort of lose track of where you are in real life and you really feel like you are in the context that's being presented to you in the virtual reality. And it's used for a whole host of things, among them gaming and entertainment, it's used in training of pilots, it's used in military training, it's used in architecture for sort of rendering different buildings I guess, and it's used in medical education. And then in psychiatry there are a lot of different ... in psychiatry and medicine there are a lot of different ways that it's been used.
- Dr. Pelcovitz: Virtual reality has actually been used psychiatrically for over 20 years now, and there have been a lot of interesting findings. I'm going to talk a little bit about findings in the adults, in adult literature, but what I'm more interested in is the way that virtual reality has been used in youth. So in, like I said, in adults it has been used in both acute and in long-term pain management. It's been used to facilitate physical therapy. It's been used to manage anxiety during procedures. And most importantly or relevantly here, it's been used for a variety of anxiety disorders and PTSD, and that has been applied in the context of exposure therapy as I described before. So used virtual environment as realistic and immersive context for exposure.

And as I mentioned, it has been studied in adults, but it hasn't really been as well studied in youth.

- Dr. Pelcovitz: In youth there have been applications in medical settings. There's a pretty robust literature on management of pain using distraction and managing procedural anxiety in medical settings. So when somebody is anxious about going in for, about to have a blood draw or something like that, then VR can be used for distraction or managing that anxiety. There's a recent study of using mindfulness to sort of distract and relax someone before going when they're sitting in the emergency room. Again, pain distraction during procedures for patients with burns or wounds.
- Dr. Pelcovitz: In psychiatric settings it's been used in autism spectrum disorder and it's also been used to sort of manage aggression, particularly in youth with psychosis. And then in non clinical settings it's been used to train emotion regulation and anxiety management. But we do have a lot more to learn about the clinical applications of VR particularly in youth and particularly for exposure. It has been used in exposure, but there the literature just has a long way to go in terms of whether or not we can really effectively use virtual reality for exposure therapy in youth.
- Dr. Pelcovitz: So before we go on to talking about the specifics of the pilot study that I'm doing, I just wanted to talk a little bit about safety considerations. Some people before the webinar actually asked about this. The three main things that people talk about is cybersickness, which is similar to motion sickness, the risk of falling, and there's an extremely low risk of seizures, which actually hasn't really been replicated in the literature. It's in all the safety manuals for the commercially used virtual reality headset, but I haven't really seen much in the literature about any evidence of seizures.
- Dr. Pelcovitz: Cybersickness is something that has become less and less of an issue as the technology has advanced. So just the developments in the quality of the hardware and also in the quality of the software has sort of eliminated the major issues with motion sickness in VR. But in research and particularly in my study, the way that we have addressed some of these safety considerations is by excluding individuals with history of severe motion sickness and just in case a history of seizures.
- Dr. Pelcovitz: And then, as far as the risk of falling, we have the patients usually just sitting still while they're in VR. The reason that there's a risk of falling is actually fairly obvious, it's there's a headset on their face, so they can't see around them. And if somebody's going to be moving around, then they might not see if there's something in front of them. They might bump into something. They might trip over something.

- Dr. Pelcovitz: In our study the patient who is in VR is obviously being very carefully monitored. There's somebody in the room with them. And we also, again, have the patient sitting down throughout the duration of their time in the VR or standing up but in one place. We also don't have them moving around the virtual environment very much, which is something that would contribute to cybersickness. So we try to manage those safety considerations that way.
- Dr. Pelcovitz: I'm going to outline how virtual reality exposure therapy is being applied to social anxiety in youth in my pilot study that's being funded by the BBRF. But first I want to lay out a model of social anxiety disorder that explains how its maintained in the absence of treatment and how CBT can address that.
- Dr. Pelcovitz: We'll talk about Josh. Let's say Josh walks into a party and he sees a young woman his age that he doesn't know. Immediately he misinterprets a neutral look on her face as disgust or rejection and his heart begins to race and he recalls the incident from a few months ago where he was rejected when asking a young woman out at a party. His instinct is to avoid. So he immediately goes into the corner of the room. He begins playing the game on his phone and he feels calmer because he no longer has to interact with his peers. But he also has no opportunity to extinguish his fear. He has no opportunity for corrective learning experience.
- Dr. Pelcovitz: So CBT would address this by the patient being encouraged to engage in gradual exposure. For example, he would start by being encouraged to make eye contact with the female peer or initiating a conversation with someone that he already knows or initiating conversation with an unfamiliar male peer or something like that. And then with repeated trials over time he would eventually experience fear extinction. And the current study addresses this, the kind of critical components of this model.
- Dr. Pelcovitz: We assess extinction learning using a computer task whereby neutral shapes on a screen are paired with an aversive stimulus, which is a puff of air. And then we assess arousal associated with fear using a psychophysiological assessment. So we're looking at fear indicators including galvanic skin response, heart rate, and heart rate variability.
- Dr. Pelcovitz: And then, after we've done this assessment, it's followed by 10 sessions weekly of cognitive behavioral therapy plus VR. And that includes teaching varied coping skills. So we teach relaxation and mindfulness skills. We teach cognitive restructuring and cognitive coping. And we also teach assertiveness skills. And this is, as I mentioned earlier, patients with substance use with ... I'm sorry, with social anxiety disorder are particularly at risk for developing substance use disorders. And one of the reasons that we hypothesize that that's the case is because of their difficulty asserting themselves.

- Dr. Pelcovitz: They also are using substances as a form of avoidance, but they also have a difficulty asserting themselves in social situation. So we actually teach them assertiveness skills, and then we give them the opportunity to practice all of the skills that I just mentioned in virtual reality. And then we also obviously as I've sort of built to this whole time, we're using exposure in the virtual environments. They have opportunity, like I said, to both rehearse the skills in that environment and to engage in exposure in that environment. And then after that we reassess fear learning and arousal to see whether or not that extinction learning that we predicted did happen.
- Dr. Pelcovitz: I'll talk a little bit about the specifics of what happens in the study. We start with a clinical assessment. The clinical assessment establishes a psychiatric diagnosis. So it's a semi-structured clinical interview where we just assess anxiety, depression, and self-report measures of, again, anxiety, depression, and functional impairment. And this is to establish whether or not they have primary social anxiety disorder.
- Dr. Pelcovitz: Then they undergo this extinction learning task whereby, as I mentioned earlier, neutral shapes are paired with an aversive stimulus, which is a puff of air. And then they also undergo the psychophysiological assessment where we assess whether or not they're ... how their body is responding to this fear learning.
- Dr. Pelcovitz: At this point the 12 age-matched healthy controls are done with the study. And we include those people because we wanted a comparison point for the arousal and extinction learning. So they just engage in that first study visit and then they are no longer participating in the study. After the assessment visit, the 12 participants with social anxiety engage in 10 weekly sessions of CBT plus VR, and they repeat the assessment, the same assessment, initial assessment after a treatment and then at three months follow-up. I'll talk a little bit more about what is happening in each study visit.
- Dr. Pelcovitz: The first study visit is basically just the participants getting to know the kind of model of the study ... Sorry, each therapy visit getting to know the model of the study. Then they come to learn the model of CBT, why we believe that CBT is effective. We familiarize them with being in VR so they get to play a game in virtual reality. They actually get to use Google Earth, which I highly recommend. It's very cool. You can visit anywhere in the world virtually in this immersive context, which is very, very cool. Then they learn about what opportunities for exposure the VR can offer. And what we are presenting them with, and I'll show you some clips after this, we're presenting them with opportunities to engage in exposure and skills rehearsal in a party and also in a sort of like public speaking environment that looks a little bit like a lecture hall.

- Dr. Pelcovitz: We then have the participants rate how anxiety-provoking different tasks that they would do within each of those environments would be. And we have them sort of create what we call an exposure hierarchy, which is basically a map that we will use to decide how we're going to have them engage in gradual exposure to get them to the point that they are able to engage in their most difficult exposure tasks without feeling the need to engage in avoidance.
- Dr. Pelcovitz: Then in subsequent sessions, like I mentioned, we teach them a variety of skills. We start by teaching mindfulness and relaxation and grounding strategies. Then we teach them cognitive restructuring and about different cognitive distortions. People with anxiety disorders have a tendency to sort of jump to the most negative ways to interpret the world. They have a tendency to sort of overestimate the likelihood of that something terrible is going to happen. And we teach them about becoming aware of those thoughts and also about engaging in cognitive restructuring skill, which will help them to challenge that thought and come up with a more accurate coping thought.
- Dr. Pelcovitz: We teach them about, as I mentioned, assertiveness skills, so what assertiveness is how, they might apply it in a variety of situations that are realistic in their lives and also how they would apply it particularly in the situations where they were offered substances and they wanted to say no.
- Dr. Pelcovitz: And then after we're done teaching all those skills, we engage them in several sessions of only exposure. Each session is an hour long, and we have participants participate in ranging from two to seven exposure exercises per visit. As I mentioned, they will engage in the exposure in these environments and then they also will repeat each exercise with skills rehearsal.
- Dr. Pelcovitz: So first, they'll go into a conversation and experience that fear learning that we talked about. And then they'll repeat that conversation but they'll be prompted to practice their deep breathing skill while they're doing it, or they'll be prompted to beforehand come up with a coping thought using their cognitive restructuring skill.
- Dr. Pelcovitz: Like I said, the purpose here is to give them an opportunity to engage in exposure in a realistic context, but also give them an opportunity to practice skills in a realistic context. Because coping skills, while we can teach them in a therapy room and encourage participants or patients to practice them in their real lives, we don't really know how effectively they're actually practicing them, and this gives us an opportunity to watch live them applying these skills and how that affects their ability to use the skill and how that affects their ability to sort of internalize and apply the skill in real life.

- Dr. Pelcovitz: Okay, I think I mentioned that we after the end of the CBT plus VR sessions, we have a post treatment and three-month follow-up assessment, which is a repeat of our first visit.
- Dr. Pelcovitz: Okay, so now I'm going to show you a clip of the party. This is the, just sort of a little bit of a run-through of the party environment. And I want you to imagine that you're the participant that I described earlier, that you're Josh engaging in this environment.
- Video: Hey. Come on in. I'm Marcia. What's your name? Nice to meet you. Make yourself at home.
- Dr. Pelcovitz: Okay, I think I'm back. So as you can see, that provides ample opportunity for exposure and for rehearsal of skills.
- Dr. Pelcovitz: Here is a still shot of the public speaking environment. What it doesn't include is the avatars. So there are usually people inside this environment. It actually really does look a little different, but this was the picture that was on the website. And basically we use this environment as an opportunity for participants to practice what they might have to do in a college class or in a high school class, presenting to a room full of people or maybe being rejected or being laughed at while presenting to a room full of people. Again, another opportunity for exposure and also for skills rehearsal.
- Dr. Pelcovitz: And then here we have another video. I have to apologize. The audio quality on this video is pretty terrible because it's actually a recording of a computer screen. So you can see that the screen is split. This is what the computer screen looks like when a participant is in virtual reality. And it's because they are seeing two different, there's two different sets of images that they'll be exposed to while they're inside the VR headset.
- Dr. Pelcovitz: I also have to apologize for the quality of the acting. The voice that you hear in this clip is the voice of the avatar, and then the patient that you're hearing is actually me pretending to be a socially anxious participant. And I'm not a very good actress. Hopefully you'll be able to hear this pretty well. We'll give this a shot.
- Video: Hey again.
- Video: Hey, how are you?
- Video: I'm good.
- Video: So what's going on?

- Video: Oh well, I've just been catching up with some friends. Did you meet anyone fun?
- Video: Not really.
- Video: I'm thinking of jumping in the pool. Want to come?
- Video: I don't have my bathing suit here.
- Video: Oh don't let that stop you.
- Video: No, I think I'm going to pass.
- Video: Let's go.
- Dr. Pelcovitz: Okay. So Despite the audio quality I hope you could hear a sort of typical example of what you would hear, what an exposure would be like. That was a friendly one. We actually because of the nature of the environment that we're using, we actually used voice actors to dub the voices of the avatars, which is why you might have noticed that the syncing between the voice and the avatar speaking wasn't perfect.
- Dr. Pelcovitz: We have a bunch of different options for the kinds of conversations that people have in the VR. That like I said was a friendly one, but we have some pretty rude ones, and we have some very ... conversations that are very heavy on the peer pressure. So peer pressure to drink or do drugs, peer pressure to engage in maybe sexual contact that the participant might not want to. Again, this is an opportunity for exposure and also for rehearsal of those assertiveness skills that we believe are really important for youth with social anxiety disorder to develop.
- Dr. Pelcovitz: Even though as you can tell the quality isn't perfect, we've had some very good qualitative feedback initially from our participants. Unfortunately the study is ongoing so I can't share any of the hard data that we have so far, but what I can share is some quotes from participants I've had. Participants say, "I can't believe how real this feels." One participant said, "The situations are way more realistic than I expected." Somebody at the end of treatment said, "Overall the VR helps me face my fears and get used to uncomfortable situations in real life that happened to me." And that was actually a patient who has never been to a party in real life and she was able to use this as a platform to sort of practice a bunch of different things, sort of the exposure and also basic social skills for small talk and just sort of walking through a party and being surrounded by her peers in that way.
- Dr. Pelcovitz: So let's talk about what's next. And I see that we have a lot of time for questions, which is great. I really do want to hear from you. The next step, assuming that we establish that this is feasible, which is really the purpose of this pilot study, is to

establish efficacy and effectiveness, so to establish that we know that CBT plus VR is actually doing what we think it's doing and is actually going to treat social anxiety either in an equivalent way to traditional CBT or maybe even potentially exceed the benefit of traditional CBT for adolescents, and maybe close the gap that we saw in the CAMS study that I mentioned earlier.

Dr. Pelcovitz: And that effectiveness would be, okay, that's great that we know that it works, but does it really realistically work in a real clinic environment, which I know some of you before the study had asked whether this could be used in a ... sorry, before the webinar, asked whether this could be used in a clinic now and some ... There are clinicians that do use VR, but it's not quite as widespread as we want it to be. And I think that, furthering the research will help that.

Dr. Pelcovitz: We also want to come to understand the neurobiological mechanisms, what's going on in VR and what's going on in VR that potentially is closing that gap for adolescents in fear learning. So we hope that potentially if we are able to take the study to the next step that we'll be able to understand what's going on in the brains of these participants, if the VR is actually helping.

Dr. Pelcovitz: And then for VR research in the future, I hope that this is one way that we can take quality care out of the psychiatric clinic and into other settings, potentially including the home. So one of the biggest issues with CBT is that while, like I said earlier, there are potentially some people who aren't responding, but even though there are 60% of people responding to CBT and this is the frontline treatment, there are a lot of people who don't have access to CBT unfortunately. There are lots of CBT clinicians where I am in New York City, but I'm sure that there are people who I'm speaking to right now who would have a very hard time finding affordable cognitive behavioral therapy or evidence-based therapy or specialists in anxiety.

Dr. Pelcovitz: Access is a crisis frankly in mental health treatment in this country right now, and I'm hopeful that as the virtual reality technology has developed and become more accessible, so virtual reality is now much more affordable than it used to be and there are developments in very affordable options for VR, that potentially could mean that we could deliver these treatments outside of a clinic setting, which would mean improving access to these really important treatments for people who really need them.

Dr. Pelcovitz: Before I go on to take-home, to that take-home messages, I just want to acknowledge all the people that have helped me with this up to this point. So most importantly I want to thank the Brain and Behavior Research Foundation and their donors for their generous support and for their support of my career and the career of many other early career investigators. I particularly on this list want to point out my NARSAD Young Investigator Grant mentors and collaborator Shannon Bennett,

JoAnn Difede, Francis Lee and John Walkup without whom I would not be here right now. And I'm again, very grateful to all of you for listening and for your interest in this, what I think is important work.

- Dr. Pelcovitz: And then just to talk about some take-home messages. So as I hope I've covered, anxiety disorders are pervasive in youth and it's a huge issue that could have long-term consequences and lead to significant functional impairment and potentially comorbidities and could really impact people, young people in a very troubling way.
- Dr. Pelcovitz: Current treatment, particularly exposure therapy, needs some kind of augmentation. It works but it doesn't work for everyone, it doesn't work for everyone for as long as we want it to, and we need to figure out a way to close the gap.
- Dr. Pelcovitz: Exposure therapy and coping skills training in youth might be enhanced in more realistic contexts as we learned from Dr. Lee's work from the research in mice, and VR could be the key and has already improved treatment in other domains and other populations. So we're hopeful that this is actually something that would help.
- Dr. Pelcovitz: If integrating VR into CBT is feasible and acceptable, future directions could include understanding neurobiology of treatment response in youth and improving accessibility to quality mental health care.
- Dr. Pelcovitz: And with that 20 minutes for questions Dr. Borenstein. I know that you're moderating the question portion.
- Dr. Borenstein: Yes. Thank you very, very much for really an excellent presentation, explaining what you've been doing and why you're doing it, and what it potentially will mean for people.
- Dr. Borenstein: I want to just have you speak a little bit about really the importance of this issue, of anxiety in youth. Because in many ways our field hasn't focused on that until recently. In terms of patients that you see, people that come to you, what are the type of issues that they bring up? What brings them to the office seeking treatment?
- Dr. Pelcovitz: Mm-hmm (affirmative), that's a great question. The three most common anxiety disorders that I deal with as a child and adolescent psychologist is social anxiety disorder, generalized anxiety disorder, and separation anxiety disorder. Social anxiety I think I've explained and that snapshot of Josh is a good example and actually for confidentiality reasons is more of an amalgam of a bunch of patients. He does represent a lot of the kind of older adolescents and young adults that I see.

- Dr. Pelcovitz: Generalized anxiety disorder is a disorder that's marked by pervasive worries about a variety of different issues. A lot of the kids that I have coming in are worrying a lot about their academic performance, they're worrying a lot about their future. And to many of you, you might hear that and think, "Yeah, who doesn't," especially in New York City is this sort of a baseline, is worrying about in eighth grade where am I going to go to college. So this is not an unusual thing. But as I mentioned at the beginning of the talk, the way that we can tell the difference between someone who has sort of a normal range of anxiety within the normative range, not something to be concerned about, is the absence of functional impairment.
- Dr. Pelcovitz: And people with generalized anxiety disorder have associated functional impairment that's getting in the way. They're working three times as long on their homework as their peers because they need to get it perfect. They're worrying about what college they're going to go to in fourth grade. They're thinking about ... They're saying up at night not able to fall asleep because they're so worried. And GAD, generalized anxiety disorder is often associated with a lot of physical symptoms while patients are worrying. So they might feel GI distress, so they feel nauseous, or they might feel sweaty and jittery. And that also can really impact sleep and it could just be very distressing for patients.
- Dr. Pelcovitz: And then, separation anxiety disorder is something that does affect ... It's one of the most common presenting problems for young kids, but it also can continue to impact patients as they get a little bit older. And that is what it sounds like. So it's worry about separating from their attachment figures or their guardians or somebody that they consider to be safe. Something that people don't realize is it's not always having a tantrum when they get dropped off at school, but it sometimes can look like following a parent around their apartment because they can't be in a room alone. A lot of times kids that are very afraid of the dark are kids that have separation anxiety. People who are totally fine when they're at school but are really worried when their parents leave them alone at home, or they're worrying not just about their parents' safety but also about their own safety in the absence of their parents. So that's another one that we see a lot.
- Dr. Borenstein: Excellent examples and important for people to hear because if someone themselves is experiencing this or if a parent sees this in their child, that would be a reason to seek help, that it really is affecting their functioning.
- Dr. Pelcovitz: Exactly.
- Dr. Borenstein: The example that you used with Josh is an amalgam, a combination of people. Often the transition of going to college is a significant stressor for a young person. I'd like you to speak a little bit about what parents should know as they're thinking about their child going to college.

- Dr. Pelcovitz: Mm-hmm (affirmative), that's a great question. I could talk for hours about what parents should know about their kids going to college because that transition can often be a trigger for symptoms that were previously unnoticed.
- Dr. Pelcovitz: So like I mentioned earlier, people who have anxiety disorders often have had them all along, or they had them since they were young children but they weren't necessarily kind of at the forefront because they were able to function well. Also, often kids who are anxious have parents who love them very much and want to help them, and that means the parents are providing a tremendous amount of support in allowing their kids to function anxiously in the world, and it doesn't actually impact their functioning.
- Dr. Pelcovitz: So as I mentioned earlier, it's very important to be looking out for functional impairment. But if parents are intervening with their kids and they're now allowing their kids to really experience that anxiety, then we never get to see that functional impairment. And that means, it doesn't necessarily mean that there's not an anxiety disorder. It might mean that the anxiety disorder is being covered up by what we call parental accommodation. And parental accommodation comes from love. It always does. It comes from not wanting your child to experience distress and not wanting your child to fail.
- Dr. Pelcovitz: The reason that the transition into college becomes so difficult is because parents who are accommodating a child's anxiety aren't going to be there with their kids. So they're not going to be able to rescue them, they're not going to be able to sort of help them to overcome the avoidance that's associated with their anxiety disorder anymore.
- Dr. Pelcovitz: A parent might call a high school teacher and say he wasn't able to finish this because he was so anxious and so perfectionistic that he couldn't finish his assignment, but they're not going to call a college professor, or they will, which is a separate issue. But what parents should be thinking about in thinking about the transition into college is as early as possible, having their child be independent in their own coping and independent in their own sort of functioning, especially academically, because taking out all of that support that they might have had up until that point all at once is part of what leads to that crack ... youth coming crashing down.
- Dr. Borenstein: I think your point is extremely, extremely important, which is the parental accommodation is obviously well intentioned, comes out of love, with the idea of the best interest for the child. But if a parent is finding that they're doing that, that it makes sense for them to seek help for themselves and their child so that they could fine-tune what they're doing to really allow the child to be able to develop an

ability to manage their anxiety in a healthy way that allows them to then move forward with their lives.

- Dr. Pelcovitz: Exactly. Exactly. And I mean if you're thinking about this early, then it really is just about figuring out a gradual way to phase out your own support. So if you are a parent of a fourth grader who is sitting with your child during homework time every single day, which is very ... is appropriate and some children need that, but if you're in that situation but you believe that your child probably could finish their homework on their own, then starting to phase yourself out early so that you know that they have the ability to independently complete their homework by the time they're 18. So really sort of preventing the problem before it becomes a problem is one way to think about it.
- Dr. Borenstein: One of the areas that I know you've been working on and certainly Dr. Francis Lee and the team at the NewYork-Presbyterian Youth Anxiety Center have been working on relates to how the brain in young people is developing and that the developing brain can bring about potentially challenges for the young person, but on the other hand opens up real opportunities for getting better, that the brain is still able to change. I'd like you to speak a little bit about that plasticity of the brain in teenagers, obviously children, but teenagers and young adults.
- Dr. Pelcovitz: Mm-hmm (affirmative). So I can talk about it from the clinical side. Like I said, I'm not a neurobiologist. But yeah, I mean, one of the reasons that I love working with children and adolescents is because just again anecdotally and sort of clinically is their availability for learning. And that is borne out in the literature. Dr. Lee's research showing that the plasticity of the brain in these different phases sort of allows for learning in a different way. And part of that, like I said, comes just behaviorally we see.
- Dr. Pelcovitz: Adults are stuck in their ways. Adults don't necessarily want to take the opportunity to learn or rather they just have many more years of practice engaging in these avoidant coping patterns. Whereas kids just have a little bit less time having done that. And they also sort of are more available, like I said, for learning, both behaviorally and neurobiologically.
- Dr. Pelcovitz: And the way that that plays out is that we do see especially in children, like I said, we do see a tremendous benefit of cognitive behavioral therapy in these kids because they're so ready to learn the coping skills and to engage in exposure. And that's not to say that every kid or every adolescent is going to be available in that way. But certainly as a general group children are that way.
- Dr. Pelcovitz: Adolescents and young adults because of what we talked about with Dr. Lee's animal research, it's a little bit less. The plasticity is not present in the same way in

terms of just the fear learning. The way that fear memories are stored is just slightly different in adolescents. And so that means that they are not extinguishing their fear in the same way. So exposure isn't really happening. But then ... or exposure is helping but it's not helping in quite the same way.

- Dr. Pelcovitz: But as I said in kind of clinically speaking, I do see that plasticity and the fact that the brain isn't really fully developed until well after what we consider the teenage years, has made working, doing CBT with adolescents and young adults feel a little bit more productive than I might expect it to feel in adults. But again, I can't speak to the neurobiology of this.
- Dr. Borenstein: Right. I think you gave a very good explanation and from a clinical standpoint. It was a great thing to show the video because it gives a sense of what the person sees and hears. When you're in the room with them when they're doing this, what exactly happens? The person sits in the chair and then he's encouraged to respond to the video? How does ... Sort of run by what it would be like if we were watching this happen for a person.
- Dr. Pelcovitz: Sure. I did want to post a video, but I wasn't ... of an actual session, but I wasn't able to get the approval to do it because of again confidentiality reasons. So basically what I would do ... we would, as I mentioned, in the first session we establish our exposure hierarchy. So we've already sort of run through most of the potential scenarios that they would run into in the virtual environment. And it's not specifics. It's more what would it be like to have confrontational conversation with one of the male guests? How would you rate that on a scale of zero to 10? A participant at the beginning might say that would be an eight. But as the treatment progresses, we notice that those ... We actually have them re-rate their hierarchy every session, and we notice that those numbers start to go down as the skills and the exposure, the fear learning generalizes a little bit, we see that there they shift how they're describing their anxiety a little bit.
- Dr. Pelcovitz: So what starts out at an eight out of 10 but by session five or six they're saying that it's more like a four. So I would have them go. I would say, "Okay, so we're going to have this confrontational conversation with a male guest." They sit in the chair in front of the VR equipment. They put the headset on. I actually have them put on an extra pair of headphones because that's where the audio from the voice actors comes from. And then I basically say, "This avatar is going to start a conversation with you, and you respond to them. You have the conversation with them."
- Dr. Pelcovitz: We talk a little bit about what they're worried about, what they think is going to happen. Then they have the confrontational conversation. And then they come out of the VR and we talk about did the thing that you were afraid of actually happen, how did your anxiety sort of shift throughout. We have them draw what we call a

brave wave, which is actually just sort of tracking of how their distress levels changed throughout the exposure experience.

Dr. Pelcovitz: And then, as I said earlier, we have them repeat that exposure but using one of their coping skills. And it's not an exposure then. When they're using their coping skills, it's not an exposure, but it is an opportunity for skills rehearsal. So they're rehearsing, let's say in that situation they might have done a little bit of cognitive restructuring exercise beforehand. They might have identified a coping thought. Recently I had somebody identify the coping thought, "I'm probably not going to see this guy after this party anyway." So that was their coping thought and they went into the conversation and practiced using that coping thought to sort of navigate the anxiety that they're feeling during that confrontational conversation. Does that explain it?

Dr. Borenstein: Yeah, very, very, very helpful. It gives much really good sense. And are you able to tailor the videos to the individual needs of each person? So if somebody is afraid of, the example you gave of a boy asking a girl for a date, or somebody's afraid of being peer pressured into doing something they otherwise didn't want to do. Are you able to then tailor it so that you're sort of delving into the specific area that's of concern to that individual?

Dr. Pelcovitz: Mm-hmm (affirmative). So we have a lot of options within these environments, but they're finite. And that's something that I'm hoping speaking about next steps and sort of the future of VR research, as software development becomes more accessible to more people, then the hope is that we could develop environments that can be infinitely tailored to different patients so that we can really specific, I mean maybe even change an avatar to look like the girl that rejected them or something like that, or have avatars that actually using artificial intelligence engage with the participant in the genuine way.

Dr. Pelcovitz: As far as I know, the technology is not there yet. Or actually I do know that AI, artificial intelligence is not actually integrated into VR in a meaningful way yet, I don't believe. But they ... So right now what we have to do is sort of deal with what we have in front of us, which is like I said, a bunch of different conversation options that are hopefully going to be relevant to the person's anxiety.

Dr. Pelcovitz: I can tell you anecdotally, again, I can't speak to actual results, but I did have a participant who just this wasn't relevant to. The party environment just wasn't something that felt relevant to her life particularly. But she still reported experiencing the fear learning that we talked about, the experience of being in that uncomfortable situation, experiencing the anxiety of being in that situation, and then the habituation and reduced arousal over time.

- Dr. Pelcovitz: So even though we weren't able to tailor the environment perfectly and it wasn't so realistic to the things that she was struggling with, she still experienced some reported anecdotal benefit from it.
- Dr. Borenstein: Well, I have a feeling that over time many people will benefit from this. I think it's wonderful that you are really making use of new technology to help our field in developing new and better ways to help young people. So I just want to thank you Michelle for the work that you're doing and for sharing that with us today. And I'm looking forward to hearing more about it as the results come in. So thank you very, very much.
- Dr. Pelcovitz: Thank you so much for an interesting discussion and for having me. And I hope that everyone enjoyed.
- Dr. Borenstein: I certainly did, and I'll speak to everyone saying that I believe they did too.
- Dr. Pelcovitz: Thank you.
- Dr. Borenstein: And as an aside. You're certainly a better psychologist, researcher, and clinician than actress, but your acting really was pretty good as well, so.
- Dr. Pelcovitz: Thank you. Thank you. I've had [inaudible 00:59:37]. Thank you.
- Dr. Borenstein: I also want to thank everybody who joined us today. All of the research we fund is made possible through private donations. **So please consider making a gift by visiting bbrfoundation.org, or call us at 1-800-829-8289.** This webinar has been recorded. If you've missed any portion of this presentation, or would like to share it with family or friends, please visit the events and webinar page on our website.
- Dr. Borenstein: I hope you'll join us again next month when Dr. Cynthia Bulik, Distinguished Professor of Eating Disorders in the Department of Psychiatry at the University of North Carolina at Chapel Hill School of Medicine, Professor of Nutrition at the Gillings School of Global Public Health, and Founding Director of the UNC Center of Excellence for Eating Disorders will present [Changing the Way the World Thinks about Eating Disorders](#). This will take place on **Tuesday December 10th at 2:00 PM** Eastern Time. Once again thank you for joining us. Have a nice day. Take care.

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