

Skill-Building in Virtual Reality: A Talk with Patrick Bordnick

Patrick Bordnick: Patrick Bordnick, Dean and Professor of the Tulane School of Social Work, New Orleans, Louisiana. My current work is focusing on the use of accessible and portable virtual reality to be used in health and behavioral health settings ranging from substance misuse, psychosocial education of both patients and their families, as well as training future social workers to utilize technology including virtual reality not only to educate patients and their families about the various mental health disorders, but also to utilize them during treatment sessions to provide coping skills, training, or awareness activities to patients and their families.

Grace Gregory: Fantastic. So what is your personal disciplinary background, your academic background, and how would you describe your kind of unique intersecting disciplines and interests that have brought you to this work, because it's quite specific.

Patrick: So I have a degree in psychology, social work, and public health, and I've worked in a variety of settings from inpatient hospitals to behavioral neuroscience labs, as well as collaborating with community based clinics as well as private therapists, and I really sort of come from a traditional research background in mental health and substance abuse. And what I learned was, where I started off way back when... we were studying cocaine craving during my PhD dissertation, and really trying to understand – we would bring people into the research lab and show them drug paraphernalia or pictures of people using, and we would monitor their heart rate, their skin conductance, which is a measure of stress or reactivity, and then we'd also ask them what their level of craving was for the drug.

I did that for many years reliably, but it always struck me as odd the places where we were doing this, something seemed to be missing... We were in a laboratory office or a clinical office, and we were showing people bottles of alcohol or drug paraphernalia during this study to assess craving and then also to look for ways to either decrease craving or medications in some instances to stop craving.

And I kept thinking – it just bothered me – *something's not right*. And then I realized one day the context was off. So, where are people going to normally experience the drug paraphernalia, what we call them as “drug cues”, these proximal drug cues such as cigarettes, alcohol, cocaine, crack pipe, you can imagine heroin, those types of things. They're not going to really experience them or be exposed to them in a clinical, sterile laboratory setting or in an office setting; they're going to be in their environment, whether it's a neighborhood, whether it's a convenience store, whether it's a heroin shooting gallery. So I really kept thinking, *we're missing a part of this puzzle in the lab*. I started thinking, *how could we bring the context or the environment into the laboratory setting as well as the clinical setting to better understand not only exposure to the drug proximal cues themselves, the objects which we call them, being a crack pipe, a joint, or a pack of cigarettes, but also the context where people are using these substances, a party setting, a sports bar, home alone, a convenience store, wherever you can imagine the various settings?*

We really explored how do we do this, and this was about 15 to 20 years ago, so there wasn't a lot of options other than people were building, researchers were building sort of staged bars in laboratory settings. They were trying to really create a physical environment, which was okay, but it really still offered the same limitations, you only had one setting. And so, I literally stumbled upon virtual reality when it was very... not too many folks were using it 15/18 years ago, the military, some folks in medicine, and then there was a company that was using it to study anxiety disorders such as fears and phobia, fear of planes, fear of heights, very, very cubed type environment, not very realistic, but they were seeing initial response.

And so I literally contacted a company and said, "Hey, is there a possibility of creating a party environment and putting people into that setting?" That's generally how it went. There's a little more to the story, but that's literally how it went, and we started off. And back then the avatars were very cartoonish. And so again, we want to recreate

the real world, and you're not going to have a cartoon character offer you a beer or a joint. That's just not... it breaks this idea of how we're trying to recreate the real world, with the ultimate goal of understanding craving and relapse and what goes into that, as well as how do we then treat someone to prepare them for when they go off into these realistic settings.

And so we literally would film – I mean, we were just sort of piecing things together because the technology didn't exist then – we would film live actors pretending to drink alcohol or roll a joint or something in green screen, and then we'd take that and put that into a computer graphics bar setting so we could at least get realistic people. And it actually worked pretty well; we wrote several grants and showed that people responded to these virtual environments with craving as we would anticipate, just like we had seen in the lab, but now we were not only providing the proximal cues – the objects themselves – but now we were able to provide the context and now create what we call sort of a complex environment that involved not only the objects people use but also the social context, the environment.

And we actually showed the people responding to these environments, and so that sort of led to the start of the research of using virtual reality to where we're at today.

Grace: Wow, and you must be so excited about the current state of the technology. Obviously it has advanced exponentially since then.

Patrick: Yeah, I think even in the early days, the equipment was really expensive. Some of the head-mounted displays or HMDs that you see nowadays, we had those ranging in my lab anywhere from \$5,000 up to \$65,000, run off of multiple computers with very expensive graphics cards. A lot of the graphics cards to run these environments properly would cost \$2,000/\$3,000 at the time and it wasn't very amenable to going into a clinical setting or a hospital or community-based clinic just for the cost alone. It wasn't very practical.

So early on it was always sort of one of my goals and dreams: how do we get the technology to the point where the equipment is affordable enough and the environments are realistic enough that we can have these in every community based clinic, a clinician that wants to use this whether they're in a hospital setting or a local community clinic can have access to the environment and the equipment for a few hundred dollars. That was the ultimate goal, but way back then that was an impossible dream because the technology didn't exist.

Grace: Sure, yeah.

Patrick: Even the resolution and everything that people were working on in the displays... I remember that a lot of the things you see nowadays this just didn't exist, and we almost take it for granted that I was walking in a ... I don't know if I can use the name, but a national convenience store recently a pharmacy and on the shelf they had a virtual reality viewer that you put your cell phone in for like \$15.99.

Again, that's how mainstream things are when you can just walk into the corner store and here they have a virtual reality viewer that you put your cell phone in. And I actually bought it because I was intrigued, and I actually ran a couple of demo things, some of the free environments, and they were actually pretty good. So again, you can see where we've come technology wise. I think the biggest lag right now is content, especially in health and behavioral health and content that's based on evidence based practices, therapies and principles. That's really the lag right now.

Grace: Yes, Yes. That's where your research comes in. So fifteen/twenty years ago when you were first bringing together virtual reality and studying addiction were you aware of anybody else doing that or were you sort of going out on your own and trying that without any other guidance or predecessors?

Patrick: Yeah, it was one of those unique times when people are either going to regard your work as really cutting edge in there or they're going to sort of look at it and say, "What in the world is he thinking or doing?" Honestly because, again, virtual reality when we see it now, everyone's like, "Oh yeah. Now imagine 15 years ago. I remember the funniest thing when I called up the virtual reality company, and literally, I cold called this company that was doing the anxiety disorders work, and I spoke with the CEO, and I said, "I saw your work online. I'm in substance abuse research," and he paused for a minute, and he said, "I've been waiting for a call like this for the past five years since we started doing this in anxiety."

And he said, "I couldn't find anyone," and I can't remember the words he used... if it was "out there enough" or "that would think this would make sense, exposing people to drug triggers in a virtual environment," and I kind of laughed, I knew what he was trying to infer. And I said, "Well, actually we've been doing this in social work and psychology and neuroscience for years – we bring people in to a lab, and we expose them to paraphernalia and ask them their craving, ask them if they're wanting to use. I mean, this is something we've been doing in years. The virtual reality thing is brand new. I said the principle of it is I see this even back then saying, I'm interested in understanding craving and relapse, but I'm more interested in empowering patients and therapists to bring these high risk situations realistic to expose the patients in a safe clinical setting, teaching them the skills and empowering them, so when they practice in a virtual bar in the clinic that's real with the therapist, they then when they encounter that situation in the real world are going to be more apt to recall those skills because they practiced their skills in a realistic environment, so when they're in that bar or party setting they can recall those skills. I said, "This makes total sense, based on the literature, based on evidence based practices," we're really taking the role plays to another level where we can now bring in the real world.

I based everything that I did on scientific principles and everything, even the studies we did were all based on traditional lab studies except using virtual reality versus the traditional cue reactivity paradigm that was done. So a lot of that just took time, where now if you submit substance abuse or any art of using virtual reality, it's almost accepted. It's not something totally novel at this point.

Grace: Yeah. Going back a little bit, just to sort of clarify because you said role playing at one point. I was sort of understanding this work or I guess you could say this modality as like role playing combined with exposure therapy and then just to the max with this added element of virtual reality.

Patrick: To give you the better analogy, so traditionally if you look at substance abuse or substance misuse treatment, you do relapse prevention, and some of the evidence-based interventions are relapse prevention and coping skills training. So a big part of that is coming in and having someone recognize what are the things that trigger their craving, what has led to relapse, and understanding what things, whether it's stress, whether it's seeing other people use, whether it's being in a stressful situation, whether it's being home alone, whether it's... I mean, all these things to understand what are sort of the triggers and then try to work with that patient or individual to teach them skills to empower them to cope with those situations and not relapse.

So a classic example could be, let's say someone says *when I go to a party environment, even driving up to somebody's driveway I know there's going to be cigarettes and beer and liquor in there. I'm already starting to feel in the pit of my stomach a dread and anxiety because I know that these things are going to make me crave, and I'm afraid I'm going to relapse.* Well, how do we empower that individual and give them a set of skills because their default behavior would be go to the party, they have these reactions or reactivity, and then quite possibly they end up using. That's sort of been their default behavior because that's what they've learned.

How do we not only understand what's driving that relapse behavior but also put them in a virtual bar or even driving up to the car outside of the party environment and helping them think, "Okay, here we're in the car. How are you feeling now?" Then say, "Okay, you're craving. Let's practice riding out or urge surfing," which is a term we use, to see. Let's let see, that craving, eventually it's going to subside. How do you make it through without using? How do we practice various skills, assertiveness, some self-talk, talking to yourself that you can go to this situation without relapsing, you can practice breathing, you can practice avoiding the cues, you can practice assertiveness skills. So if you go up to the host of the party and they say, "Hey, there's beer in the other room," or "Hey, can I get you a Scotch or something?", you then feel empowered because you practiced in this environment already to say, "No, I don't drink anymore. Do you have bottled water?" or "Do you have a soda?" or something like that.

So it's really, real skill based, and usually how we've done that before is role playing. So you're sitting in a clinical office setting, you say, "Well, let's pretend we're driving up to the party," or "Let's pretend we're at the party," or "You're home alone." Well, we're asking that patient to suspend their critical judgment because they're in a clinical office setting with Dr. Bordnick or another therapist. I'm not their friend. I'm not at a party with them, but we're trying to teach them skills so they can be prepared when they're in these environments.

What virtual reality allows us to do is bring these realistic environments into the safe clinical space with the therapist, and the therapist is with them the whole time. They're seeing what the patient's seeing in the virtual party and can coach and give them skills, and they can practice over and over again in these realistic environments in the virtual world.

Grace: That's kind of why... because of course, the issue like you mentioned is relapse. Somebody can go to a traditional inpatient program or rehab facility, and they can feel good about their prospects while they're in that facility or in that program, and then once they leave, of course, then all the old triggers are coming back. Would you say that's what makes this a more viable intervention in the long term?

Patrick: Well, it's an interesting thing. I get asked a lot about people that are incarcerated or people that are in inpatient treatment, and we did a study many years ago when I was in Houston where we looked at folks that were drug craving for cocaine inpatient while they're an inpatient, and we showed that it got significantly lowered while they were an inpatient, and literally after discharge it significantly increased. That kind of attests to this fact that you're isolated away from the neighborhood, everything that's triggering you.

That's not to say in jail or in treatment clinics there isn't drugs there, I mean, that would be naïve to say that. But, again, you're not around all of the traditional drug triggers or cues as we call them. So when you come out, how are you prepared? Because you're going to be in the old environment, you're going to see the same people, you're going to drive by the place maybe where you used to drink or at your house or whatever. So I see virtual reality being able to help bridge and prepare people that are in these settings, these inpatient settings, to now practice in this safe clinical space with their therapist so when they come out and are exposed to these settings, they're going to be better prepared.

Grace: Will you just list ... I know you listed a couple of the skills, but I'm just curious to hear a bit more specifically about the skills that you teach within this VR context.

Patrick: I think some of it is an awareness. That's an important thing is looking at awareness. Some people do not realize, they just take it for granted, that a smoker seeing another smoker would trigger a craving. Right? We just assume that. Well it was very interesting early on when we did the virtual reality studies, when we did some studies with smokers or people that depended on alcohol and other substances, they would go through and we would debrief after the study with them and say, "Can you tell us what you experienced?" And a lot of folks would tell us, "I

couldn't believe how much seeing, another smoker or someone drink or seeing that pack of cigarettes or seeing a crack pipe sitting on the table in there, really made me want to use."

For the casual observer or someone on the outside would go, "Well, yeah, of course it would." Right? Not thinking. But again, if you are using... these things are around you all the time, so you're not seeing them as something unique and different. They're just a part of your behavior and your environment that you've created and you've surrounded yourself with. Those things are always there. So it's very interesting when you're working with someone in recovery and you put them in these environments. They then start to acknowledge and understand the things in the environment including the smell, including the social interaction, the stress, the objects themselves, so they can help better understand what may trigger a relapse situation for them. So virtual reality is allowing us to also work with patients to understand, so they better get a handle on what's triggering their relapse situations, and they get more of a self-awareness too.

Grace: Yes, that's-

Patrick: That may or may not make sense, but it's very interesting that someone becomes self-aware because it is always there in their environment, if that makes sense.

Grace: It definitely does, and it just, to me, illuminates how empowering this is because... you've mentioned that already, but it really does give the person the tools to be able to steer the course of their own recovery or their own use, and they can have this awareness that they didn't have before, and they can just have that new point of view, whereas a lot of traditional recovery, addiction and recovery contexts it's, "Oh, you're powerless over this addiction, and blah, blah, blah," but this is really... This feels like a lot more of an empowering way to go about it.

Patrick: Yeah, I mean if you think about it, how... not only do you become self-aware of what is triggering and potentially leading to relapse – you know it could be something as subtle as anxiety.

Grace: Right.

Patrick: Or maybe stress. I mean, one of the most common things that people talk about that lead to relapse or triggers a relapse is stress. Well when you think about stress, it can be to various things. It could be stress at your job. It could be a stress in a relationship. It could be financial stress. It could be anxiety. It could be maybe a behavioral health or a mental health related stress condition, so a variety of things. So helping the person, number one, become self-aware and empowered, but then also how do you or I navigate a party situation going through right now? Right? Normally if you drink and you go to a party, you know there's going to be alcohol there. You know there's going to be people drinking. There's going to be people talking, people doing whatever.

Now imagine, you're trying to stop drinking. That party has a whole different meaning or whole different points that may trigger you to want to drink again. So not only understanding in that party the things that may make you trigger, may not always lead to relapse, but it's going to cause some anxiety or craving for the drug or alcohol. And now we can have you go through there – that realistic environment – in a safe clinical setting with your therapist, and not only identify those situations or triggers, but also then teach you skills so that when you are... Like I talked about, assertiveness. If somebody would come up to you at the party and offers you a "Hey, why aren't you drinking? You usually drink Scotch." I mean, your normal reaction was, you always drank Scotch or you always drank beer. Of course, you always used.

How are you now going to refrain that conversation to be comfortable enough to either say, "Hey, I don't want to drink," or maybe you want to say, "I don't drink anymore. I quit." It really depends on where that person is, but even empowering someone with something as simple as that - that it may seem - is very difficult because you've never thought of yourself as being in recovery or never had to have that conversation, or peer pressure. How do you handle the peer pressure if your friend says, "Oh, man, you don't need to quit. You don't have a problem." Those are things the therapist can put you in that environment, subject you to that peer pressure, and then give you the skills and teach you how to navigate that situation so you'll get better with practice.

Or even, when you see somebody drinking and you get a craving, you get this feeling like butterflies in the pit of your stomach, your heart starts to race, you're wanting that drink. How do you now practice self-talk to talk to yourself about what that's meaning for you to ride out that craving until it subsides, to feel empowered that that craving's not going to lead you to relapse? Those are all things you can process because now we can bring that high risk relapse situation into the safe clinical setting.

Grace: Wow. Yeah, that's just remarkable. This idea of being able to practice is crucial.

Patrick: And the thing that I like about the work that we're doing is... it's just like hearing your response, "Oh that totally makes sense." That's the beauty of this. It's the most simplistic sort of solution to a very complex problem. Well, we've been trying to do role plays for years, and therapists are good at it, but we just haven't been able to bring these real-world situations into the clinical setting - the technology didn't exist. Well, now we can do this to help prepare our patients so when they're in these situations in the real world, they're more empowered. And it's all based on evidence-based treatments. It's relapse prevention and coping skills training, which has been researched in the literature.

VR is not a treatment itself. It's a tool that you use as a trained therapist to work with your patient, and now the next iteration would be, okay, you practiced this environment during the session, if the equipment is low enough cost, the patient can then take that environment home and practice throughout their week in between sessions to get more skill, to manage that environment, to keep practicing.

Grace: That would be ... I mean, I assume that's the goal, to be able to make this accessible to people... Will you just talk about, outside of substance abuse the other skill building contexts that you either are in process of or hope to bring this tool of virtual reality into?

Patrick: Yeah, we're looking at a couple of different things. One thing that was very interesting and just sort of happened through serendipity, my youngest daughter who is now 12 years of age, she has autism spectrum disorder, severe ADHD, and so socially, she struggles, especially with peers. She has a hard time; if there's a group of kids, she usually doesn't interact, she'll be on the outside of that group, and you can see her struggling to try to understand how to fit into the group.

So one day she was in my lab, and we had one of the party virtual environments. And you can actually... these environments are so detailed that you can just have everybody in the party drinking soda or water so people aren't using drugs or alcohol. Well, she said, "Can I go in and see that environment?" So we put her in the environment. And it was very interesting as I was sitting there, I was watching her kind of walk up to people, almost like testing it out, walking up to people in the virtual world, not saying anything, but just kind of walking up. And it sort of sounds cliché, but this light bulb goes off in my head: *I wonder if could design a social environment that she could practice to develop social skills that would improve her quality of life and how to interact with her peers.*

Imagine a virtual classroom or a virtual school yard or playground where she would be able to go and her therapist could teach her skills on how to approach a group of kids. How do you walk up to them? How do you join in on the conversation? How do you get over that awkwardness that she's feeling, or anxiety? That was one of the things. So that's another area that we're exploring is using virtual reality in these social situations to teach adults and children with autism spectrum disorder social skills to improve their quality of life.

Grace: Wow. That's incredible. That's really, really incredible.

Patrick: Another great example. I'll give you another simple thing.

Grace: Yeah, please.

Patrick: So, my same daughter, going to the doctor was extremely stressful for her, and my wife and I, getting injections or having procedures done. We literally would have to hold her down because she'd have to get the procedure. So on a recent visit in the last six months, I had a Google cardboard sitting in my car, and I said, we're going to do this, so I literally downloaded a free app, a virtual reality app off the shelf, and said, "Okay, do you remember this from the environment?" She put on Google cardboard, I held her hand, and they were able to draw nine tubes of blood. She didn't need to be held down. She was nervous, but didn't even feel the needle go in. And then she had an overnight hospital stay, and we took in a Google daydream headset with us, and she was able to get through all of those procedures with less stress, less anxiety, and more comfort.

So even something as simple as that in a parent that may have a child with autism spectrum disorder really understands the stress that the child and the parents and the family go through, let alone the medical professionals. Literally that was a game changer. That just shows you the impact that virtual reality can make, even on something that may seem very small, but for a parent with a child with autism spectrum disorder this is a huge game changer... or any child with social or anxiety or fear of the doctors or injections. This is a very simple thing that doctors and nurses can incorporate, which will make their practice less stressful as well as for the family and patients. And then adults too.

Grace: Yeah, exactly. So many ideas popped into my head. I mean, I have a friend with borderline and she's always practicing DBT and I could see how this would be totally effective for her in managing emotional responses. There just seems like there's an infinite array of possibilities of ways to bring this into that skill building context. It seems infinite to me.

Patrick: Imagine changing how we educate future social workers. So social workers are providing the majority of assessments in therapy around the world. We're the frontline practitioners. Now imagine us training the next generation of social workers to use virtual reality to provide what we call psychosocial education, so information about the disorder or syndrome to the patient, *as well as the family*. Traditionally, you sit in an office and it's sort of academic lecture. Sometimes people hear it. We all go to the doctor, and the doctor tells us a bunch of things, and then you go home and say, "I don't remember what he or she said." Right?

Imagine being in an immersive environment where someone is talking to you about depression or about borderline, schizophrenia, eating disorders, anxiety disorders, and running you through everything from what's going on in your body to your cognition, to your environment, that is in understandable terms so you come away with that being more empowered as a family member on how to support your loved one as well as the patient has a better understanding of what's going on.

Again, it's training future therapists as well to help educate patients and families using these technologies. That's one of the things I'm really excited about as well.

Grace: And you said earlier it's really the content, right? That's kind of what's missing is the settings and the actual virtual reality spaces and the apps I guess you would say. That's what's missing?

Patrick: I think the big thing is evidence-based applications. You can go up on Google Play store, Apple, and find virtual roller coasters, virtual nature adventure, virtual beaches. You can find a lot of these things, but when you really look for evidence-based tools for clinicians to utilize in substance misuse or doing psychosocial education, we're really going to start seeing a lot of that come out because a lot of it doesn't really exist right now that's out there.

Grace: Who do you need to get on board to make that happen – to create more of these environments like you've been creating?

Patrick: Oh, I think it's getting companies to embrace. Right now we have this interesting... and people are starting to come together. You've got a lot of companies that are developing great equipment, great headsets. I think when academic researchers join with these companies to develop the content, especially for health and behavioral health application, I think we're going to see huge strides. I think if we all start working together, the Googles, the Oculus, the HTC Vive folks and going beyond just the equipment and creating great partnerships to develop meaningful apps based on evidence based research, for health and behavioral health, I think we're going to see great things happen.

Grace: Amazing. Wow. Thank you so much for talking to me.