eGames Case Study: ReMission

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[Erin Edgerton] Thank you for joining me for this edition of Health Marketing and Interactive Media. I'm your host, Erin Edgerton. Today I'm talking with Steve Cole. Dr. Cole is responsible for HopeLab's research programs and evaluates the effectiveness of their interventions. He received his Ph.D. in Psychology from Stanford University and his BA, with the highest honors, in Psychology from the University of California, Santa Barbara. He was a Postdoctoral Fellow at UCLA where he is now an Associate Professor of Medicine, in addition to being HopeLab's VP of Research. Welcome, Steve.

[Dr. Cole] Thank you.

[Erin Edgerton] Let's start by having a description of HopeLab. What is it and what's the mission?

[Dr. Cole] HopeLab is a non-profit foundation, founded about five years or so ago now, that basically seeks to improve the health and quality of life of young people with chronic illnesses by combining rigorous research with innovative social technology solutions that are aimed to impact health-relevant behavior in young people.

[Erin Edgerton] We recently had Debra Lieberman here, and she mentioned HopeLab with regards to your ReMission video game. Could you tell us a little bit about ReMission?

[Dr. Cole] Yeah, ReMission is essentially a top-of-the-line, standard issue video game. It's got 20 levels of game play in which players pilot a small, microscopic robot through the body, battling cancer cells, bacteria, checking out symptoms, basically, sort of simulating the inner world of the biology of a cancer patient.

[Erin Edgerton] Why was it important for HopeLab to focus on building ReMission? Why a video game and why cancer?

[Dr. Cole] The ReMission video game really arose as the vision of Pamela Omidyar, who was the woman for whom eBay was founded, and Pam was a graduate student at Stanford and spent all day looking at cells through a microscope and then would come home and watch her husband play video games, and she had this vision, this conception that video games were really powerful tools for behavior change, and she founded HopeLab after eBay came about in an effort to really try to understand how effectively we could use video games for positive behavior change.

[Erin Edgerton] Tell us a little bit about ReMission…how you began building it and how involved the kids were in developing the game.

[Dr. Cole] Well, the kids really played a central role in the development of ReMission, both on the front end, in providing, essentially, critical guidance from our target user population and how

the game should look and play and feel, as well as being the participants in a very ambitious randomized intervention trial that we carried out after the game had already been built to determine what kind of efficacy it had…what kind of impact it was gonna have on critical health-relevant behaviors in the context of adolescents and young adults with cancer.

[Erin Edgerton] And did their input really matter? Were the designers willing to take input from kids on how to design the game?

[Dr. Cole] Yeah, it was really funny, actually. So one of the things that was novel about the ReMission enterprise was, you know, this was really the first major video game that was built specifically with positive, health-relevant behavior change as its key target. So, of course, to build a game like that, you need to have the participation of game experts, you know, game designers and people who have experience in that realm, as well as experts in health behavior, health psychologists, physicians, nurses, those sorts of folks. And there was actually, you know, it was not easy to get these two differing parties to agree on what the game should look like, how it should play in order to cause positive behavior change. So our ultimate referees were the kids themselves. We'd have these fights about, you know, should the cancer cells look like real cancer cells look, or should they look like ferocious monsters? And so we'd go to the kids and say, "What should it be? Should it be a dull white cell crowding out its neighbors?" the realistic portrayal of cancer, "or should it be a nasty, evil, you know, monster devouring everything in sight?" And the kids said, you know, "Definitely a monster. That's what it feels like. That's the reality of cancer to me."

[Erin Edgerton] You mentioned that this is one of the first examples of building a game around health communication. Could you talk a little bit more about how you built health communication theory and techniques into the game play?

[Dr. Cole] Sure. We took a process that we call "rationally engineered game design," and it was really inspired by what's called "rational drug development." So these days, when we build a drug for cancer, we don't just randomly try out a bunch of different chemicals until we find something that slows down the growth of malignant cells. What we do is we understand the pathogenesis of cancer at the molecular level and then we design a customized molecule that we believe will focally interact with that disease-relevant biology. So, we took that as an inspiration for building the ReMission game and we asked, "What kinds of behaviors influence health outcomes in the context of cancer?" And then, "What kinds of psychological processes shape those behavioral patterns?" And then we built the ReMission video game specifically to engage those psychological processes so that people who had cancer could kind of understand, basically, the relationship between their own behavior as a whole human being and what was going on inside their body, so they could really understand the impact of behavior at its biological level, inside them.

[Erin Edgerton] Can you give us some examples, in the game, about how that was represented?

[Dr. Cole] Sure. Here's a key example: So, we had a series of particular behavioral targets that we knew from the research literature were issues for kids with cancer. For example, adolescents with cancer have a propensity to slack off on adherence to their prescribed medication regimens,

particularly when their symptoms abate. So, we had adherence to long-term chemotherapy regimens as a key behavioral target that we thought would be supportive for health outcomes in this age group. So, one of the reasons that kids might slack off from adherence to their prescribed medication regimens is because they believe, on some level, that they are cured. After their symptoms have gone away, they don't really feel like they're sick anymore, and they really want to be better, and everybody else is telling them they're getting better, so it's easy for them to feel like, you know, they're really through the worst of it and it's not so important that they take *every single one* of their prescribed chemotherapy doses. What they don't understand is that, inside their body, there are still lurking, potentially at least, a few residual cancer cells, and if we don't kill off every last one of them, that cancer is gonna grow back and take 'em out. So what we really wanted to do is help kids understand the difference between the world that they would experience, you know, when they inhabit their own body, and what's actually going on inside. So that's what we would portray in the game, and we would show them, for example, we'd send the players on a mission where it was their job to hunt down a few residual cancer cells inside the body of a patient who was in ReMission right now. They'd been treated, their symptoms had gone away, they were largely better. But it turns out that when you're flying your little microscopic robot, Roxy, around in the body of this cancer patient, you can still see, "Oh yeah, there are a few residual tumor cells here" and, "Look, they're dividing right before my eyes!" Well, when you're a player in a video game, what you want to do is hunt those things down and kill 'em; that's what you're all about. So, if the body that you're flying around inside is the body of a person who's slacked off on one of their chemotherapy doses, then we construct the game play so that that really hits the player where, you know, where it hurts. So, for instance, every fifth or sixth shot of their chemoblaster might miss-fire…allowing the cancer cells to get away, and that creates, in a very subtle way, this connection between the adherence of a person to a prescribed medication regimen and it's actual biological impact in controlling the growth of residual cancer cells in the body.

[Erin Edgerton] And so you are, in essence, trying to communicate very complicated biological processes to children. How did you evaluate the game to see if you were effective, and how did you determine what measures of success you would be looking for?

[Dr. Cole] We used that same analogy of rational drug design when we were thinking about rational behavioral interventions like this one. So we said, "Okay, if we believe that behaviors like symptom reporting or adherence to chemotherapy regimens are the behavioral road to positive biological health outcomes, let's assess those, and let's do that in the context of the same kind of rigorous experimental trial that we use to test new drugs for cancer. So we carried out an ambitious, multi-site, randomized intervention trial in which 374 adolescents and young adults received a personal computer that contained either a control, commercial video game, or the same control commercial video game, plus ReMission. And we measured a variety of psychological, behavioral, and health characteristics at baseline, right before they received the computer, and then again, one and three months later. And what we found over that three month follow-up, is the kids who are randomized to the ReMission group showed significantly better acquisition of cancer-related knowledge, a faster growth of self-efficacy, or their subjective ability to beat cancer, as well as indications from technical measures of medication adherence. So, for example, we had electronic monitors on their prescription bottles that told us when they took their antibiotics. And we also measured chemotherapy metabolite in the blood of these

patients, and what we found is that the kids who were randomized to the ReMission group actually showed higher levels of chemotherapy metabolites in their blood over time and higher utilization of their prescribed antibiotics.

[Erin Edgerton] I'd like to focus in on the self-efficacy piece because that's something that we talk about a lot in health communication marketing. Could you expand on how you think the game increased their self-efficacy and, overall, what affect that had on their compliance to their treatment regimen?

[Dr. Cole] That's a great question. One of the things that we're really interested in right now is deconstructing the ReMission experience and understanding what elements of game-play really impacted the behavioral outcomes that we care about. So, for instance, I just mentioned that we saw increases in cancer-related knowledge and increases in self-efficacy. It's really the emotional or motivational characteristics that changed over time in lock-step with the behavior, not so much knowledge as the royal path to behavior change, as changes in motivational states, so things like self-efficacy, or belief in your ability to beat cancer really seem to be in the kinds of mechanisms of action study that we're doing now as follow-ups to the clinical trial, seems to be really the active ingredient in the effectiveness of ReMission. So, for example, at this point, we're doing studies where we actually do brain imaging of kids while they're playing the ReMission video game and ask how the experience of playing this video game is different than other kinds of health-messaging strategies we might be giving to them. So, for example, we know that when these kids play ReMission that there's a lot of activity in the limbic system, the part of the brain that governs emotional and motivational processes, and that seems to be a strong correlate of the game's impact on general knowledge and attitudes and motivations in the area of cancer. So that's one example of how we're really trying to understand the way these games work. We think that one of the major ways that interactive entertainment media in general, both games and websites might differ from traditional health communications is in their ability to involve an individual in a way that's really sort of motivating or exciting…that the emotional experience of interacting with people over the web or of kicking cancer's butt in a video game is really how these interventions are different and why they might be more effective in inducing behavior change over a long term.

[Erin Edgerton] And looking back at this experience, can you give us some lessons learned…things that you would pass on to others who are interested in using games to elicit health behavior change?

[Dr. Cole] We've learned a lot from ReMission in terms of just the business model of developing these kinds of things. Most video games are developed purely for entertainment with profit as their ultimate objective and, you know, we were tweaking the video game development model a little bit by asking it to be more about behavior change in a positive, health-relevant way. So there's a lot of challenges at the business side between, you know…involved in basically melding the value systems and talents of game producers with the scientific theories of behavior change that health psychologists and other kinds of, you know, health professionals have. So that's something that required a lot of patience, a lot of iteration, and the one thing that we really learned is that when there's conflict between different perspectives on how a game should be, always go to your customer. They're the ones who know what they really like, they're the ones

who know what's gonna be fun and, I think, you know, one of the things we've learned is if it's fun, the kids'll play it. No matter how good it is, if it isn't fun, the kids won't use it, so fun is important first and foremost. That's what keeps them in the intervention and, after that, to the extent that you can show people things instead of telling them things. In other words, to the extent that the game will teach you basic principles of health behavior and, you know, sort of what its impact is inside the body. Instead of just putting up a bunch of text or having a character, you know, sort of read off a soliloquy about why they should be doing something. That really works. Kids respond really well to participant experience…to sort of living out the contingencies of a world, and they learn really well that way, and that's something that we think is a big opportunity in these kinds of game-based interventions.

[Erin Edgerton] You mentioned the business model. Can you tell us how you are disseminating ReMission, how many copies that you've gotten out around the world, and if there's a charge?

[Dr. Cole] Well, ReMission is available free of charge to kids with cancer; in fact, anybody with cancer. Other people we ask for a minimal donation; but, in fact, if people don't want to give us the donation, we'll still send them ReMission. The way we get it out there, you know, the great thing about these kinds of digital game-based technologies is they're really easily distributed, so we send them out on CDs or DVDs. If people want to order them through the mail, that's great. We can send them out as downloads over the internet, so that's another really effective dissemination strategy and really one of the preferred receipt strategies that young people have these days. And at this point we've, through all three of those modalities, distributed more than 90,000 games world-wide…probably, the majority of them to people who don't have cancer. One of the things…it's interesting about ReMission is because it is one of the first, you know, sort of custom designed games specifically targeting positive behavior change, there's a lot of interest from game developers and health professionals and other people who are just curious about how you would use this kind of an intervention to achieve positive behavior change.

[Erin Edgerton] You touched on this a little bit earlier with your example of showing kids and allowing them to do something rather than telling them something, but I just wanted to really get your opinion on what do you think the elements are about games that make them effective for behavior change?

[Dr. Cole] I think that probably the most important aspect of these games, at least the one that's most distinctive relative to the way we've traditionally tried to influence health-relevant behavior, is the personal involvement, the interactivity. So, for instance, Debra Lieberman, when she was talking about the promise of game-based interventions, probably really stressed the role of interactivity. We unpack interactivity into the experience of an individual as they're playing, and what the interactivity does is it involves you in the experience in a way that prevents you from being sort of a passive, and a half-attentive participant and really makes you an intrinsic participant. So, it's in some sense like we're telling a game player a story, except that they're an actor in the story; they're part of the action. And with the FMRI studies and the other kinds of mechanisms of action studies that we're doing are telling us that that really gets people…that changes their emotional experience, their motivational experience in ways that probably causes the learning process to happen differently. So there's excellent research from neuroscience showing that if a person is motivated and excited and, having essentially, lots of emotional

experience, at the same time, they're learning something, that knowledge sticks harder, it comes back more easily later on, and it's more likely to influence their behavior. We think that what's unique about games is their ability to create that kind of emotional experience and physiologic arousal while it's delivering this kind of very stealthy learning process, so you experience it as just an exciting piece of game-play or an entertaining experience, but this stuff is really, in kind of a stealthy way, getting into your head, and changing the way that you behave outside the game context in the real world.

[Erin Edgerton] So, tell us what's next for HopeLab?

[Dr. Cole] Our overarching ambition is to take this same basic recipe for positive behavior change and apply it to a variety of different disease areas. So, for example, we have a major initiative underway right now to develop new, sort of, game and play-based strategies for increasing physical activity as a way of combating the diseases associated with the growing epidemic of obesity. We also have initiatives underway in the area of sickle cell disease, autism, major depressive disorder, and we're continually scanning the horizon to understand new opportunities, to recognize new opportunities for applying this kind of game-based learning to serious behavioral health issues. So, you know, the overarching perspective we take is that play is serious stuff. This is a major component of the way the human brain works, the way the, you know, sort of the human learning process takes place, and we think it's a great opportunity to take advantage of that basic human capacity in ways that are motivating and fun, in addition to educational.

[Erin Edgerton] We will have links to HopeLab and ReMission on our website, but are there other resources that you could direct public health professionals to if they want more information about using games for behavior change?

[Dr. Cole] Sure. One resource, for example, is to look at our Ruckus Nation Competition which is at www.ruckusnation.com. The Ruckus Nation Initiative is an attempt to outsource the creative process, so one of the things that we learned at HopeLab is that a bunch of 40-year-olds sitting around, wondering about what young kids really are gonna find the most fun…probably not a great recipe for the best solution you can come up with. So what we're doing is we're having a competition where young people throughout the world can send us ideas for new products…new things like games or websites or other kinds of social technology solutions. And we'll essentially be harnessing that incredible collective creative capacity and identifying winning propositions and then building those things out and empirically testing them to see if they'll work before disseminating them. So that's a good business model for how you would meld this kind of traditional product development model with the creativity that the internet really effectively harnesses. Some other great opportunities are the Robert Wood Johnson Foundation who has a collection of contests underway for potential solutions in other areas and is really actively considering how digital gaming and other kinds of social technology solutions interact with human experience to influence health outcomes.

[Erin Edgerton] Excellent. Well thank you very much for joining us today.

[Dr. Cole] My pleasure.

[Erin Edgerton] Thank you for joining me for this edition of Health Marketing and Interactive Media. For more information about this podcast series, please visit the CDC's health marketing website at www.cdc.gov/healthmarketing.

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