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Healthier Together: Social Approaches to Health and Wellness

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>> Okay, good afternoon. All right, I was told I'm supposed to tell a little of my story of how I got here, which is really a story of collaborations with a number of other fabulous people who had complementary expertise, who I learned a lot from in many different fields. I want to, just tell a little bit of advice since I've noticed other people doing that and then I'll get to my main topic which is to talk about Social Nudges for Health Behavior Change. So, a little bit about my story, I got a math undergraduate degree at the University of Michigan. I went to grad school at MIT in Computer Science. While I was there, I started in Artificial Intelligence, I finished in HTI which didn't really exist at the time but I did it anyway. And even during the DHT program, I started making collaborations with people from other fields which was the primary way that I learned the things that I needed to from the, from these other fields. Now the first was in Community Development, from Mel King, I was very interested in technology media and then social participation although we didn't have that name for it. In fact then I, after I decided Artificial Intelligence wasn't really the right thing for me after my masters thesis I went around to nonprofit organizations around Boston and I said, I'm getting a PhD in Computer Science, I'd like to do something good for the world, could you tell me what I could do that would help you that I could get a PhD from? And they all said, well we could use a membership database. And I said, I don't think I can get a PhD for doing that. But, Mel King, actually did have some ideas around connecting people through technology, I ended up thinking about trying to use the technologies that people had in low-income neighborhoods in Boston at that time was touch-tone telephones. And I did my thesis on groupware by telephone, things like event calendars and people in craigslist, but all with this touch-tone and voice recordings. I collaborated with, a guy who was working at one of the phone company labs who actually knew how to conduct experiments and knew how to do--in fact just research on how to make things usable and that was Bob Virzi. And so I ended up, what I got a dissertation for was not the community development stuff but how to make audio interfaces more usable. After I graduated, the first piece of work I did after that was on collaborative filtering and that came out of a collaboration I formed with John Riedl. We actually met at a conference at the CSCW-92 conference. We're inspired by [inaudible] talk there, he knew distributed systems and even though I had a degree in computer science, I didn't really know things like how to make things scalable and things like that, so this was a really helpful collaboration. And this was our paper from 1994, maybe some of you have seen it before. We're the first, the things that launched recommender systems, as a field. A little bit later, I collaborated with a legal scholar, Larry Lessig. Actually this came out of, I had done some technical work, he had stood up at a conference and said it was terrible. And--actually no, he said it was the devil. And so we did the academic thing of sitting down and figuring out what we agreed on and what we didn't agree on, it turned out, you know, a thirty page, Larry [inaudible] article, twenty nine pages were things we agreed on and one page we laid out at the disagreements, yes?

>> May I ask what the work was that you were going to?

>> Oh, it was that work on internet filtering, that's the platform for internet content selection. And probably, I mean, it didn't really get adopted but it got a lot of publicity at first and so it got noticed. I collaborated with a couple of computer scientists over the years, the first, Bob Putnam and very recently Brendan Nyhan, who was the newest assistant professor at Dartmouth now. I don't have results with the work with Brendan yet to report. Well Putnam invited--he, how many of you have heard the book "Bowling Alone?" That was Bob Putnam. He was responsible for making the term Social Capital be known outside of

Academia. And he convened in 1997 a group called the Saguaro Seminar, it's a big engagement, people from a bunch of different areas and their job was, our job was to figure out how to reverse declining civic participation in America. There are a bunch of--that was Bob Putnam on the left there, that's me in the center, somebody else famous in the back there. And what we did was we sat around at about a bunch of meetings, yeah, we're all looking really younger there. And talk about what could happen in politics, what could happen in the arts. I was the technology representative in this group and I was supposed to think of how technology could reverse declining civic participation. So I was supposed to invent--but I didn't. Other collaborators--several collaborators I have had in economics. In long, for the long, longest running collaboration with Richard Zeckhauser, he was actually--remember Alan Craidmun [phonetic] yesterday at Brookings, Richard was Alan's thesis adviser. And so we did a couple of papers won, we did a field trial, an eBay, seeing whether selling items under an identity that has a positive reputation is helpful to the seller, as opposed to a new seller. And so we had the first real confirmation that yes, having a good reputation on eBay does help your set. We also had done some theoretical working including this peer-prediction method, how you can give people incentives to honestly record their subjective opinions about things when you won't ever have a real ground truth, you only have other people's subjective opinions. So, for Kevin, for his, getting people to label things where you don't have a real ground truth. Another economist, Eric Friedman, again to gain theoretic modeling--I did with him around "The Social Cost of Cheap Pseudonyms." If people can keep coming back to internet forms, internet online communities under different IDs, what does that do to the ability of reputations to regulate behavior? In recent years, I've worked with the computer science theorist on how to make recommender systems be resistant to manipulation, when we--in both positive and negative results that is, you can, like to improve, be resistant to a certain kind of manipulation. But you have to throw away a lot of information in order to do that. Starting in about 2003, I started working with social psychologist, Bob Kraut and Sara Kiesler, especially Bob Kraut, we had a big project between economists, computer scientists, and social psychologists across Michigan, Minnesota and Carnegie Mellon. This is one of our team photographs, there's Bob Kraut on the right, Sara Kiesler in the middle, me with some facial hair. But also others you might recognize, Joe Konstan, Lauren Traven [phonetic], John Riedl mostly obscured in the back. There's Yan Chen who was one of my Chinese colleagues. Some of the students on that project, maybe you've gone on to notice. There's Dan Cosley in the back, I know one of Dan's student is here, Moira Burke, who just went off to Facebook. So, that's the thing that Marc Smith was referring to at the beginning of work I've been doing on how to motivate people to contribute to online communities. Out of that project came a book that just came out this spring--have any of you seen this book cover somewhere?

>> That's very good.

>> Jenny says it's very good, I think she even says that on the back cover. And yeah, I hope that it'll show up in courses that you might take. So that's my trajectory and to summarize some of the courses--not everyone will take the same trajectory but here's what I would distill from it. One is to collaborate with complementary experts, don't collaborate with people who were just like you. Bring something--collaborate with people who will bring something different to the table. And then, don't just have them do the thing that you can't do. Learn what they know as you do it with them. I would summarize in the second point is go deep into these fields that you're crossing over into that--you've got a collaborator who can teach it to you. Don't just accept a surface understanding. When they say, you know, I'm doing this equilibrium analysis, the [inaudible] what equilibrium analysis is? I did back in 1997 or something and it turned out to be quite useful to me in many other places. When I collaborated with Bob Virzi in human factors, things and, you know, leaned about the Latin square design was for experiments that turned out to be useful to me in many other settings and, you know, now I can even serve as their--could you tell somebody else about that. So, go deep into these fields that you cross into. But you don't necessarily have to be broad. That's where you can rely on your collaborator to tell you the things that you're missing. I know many of--I can tell from the various comments and the affiliations and many of you who are like this. But learn math and

programming, do one more than you think you can possible stomach in terms of courses in that--in grad school. You will not regret it. It'll keep coming back to help you--you won't get everything you need. I keep learning new stuff in statistics and things through the years but it's a lot easier to get it--that in grad school and that stuff--that's harder to pick up on the slide, from just reading somebody's great book about a theory or something. And the last thing is a few thoughts, basically an encouragement this won't be for everybody. But to think about taking a design perspective and, let me elaborate on that, there's this--this was going around Facebook a little while ago, I liked it so much I think--that if your theory is when know everything but nothing works. Practice is when everything works but no one knows why. In our lab, we combine theory and practice, nothing works and no one knows why [laughter]. But seriously, I do think you can combine theory and practice, there's a little wisdom from Kurt Lewin, two nuggets. One is that there is nothing so practical as a good theory. If you want to actually make a difference, have a theory about why things work and go the other way. If you want to understand something, try to change it. So I would sort of distill that as understanding and changing things go together. And I would encourage you not to decide early in your career that you're going to be one of the people who just observes or you're going to be one of the people who just builds. You got to--you don't have to. But I encourage you to do both. I think there's great power in trying to do both. Okay. So that concludes the background in my generic advice for you as budding scholars. I want to get into the topic domain here which is Social Nudges for Health Behavior Change. And I want to start by just pointing out in terms of national priorities. We have an obesity epidemic. And you probably heard that term, maybe you've seen controversy about what's the studies saying that obesity is contagious. I don't really--I'm not sure that epidemic is quite the word but obesity is on the rise in the United States and there's--it's very costly. It's costly in terms of heart disease, stroke, type II diabetes, shorter lives, lower quality of life. And it's costly in economic terms. An average, this of course has an estimate of 1,429 dollars a year in health care cost per person per year and that's averaged over all people that--so that's a big effect. It is a growing problem in the United States. This is a graph from 1985. This is--by state, the percentage of the population who have a body mass index or BMI of greater than 30. So, to just calibrate that a little bit, that would be somebody who--if they were five feet four, they're about 30 pounds overweight. And you see that it's not equally distributed across the country. My home state of Michigan has no data for that year. Okay. So, we don't know they were doing. But, you know, you've got Ohio with more than 10 percent--oh, sorry, with 10 to 15 percent whereas you've got less than 10 percent in some other states.

>> And nowhere about--

>> What's that? And nowhere more than 15 percent, nowhere that provided data. Well, in 1986, you can see a few more states are providing data, a couple more are turning blue, are turning dark blue here who gets in 1987, 1988, we're filling in, 1989, and some of those that were light blue are now turning dark blue. So this is 1990. Many states are in the 10 to 14 percent range. Shortly after 1991, we start to have an additional color introduced. This is the 15 to 19 percent and my State of Michigan is there. And we start filling in. By 1993, we've got data from almost every state and we've got a lot more dark blues. 1994--it's getting to be more dark blues. Half of the states are over 15 percent by 1995. 1996, oh, we have to introduce another color in 1997 for they're greater than 20 percent. And, Michigan goes into that category in 1998. Almost half of the county is in this new color by 1999. In 2000, even more. We have to have another new color in 2001 for--yeah, do you want me to stop? I can't stop. I got to keep going. [Laughter] 2001, 2002, more states are getting this red color. More and more states by 2004. Oh, we have to have yet another color in 2005 for--for the 25 to 30 percent, okay. And then, we're going to see a bunch of states get that by 2009 but--okay. Well, we do have to stop here. I don't have data after 2010. But--it's probably gotten a lot better than the last couple of years 'cause I started doing the search in this area and it's been really very effective. Yeah.

>> I want to ask [inaudible] about the data. In terms of how it was reported overtime, does that inform how this [inaudible]?

>> Could be. I have not investigated how good this data is. But it's coming from--coming from Center for Disease Control website. So, it's at least not completely made up but it could be that the methodology changed overtime. On the other hand, you're seeing such a continuous change. It's not like it goes like this for a while and then suddenly it switches which would suggest the methodological change. When you see it changing every year, it suggests, it probably is a real thing.

>> Further back to wrap on the medical side, I don't know what single physician [inaudible].

>> Okay. [Laughter]

>> I just want to just comment about graphic. I mean, it's really relatively simple display but boy, does that have an impact.

>> Yeah. Yeah.

>> Bravo.

>> Yeah, it really does. And, from beginning to end, remember, at the beginning, we had some states that were into the 10 to 14 and some less than 10, and then some that we didn't have any data for. And, at the end, there's no state that's less than 15. And--

>> Yeah?

>> Half of them are more than 25. So, big increase. All right. So this is--given the human cause, the economic cause and the problem, then the fact that it's a really growing problem, this would be a reasonable, this would be a reasonable national priority to say, is there something we can do about it? Now, there are lots of reasons why people are obese. Some of them have to do with environmental factors. Some of them have to do with changes and availability of different kinds of foods. Some of them have to do with individual genetics. There's lots of things going on. But there are many people who are trying to control their weight. It's actually a pretty--except for, you know, a few cases where there are genetic things going on. It's really a simple matter of arithmetic. You have to have fewer calories going in than there are getting burned if you want to bring weight down. And, I have chosen to focus on the getting people to be more active part. I got into this through my wife who was a physician and who was already doing some work on this, doing pedometer-based interventions where she gives people pedometers. This one is--the [inaudible] is kind of cute 'cause it's small and has a color on it and it's also nice because when you walk near a computer that has the uploader on it, it does the upload. You don't have to actually take it out and touch a wire. I got interested in how could we super charge the kind of intervention she was doing by adding social elements. So, I'm going to intersperse a little bit of some of the things I've done with her and that are ongoing with some things that I've noticed that are just apps that are out there. Starting last fall I started a blog that chronicles some commercial apps that are out there, some research, some theory. It's called healthier together dot info. The theme of it is where does connection and data from other people help people to be healthier? So I've had a number of collaborators in this research, Caroline Richardson's, my wife who is a physician, Mark Newman and other HTI faculty member at Michigan, Margie Morris at Intel, Erin Krupka who's a behavioral economist at Michigan, and Sean Munson who's a PhD, he's actually a PhD and is on his way off to University of Washington as a faculty member this fall, and Debra Lauterbach who was a masters student and is now at Google. I wanted to start by; I'm going to, as I said I'm going to disperse some of the things that are--my research with just other products that are out there. And let's start by talking about self-tracking. You heard a little bit of reference to it this morning but with the, you know, analysis of when do people want to be tracked and how do you bring values into the design of tracking

systems. How many of you have heard of the quantified self mood? Okay, good. So these are people who are quantifying themselves. Things like how much sleep do they get last night and making grasp of that there's the Zeo product that is a sleep monitor but you can also get the sleep cycle up on your iPhone and various other ways of tracking your sleep. Physical activity I mentioned, here's the things from the Fitbit with this bar graph showing how many steps they walked in different days. Tracking food. This is something--this is an app where people are supposed to--it's called the eatery. You're supposed to take a photo of everything you eat and other people then rate it and tell you how healthy it was. It turns out that looking at other people's pictures and rating it is this somehow a fun activity. People like doing that. So for every--yes, it is in science. For every thing that people post there is like 7 or 8 ratings of it by other people. So it--apparently it's more fun to rate other people's mood than to actually upload yours. I also discovered the Measure Grid after I like, you know, I just downloaded and tested a bunch of these things but many of them I don't continue using, that you're really supposed to take a picture of it before you eat it. And I have this like awful photo of like, you know, chicken carcass after I ate a piece of chicken and everybody gagged it all the way and even though it was pretty healthy because it looks so horrible. Anyway, mood tracking, on the left is an app called moody me and the right is one called when recovering which is part of an app for people who are recovering alcoholics. These are the things where your--you can at various times a day say, I'm happy now or not or on the right, you know, lots of different adjectives you can use but they reduce to good and bad, yellow and red. And when it's red, your support team calls you to make sure that you're not going to have a drink. A bunch of these things have added some form of gamification and there is, you know, lots of offenders out there who are adding something on top where you get some kind of points, you get some kind of badges, maybe you get prizes after you do them. And I want to encourage us to think for a little bit about rather than having these individual activities. What do we get when there's some amount of sharing? And there's three kinds of things that it can help for. One is social support. That is, I'm not alone in this. There are other people who are dealing with the problem I'm dealing with. There are other people who are--who know what I'm going through. There's--can be helpful for decision-making. You get sites like patients like me where people are sharing--here is the vitamins I tried and they did or didn't help with my condition. But I want to focus on a third category which is things that not just help us to be a--the person we wanted to be, but help us to change the behavior that we wanted to change. And I think there is a few ways that other people can help us to do that. One is to make the activity, which might not be so fun to be a little bit more fun. So here's a little bit of data from essentially, corporate wellness program it happens to be at University of Michigan, wellness program that, like they run something where everybody can sign up and you go to a website and input how many minutes of gardening or walking, or swimming, or whatever activity you've done. And you do this for, of course in 8 weeks. And you can either sign up as an individual or you can sign up as part of a team. And that can team can be, you know, all the students that are actually wasn't undergrads. But it can be all the students in your department. It can be your co-workers. It can be, you know, any group of people that gets together. Some people sign up alone, some people sign up in-- [inaudible] teams. It only have a couple of people in them--and other people sign up in bigger teams. And what we're charging here is over the course of 8 weeks. What's the probability that this person enters data in that week? And of course, as you might expect overtime, it goes down a little bit. People are more excited about this program at the beginning than they are at the end. But you can see that, there's four of these lines that are basically distinguishable up at the top. And then, there's the ones down below. The ones at the top are all the big teams, five or more people. The ones at the bottom are the individuals and [inaudible] teams. So just participating in this and you've got no--you don't get to see how much data, or, you know, how many--how much exercise that neither people on your team did. You do get to see some team standings. So there's a little team competition that's going on. And that was perhaps, just the camaraderie of being on a team, seems to be enough to make that difference. [Inaudible Remark] What's that?

>> I was just doing the multiplication--I have, it looks like there's about 60 percent [inaudible] that you do it by yourself, is that--

>> In the first week, and about 30 percent in the last week, something like that. Yeah?

>> So a team of two, if it were independent, then if it's one person, we do that about 60 percent of the time, we spend like--notice the other person.

>> Perhaps, although they get--anyway we don't know the nature of this [inaudible] attacking your caveats later. But there's a selection effect going on as well, that certain people are more likely to join the team. And maybe that the people who are more likely to join the team are more likely to stick with it, rather than the team causing it. So we--this is not on a control of experiment. This is a natural experiment and we can't necessarily be sure about the causation.

>> Were they cell selected or signed?

>> This is all cell-selected. You can join as a team. You can sign up as an individual.

>> So you go to sign [inaudible]?

>> What's that?

>> You don't--

>> These are not assigned. Okay. Another thing--another example of making the behavior social, as a way to make people being more motivated. So taking a walk together generally more fun than taking a walk alone, I picked up an app called--I can't remember what is called here, but it turns it into a little treasure hunt. You walk around, somebody has gone around and made some weight points that say, when you get to that weight point on your phone, it pops up and ask you a question that you can only answer if you're at that spot. Like what's the text above the building or something like that. And that gets you to take a little tour and at least anecdotally from the people who created this app, it's the fact that somebody in your family or one of your friends created the tour, makes it kind of more interesting to be taking the tour. So also, how many of you have ever done Geocaching? Okay, so this is a thing where you go around with your GPS and you find a cache somewhere in Washington DC, that's someone's left, left something there and you have some cryptic clue and you got to go find it using the GPS coordinates. And then, when you find it, you make a little note that you found it, things something online. That's another thing that makes it a little bit social to get out and about. Making the tracking social that is people sign up for some kind of walking program just letting them talk to each other, as part of that program turned out to be something that caused people to stick with the program more, so. Caroline, had been, you know, giving people pedometers, not this one actually. Online pedometers and doing this program where they can go online and see a history of their steps. They get some motivational messaging. Things like that. And we ask the question, would it make a difference if the people who are involved in the study could talk to each other? And so for some of the people, they got this area down at the bottom with basically forums. And here we do have random assignment. So people signup and a small subset of them got no interaction with other with other--with other participants and the rest of them got to be part of the forums. And in fact, we see a pretty big difference in completion rate. And for both groups that they complete, they increase their stat counts quite a bit. Okay, you can take it 66 to 79 percent, I like to flip it and think about what percentage dropped out. 34 percent dropped out from the individual tracking only where there's only 21 percent are dropping out. So it's almost cutting it half, the dropout rate. With pretty, pretty big effect there. All right so those are things about either making the activity itself, something that you do with other people or making the tracking, something that you do with other people. I think other people can also make the activity more rewarding not just through their presence but through what they do. For example, there's an app for

runners, Nike plus I got it on my iPhone. I started running last year. And you can use it, you know, you listen to sounds when you're going and it keeps track of where you run. They also have this feature called cheers. So if you integrate it with Facebook, and when you start running, you say, I'm running now, it makes a post to Facebook saying that you're running. And if one of your friends clicks the like button while you are still running? It interrupts your audio and you hear cheering. Which I thought it was pretty cool. I--probably you don't have enough friends who were interested. I had to go out of my way to tell some--I'm going to be running now could you click the like button while I'm running? So I got--I got to hear, it did not try to say motivational effect of--

>> Spontaneous to hear.

>> Yeah it wasn't quite spontaneous. And of course this--I don't use it anymore because I don't think my Facebook friends want to know every time I'm going running. Maybe they want to know about what I had for breakfast, but regarding running, it's not quite as interesting point. So there's some things that need to be worked out with this model. But I think, you know, there's possibilities therefore, incorrect. Of course it, it may not be real time. I think there's another potential and here, this is a study that we have a design for that we don't have funding for yet. The idea that--is that helping others maybe more motivating than having other people help you. So you see people do the cancer walk or things like that, and you know, they might not have walked 20 miles that day. But they'll walk 20 miles that day because they're raising money for a charity. So we have this design, where there's basically an incentive for meeting your walking goal. But where you're going to vary in the different conditions, some of the people will get a gift card if they meet their walking goal. Other people, their friend will get a gift card if they meet their walking goal. In some people, it will be split between them. This was inspired by a study that [inaudible] did at the MIT business school around trying to do Biowell product recommendations. Where they tested, you can either send a coupon to your friend, or you can send a record--you know, a suggestion to your friend, please buy this product. And when you do, I'll get some money, or some step between. And they got a lot more people to do the referrals when the friend was going to get some money than when the--they themselves were going to get the money. And it was actually most effective when it was split. So I think, I think there's a lot of opportunities that are not yet exploited for motivating people by attaching incentives that don't go to them. But they go to their friends. Another thing that other people can do is create accountability. I think it's the first thing we think off when we think of other people and behavior change. So at the eatery, you take a picture. And other people say, that ice cream maybe wasn't so good, or it was. So feedback from others can create accountability. I mentioned with one recovery where, where your support network actually calls you when you say that you're angry or depressed. How many of you have seen stick.com or heard about it? So this is a something that tries to use financial incentives. Stick as in stick to something and the extra K is a contract. So I took a contract out on myself last November. I have, I have a long-term behavior change problem of not stretching. And it actually, it harms my life. I get pain. I get inability to do things that I would like to be able to do because I'm not flexible enough. But I can't--having been able to get myself to do it. Except I did manage to do it, you'll hear the story, so I signed up. Then they let you take out a contract. I took out a contract. I will stretch six days out of seven, every week for the next 12 weeks. In any week that I don't meet that seven days, make this six out of seven, I have to pay 25 dollars. But 25 dollars wasn't that much. So I figured I'd better turn, turn this cruise here. Anytime I didn't do it I had to pay 25 dollars to support an organization that does political work against gay marriage. I support gay marriage. So I took a contract out of myself and then I did, I mean, I could afford to lose the 25 dollars, I can't afford the psychological feeling. I think that I mean, I think that group really hurts people. So I didn't, didn't want to be in the position of giving the money. I stretched seven days out of seven [inaudible]. And I'm just realizing I need to take out another contract because I'm off to, after that. But the interesting thing is unlike the pedometer which is going to count whether I did my steps or not, I could lie about whether I am, whether I do my stretching and this is actually a problem with these commitment contracts that in advance, I would like to be held to the contract because I wanted to have an incentive effect. But after I failed to meet my

commitment, I kind of want to be let out of the contract 'cause I don't want to actually give the money to the organization that I hate. And so I thought well, I'll solve that problem actually, stickK encourages this. You can designate an external monitor. So, in this case, I--thus gave my wife as the monitor. So she's the one who, who has to report whether I made it or not.

>> You didn't tell her the consequence, right?

>> Well, that was the, that's the, so she actually, you know, that's close enough to me. That she could tell whether I stretched before I came to bed or not but I did tell her the contract and she's, and she said right upfront. I'm never going to report that you didn't do it. So I had to cancel her as the monitor and go back to self-monitoring. So but I do think, I do think that possibility of other people as monitors is a way that we can, we can make these commitment contracts work better because if you find the right person who really understands what the purpose of it and they just say "Look, you know, I'm going to, I'm going to hold you to it because that's what you wanted originally and you know I'm going to do it, so. And so I think we could get other people to do that for us. But I think we can also take the stickK model and think about instead of having financial penalties thinking about having social penalties, and think about social punishment. This is something that we have, we have played around with, then are now about to--we're now designing a controlled experiment that we, that we do have funding for. I'll tell you that in a minute but here's the feature which is I make a commitment for something I'm going to do next week. I'm going to walk at least 40,000 steps or I'm going to, I'm going to meet my daily target at least 5 days, something like that. And when I make the commitment, I authored two messages. One of which will get posted. Either the success message or the failure message will get posted depending on. So--and this is self blackmail, right? So I post to my news feed that I didn't keep my commitment, if I were using this--this is a [inaudible] app with Sean Munson and I wanted to make the suggested text be you know, "I'm a loser," I can't be trusted, something that I really wouldn't want to have posted and he said "Oh, no that's going to be too icky for people, no one will like it. So, we-- But you can author whatever you want. We are suggesting this "darn." And you do that and then it'll post it to Facebook for you. We've actually designed an experiment here. We're still in the design phase. But I want to make a little detour and make an encouragement for those of you who are doing experiments of any--conventional, old-style experiments. If you go to Facebook as an intern for the summer and you're going to have 10 thousand people in your experiment, you don't need to worry about this. But for the rest of us, we're going to have 20, a hundred, 200 people in your experiment. We do not emphasize enough to graduate students the need to do power analysis. And let me--I have become a real--I've sort of said to my students over the years, "It would--you should do one." But then, they wouldn't do it and I wouldn't make them. And this time, I actually did it and found, "Oh my god, our design is not going to work. We do not have enough subjects and we couldn't possibly afford the number of subjects we would need." So, let me explain a little bit about this. So, we're going to run this experiment. We're going to recruit people who are--have BMI over 30 to be participants in this study. We're going to give them pedometers and we're going to assign them into one of four conditions in a two by two design. Some of them are going to make their commitments to the computer and only they're going to see the commitments and they're going to see the results. Some other people are going to have their commitments and the re--and/or the results announced to their Facebook friends and by e-mail to three people that they designate. Now, there's--it turns out there's some theory saying that public commitments are not always a good idea in terms of motivating people. But you would think, you know, I'd make a commitment that I'm going to--I tell you now, for the next three months, I'm going to stretch everyday that that should increase my probability of doing that. But in fact, none of you will be able check up on me and so, it may not be so effective. In fact, there is one set of studies that finds it actually has a negative effect for some kind--in this experiment that people who made a public commitment were less likely to keep the commitment than if they kept their commitment private. The explanation it gives is that once you make the public commitment, you actually get a lot of the social rewards that you were going to get. And you don't have to actually do the activity in order to get those social rewards. So with that, sort of, you can see why that would motivate this design or

you're going to try to see if you have the public accountability for the results, whether that means you now can't get those social benefits unless you carry out your commitment. So, this is our design. This is what's called "A Between Subject's Design." Every subject is in one of the four conditions and we're going to compare between the conditions. And so, those are the--that was the conditions. Our first design was a between subject's design. Each subject is randomly designed--assigned to one of those conditions. They stay in that condition for 14 weeks. And we analyze, do the people in one condition walk more than people in the other conditions. So, I wanted to see whether the--and then, we have a budget for a certain number Fitbits. If we did that design, were we going to have a reasonable chance of getting a statistically significant difference between the groups? And it turns out, running a power analysis by simulation, I always used to think this was--something had to do with closed form-mathematics and only very simple designs, could you do it. And I've recently discovered gosh, running a simulation is really easy, it took less than a hundred lines of code. So, I'm basically going to fake running this experiment. K times, each time having a total of n subjects. And what do I mean by fake it? Well, I assume that there's--that the people who are in the public condition are going to have step counts drawn from one distribution and the people who are in the private condition are have step counts drawn from the other distribution. And, you know, there's some overlap between those distributions. What's the--and then, so I generate fake results that way and see whether with 30 people in each condition, do I get a statistically significant result on this fake experiment? And then, I run that fake experiment a thousand times and I see what percentage of the time does this fake experiment give me a statistically significant result? So, that's power analysis. I'm sure in your statistics class, it was referred to. But how many of you have conducted an experiment before? How many of you did a power analysis before you did the experiment?

>> Sometimes. [Laughter]

>> Sometimes, okay. Well, good for you. I can't say that I always did.

>> There are also websites that'll do it. And he said, for the design you had--

>> Right.

>> --you easily find a website that would--

>> Yeah, that pluggable.

>> It actually turns out probably not for mine because I had to do a mixed model logit, and I don't think they're doing that. But anyway, so yeah, if you have a very standard design, you may be able to do that. If you don't, you can still do it. It turns out not to be that hard. And with our power analysis, we found we were going to--that even if you had 90 subjects per condition, you know, obviously, I'm making some assumptions about how big the effect is. That wasn't going to be enough. I'm covering up a lot of differences here. I'm at--my outcome variable actually wasn't step counts, but how many days you made the target that we gave you? But it turns out that actually, you need a lot of subjects to have decent power in between subjects designs. And this is one of the things that, you know, I'm just reading Daniel Kahneman's book "Thinking, Fast and Slowly" and he's sort of going back through, you know, his history of biases and judgment in the decision-making. And experimental psychologists routinely underestimate how many subjects they need in order to have sufficient statistical power. So, that's--this has caused us to switch to a partially within subjects design where instead of having between subject comparison, we have every subject for a few weeks do a baseline where they don't make any commitment at all. They just--we just see, you know, just see how they walk. And then we're going to compare among the conditions the change from baseline for each individual. So, if you have one individual who's walking a lot more than somebody else, that's going to get washed out because it's the changes that we'll be noticing.

>> You should probably leave a group that has a control and note the commitment to see if people walk more overtime just by himself.

>> We're having a lot of arguments in the group. One of my colleagues wants to do that. I actually don't think that's right. You want to know what he's suggesting with? That he was saying we should have a baseline group that keeps going. That would allow us to tell, whether having any commitment was different from having no commitment. But what we're trying to test is whether having public commitment is different from having private commitment. So, we could talk more. I have been unable to convince my colleague, but I'm pretty certain that this is--that you don't want to do that. I mean, unless you want to--and have some extra subjects and you also want to test the difference between commitments and no commitments. Let me--I know I'm getting near the end here. So now, I did a long detour there about the power analysis. It's on my mind recently so that's partly why. But also, I think it's something that we don't do enough of when we're doing experiments. I want to come back to some of the substance of things. I've been making a case that if we want to help people make behavior changes and for me, it's particularly behavior change about physical activity that we can draw on other people, for accountability, for support, for encouragement, for making the activities fun. But there are some problems. It's not all easy to do this. One is that some of the sharing is embarrassing to people and they don't want to do it. Especially, they don't want to do it on Facebook. And I won't read these, but you can see that especially on Facebook, actually, it turns out that on the SparkPeople, they'll share everything but they don't want to--they're embarrassed to share with their Facebook friends. They're even more worried. And this one was a little surprise to us. They're actually less worried about embarrassing than boring their friends. You know, I don't think everybody wants to know every time I take a run. And, you know, other people probably correctly think that all their friends don't want to know what their daily weight is or how many--what their daily step count is. There are also issues we--I didn't talk very much here about the use of leaderboards in competition, but that's another way that we can get motivation from other people. But not everybody likes those, especially for people who have low self-efficacy for the activity. They're worried that they're not going to be able to do it. They are probably not going to like the prospect of competition. In that study, where I was saying what's the difference between being on a team and not being on a team? People self-selected whether to be on a team. And we found that people who are heavier were less likely to join a team. So, there are some issues to deal with there. There are some interesting studies in economics, that's wherein they found that in--not in this physical activity ceremonies, sort of lab studies, women were less likely to choose to compete than men, even when their abilities were the same. So they had an experimental set up where they created different ability levels and they made it so that they had, you know, it's an audio-visual task, and they made it so that they would have the same ability to complete the task. And women were less likely to choose to compete even when their abilities were the same. They were more likely to choose a non-competitive option where they got piece-rate pay for their work. So, there are gender effects, there may be self-efficacy differences. We need to think carefully about when to introduce the comparisons in competition. The other is that if we're--I haven't talked as much about other people as sources of social support. But they aren't always sources of social support. Sometimes, they are social drags. And I was really struck looking on--there's a diet and exercise site called SparkPeople where people share more anonymously, but share everything, their daily weigh-ins and all kinds of stuff. And they say things like, "I'd much rather share on SparkPeople 'cause the people in my real life aren't supportive." They'll say things like, "Oh, are you counting calories? That won't work. You should do the thing that I did, instead. You should get a pedometer instead. Counting calories will never." So, that's one unhelpful response. Or they sabotage, "Well, come on, it's a birthday party, you can have one piece of cake." Or the seemingly helpful, "Hey, you know, don't be so concerned with your body image. You're fine the way you are. Your husband loves you anyway. Why are you putting yourself through this?" Maybe reasonable, but the person who hasn't heard it doesn't experience it as reasonable. They experience it as unsupportive. Whereas interestingly, now this--of course, this is highly-selective, highly-biased. The people who are still on

SparkPeople are saying SparkPeople is great. But it's--but it is pretty remarkable, the kind of, the love fast [phonetic] they have there, "Oh, everybody on SparkPeople is great. None of you ever do these unhelpful responses." All right, so to summarize, I think there are benefits of tracking together. There are a lot of possibilities for supporting health behavior change. I had--I talked less about support and decision-making. But I think those are also ways that other people can help us. I think there are some critical design challenges around sharing the right stuff with the right people, and matching the social elements to the individual needs, give the competitive aspects with the people who are going to benefit from it but not to others. I want to remind you of--since I've mostly focused on these, I do want to remind you of some of that advice as you pursue your careers, which is if you're going into a new field, don't just read the literature "Find somebody who is going to be your guide. Choose somebody who is good." Make sure that you're bringing something to the table so that they'll want to collaborate with you. Go deep in the fields that you cross into that is learned from your collaborators. Learn math and programming while you're in a grad school and still have the time. And take this change perspective, the designer's perspective. If you want to understand the world, try to change it. Thank you.

[Applause]

Yes?

>> First, I think it's a really, really great stuff. One thing, have you heard about JIMPACT?

>> JIMPACT, is that the one where everybody puts in fifty bucks and the people who keep the pact get the money and the people who don't lose the money?

>> Similar concept. So, you sign up--when you sign up for JIM for a year or have a JIM membership. You say how many days a week you will go there. And you have to check in with your iPhone. So, it's not just you say that you were there but you actually have to be there for at least thirty minutes to really make it count. And every time you don't go, you pay ten dollars into the pool. And the people who did go, they spend this 10-dollar payment. So, it can make some extra gains and lose by luck, and lose kind of luck. So, it's a very, very similar approach.

>> Yeah. So instead of giving the money to the anti-charity, you go into one of these pools. It has the additional advantage that when you sign up, you not only think I'm not going to lose any money 'cause you know, you're going to keep your commitment. But you actually think I have an expected gain because unlike me who has so much self-control, everybody else doesn't, so I'm going to get some of their money. So, the--in expectation, you--of course, you're wrong. But you think that you're going to earn money. And yeah, so I think that is a way of amplifying it potentially. Especially, I think if you do it with a few buddies, that may also introduce the social accountability element. Yeah, on the back?

>> In addition to--when you're doing your regimen, do they walk more or not during walk [inaudible]? If there's another aspect to think there's always a little [inaudible] through all bleachers, how hard was it to you? If it turns out independent with how many calories you're actually enduring, do you have any clue from what you'd get this by as to whether a--how did you feel and how much did you like this from what makes it [inaudible]?

>> Yeah. I don't know as much about that. If Caroline was here, she'd be able to give you better answer. I can, you know, quote you. The interesting quotes I've heard per se at the dinner table overtime, one of them is that people who start walking programs because they want to lose weight or because they want to lose inches on their waist don't--or get demotivated pretty quickly 'cause walking programs actually take a very long time like years to help with weight loss. But those people who do it to reduce stress, to feel

better, have a better time sticking with it. So, I'm not sure if it's exactly getting at your question, but I think things that help people reflect on--gee, have you noticed that your mood was better on those days when you walk than--'cause they may not realize that it actually works for stress reduction and feeling better and sort of helping them realize that maybe a really effective way to keep me from motivated. It would be nice to know, is it easier to take a walk now than it was a month ago? Maybe you're suggesting that kind of question. I don't think we have that. I guess, I would like to have maybe some kind of experience settling rather than just beginning--end--if we were going to do that. Jenny?

>> Well, your work is fabulous but if you have more PhD students coming along, I wonder if there is an interesting project that involves people with ECG and with possibly lower incomes. 'Cause when we talk about JIM and when we talk about all kind of apps and technologies and stuff that somebody [inaudible] it kind of implies, you know, people do it moderately but I don't know the story terribly well, but I believe that there is some sort of strong correlation with income and ECG, whether it's to do with not having money to buy that sort of food, or whether it's to do with the relational share of possibly between income and education and not knowing what to be. So, it's just a suggestion. As your many PhD students come through, that that might be a complimentary area that might be a really important point, having impact on this big area. I mean, these slides at the beginning, it's just like shocking [inaudible].

>> Yeah. Speaking of, you know, PhD students and the next ones that, you know, send your great undergraduates because I have John who's graduated and Daniel Joe who's graduating and Siddarth who's here, but Siddarth is working on our politics work not the health work. So, I actually--this is all that happening with staff now not with PhD students. So, it would be great if you could send us some.

>> I mean, it's kind of a [inaudible] for this other part. You know, dealing with obesity in this other area or, you know, what kind of--

>> Yeah. It's sort--substantively to take there, your intuition is that some of these things, you know, won't work with or will work better or worse with different populations. And that's certainly true.

>> Or accessible to difference.

>> It's the accessibility.

>> But yeah.

>> Yeah. Actually, my intuition about the effect of financial incentives is that it will be much more effective. You know, the less income the people have, the more effective a smaller financial incentive is.

>> Yeah.

>> But it maybe that, you know, recruiting people to participate is maybe more or less difficult.

>> It's more getting the relationship between, you know, income.

[Inaudible Remark]

>> There is actually a research project that view on lower-income and obesity and how FCI can help with this.

>> Did everybody hear that? He's saying there was a project at Colorado on lower income people and obesity and how technology can help or--?

>> How FCI.

>> Or how FCI can help.

>> Okay.

>> Yes?

>> Actually, having been in many weight loss programs, I realized and I went in one--in Michigan recently. So, it's very near and you don't find it hard but the reasons that like my reasons for not being able to lose weight and especially those who were of lower income were extremely different. And especially among the older--for older people, they had no knowledge of nutrition in general, and it was just so shocking how little they knew about what was actually a proper meal and what kind of or the concept of calories or the concept of how intake and out, you know, the balance, and they were just like fascinated by that. So, I don't really agree with Jenny that there may be a larger income or maybe education difference.

>> I will say that these pedometer programs, I mean, my wife has used them with--there populations including VA, the Veterans Administration. And that is a lower income population 'cause the veterans who have good jobs and health insurance are for the most part, not using a VA. But they've had success with those groups. They've had success with patients with, you know, various kinds of disease, diabetes, mental health. So it does seem to--it isn't the case that their walking programs don't work for disadvantaged populations. But it may be that particular elements of it will or won't work better.

>> One thing that I found personally and I don't know if I'm just weird, but what I found when I tried to loose weight is that--when I start up in exercise program, there's an initial actually weight gain. And I think it may have something to do with muscle or something. And it's--I have to make myself overcome that, okay it's okay. It's okay to gain the weight because it actually helped you, even though my weight has increased. And so, that's always been a hard part for me is just going okay, that's all right to gain a little bit.

>> All right. And that maybe is, you know, something where having the right mental model makes a huge difference. I will say that, you know, again, I'll leave the medical parts to Caroline to some extent but, you know, I've noticed that she is very careful in these programs, that these are physical activity programs. These are not weight loss programs. She never asked people to weigh in. She doesn't measure weight at the beginning and the end. None of the tips are about weight loss. It's about activity and how to deal with your ankle hardening and that kind of stuff.

>> So to me, a lot of what's interesting about within self-tracking and social self-tracking is the idea that people are being kind of self-motivated or peer-motivated to change. And that's the sort of like horizontal authority was on the surveillance reinforcement. And I was just wondering, when you're studying that and coming into it as a researcher and saying, "Well, here, take this fabulous thing." This fitness thing is a sort of an implicit way in which you're taking the role of an authority. And therefore, it's not a security horizontal as you might think. Is there a way to observe that in a way? As a researcher, it's what we do to cast ourselves as authority and sort of treat the system.

>> Yeah. So, the experiment or the fact that people do things to--'cause they think the experimenter wants it. Those are great concerns. The approach that we generally take rather than trying to have some control that doesn't involve the experimenter is that as we try to build in the same experimenter demand effect for

all the conditions and then you compare a cross condition. So, you have some control condition that's inside the experiment where people are, "Yeah, okay, I know you gave me the pedometer. I guess, that means I should walk more." But then, we'll compare between the people who have one versus another. And we're very concerned about, you know, unlike that conventional medical trial where you have a placebo control and people don't know whether they're in the placebo condition or the treatment condition. It's a sugar pill or it's inactive pill and supposedly they don't know. In these things, we have to do something special. We actually have to hide a little bit of what it is we're testing. So, we're, you know, going through all our instructions and saying, "This is about the effect of commitments." We don't say it's about public versus private because if we did, people would realize, "Hey, they're testing public commitments and I'm in the private version." I mean, as I should, you know, they don't want me to do well or whatever. So, it does have implications for the design that you do have to try to have the same level of experiment or demand for all of the--

>> [inaudible] this way is you'd be much smarter than people [inaudible] spanning. But it seems it could be put out among just for the observation standpoint, you--that was in a much smaller observer or the people once you're up inside the group, people who were fit today or whatever. But I'm wondering, is there a way with that on the large scale too, such that you can put different perspective on it.

>> Possibly. My take on it is that you should do those kinds of things in order to form your theories and then try to test this way. But, you know, maybe there's some great methodological advance to be made of how you can test your theories that way. It's hard for me to see how you would do it, but that would be a big contribution, sort of a medical contribution if you could figure out how to do that.

>> You know, I can't--before I asked.

>> No. I'm sorry, I can't do this.

>> Well, thank you very much, Paul [inaudible].

[Applause]