Probable Causation, Episode 42: Andrea Velásquez

Jennifer [00:00:08] Hello and welcome to Probable Causation, a show about law, economics, and crime, I'm your host, Jennifer Doleac of Texas A&M University, where I'm an Economics Professor and the Director of the Justice Tech Lab.

Jennifer [00:00:18] My guest this week is Andrea Velásquez. Andrea is an Assistant Professor of Economics at the University of Colorado, Denver. Andrea, welcome to the show.

Andrea [00:00:27] Thank you, Jen, for the invitation to talk about my research on crime.

Jennifer [00:00:31] Today, we're going to talk about your research on how violent crime affects people's attitudes toward risk. But before we get into that, could you tell us about your research expertise and how you became interested in this topic?

Andrea [00:00:43] Yeah, so my interest in research and specifically research on crime started when I was a graduate student in Colombia. That is my home country. And as a graduate student there, I had an opportunity to work with Anna María Ibáñez on research projects aimed at understanding both the causes of the long-lasting Colombian conflict and also the effect of public programs targeted at the victims of violence, particularly targeted to force displaced individuals. And that was a very important experience for me and pretty inspiring because I saw room for rigorous research to inform policy making and potentially improve people's well-being. And that was the experience that motivated me to pursue a PhD in economics. And then I came here at Duke and I had another great opportunity to work with Duncan Thomas, who was actually collecting data of the third wave of the Mexican Family Life Survey. And I'm going to talk more about this data since it is the one that I that I use in this particular paper.

Andrea [00:01:48] So this is a nationally representative longitudinal survey of the Mexican population. And the third wave of the data was being collected between 2009 and 2010. So this is when I started to work with him and I get the opportunity and the support—both of him and the PIs in Mexico, --- —to go to Mexico and to travel with some of the teams and supervisors to help them and support them, to track and reinterview the most difficult cases. And that was a great experience because already in 2009 and 2010, the country was experiencing the spike of violence that I'm going to talk about. And when I was in Mexico, I was able to witness the consequences of this violence.

Andrea [00:02:36] So, for example, while we were trying to track households in some towns or cities, the interviewers could tell me how they saw the differences in these cities. And something that that was very cool is that these interviewers were the same ones that were conducting the interviews five years before. So they would tell me, look, this environment has changed completely. Now we are in a town that after sunset, everything is closed down. People are telling us, go back to your hotel. And before they would tell me people were outside, businesses were open, restaurants were open. People also, when they were feeling comfortable with us, would tell us how about the fear that they were sensing in the environment and how things were changing the community. And that was their motivation to say, OK, we have the data, we have these arguably quasi random variation in violence. I want to answer rigorously what is the economic consequences of this violence? And that is what I have done in part of my research that has focused on understanding the economic consequences of violence on labor market outcomes, human

capital accumulation, health outcomes, and particularly the paper that we are going to talk about today, risk aversion.

Jennifer [00:03:52] Yeah. So your paper is titled, "Impact of Violent Crime on Risk Aversion: Evidence from the Mexican Drug War." It's coauthored with Ryan Brown, Verónica Montalva, and Duncan Thomas, and it was published late last year in the Review of Economics and Statistics. So let's start with a basic economics question. What is risk aversion and why does it matter?

Andrea [00:04:12] So risk aversion, just like the name says, denotes attitudes toward risk. So just willingness to take risks, how how willing you are to take a risk. And there is a broad literature in economics showing how these preferences or risk influences important choices over the life course. And importantly, these choices can have long lasting effects on an individual's socioeconomic status, health, and well-being. So, for example, these studies have showed that attitudes towards risk are associated with decisions like getting or not insurance, savings and investment decisions, even occupational choice, and for farmers, crop choice or technology adoption. Also decisions about migration. So anything where you see like some uncertainty, these- the willingness to take some risk can affect that decision, those behaviors, and therefore, that can have long lasting effects on the economic and health well-being of the individuals. So there is a consensus on that. Look, your attitude towards risks are going to affect these behaviors. These behaviors can affect your well-being.

Andrea [00:05:20] But if these preferences have such an important effect on an individual's well-being, it is important to understand what are the determinants of these attitudes. And it's in that sense there is less consensus in the literature. In fact, implicit in many economic models is the assumption that risk attitudes are fixed or stable over the life course. From this assumption of economic models departs research in psychology that assumes that these attitudes or preferences react to an individual's environment or circumstances. And this is where our paper and now a growing literature in economics comes to this scenario. And now we have a new research in economics that is particularly investigating whether an individual's environment or circumstances can affect those risk attitudes. So it's a growing literature showing how, for example, exposure to earthquakes, tsunamis, so natural disasters overall, or violence can affect these risk attitudes. I'm a development economist, so I'm like in the intersection of labor and development, and as a development economist, this is particularly important given that both the natural disasters and outbreaks of violence have disproportionately affected individuals in developing countries. This is the big picture of why we care about trying to figure out what are the determinants of these risk preferences.

Jennifer [00:06:56] And then why might violent crime in particular affect people's attitudes about risk? What potential mechanisms should we have in mind here?

Andrea [00:07:03] Yeah, so this is very important to understand, because in order to to try to say something about policy making, we need to understand what is the mechanism through which this relationship is operating. And the literature helps us to to understand how we need to think about these mechanisms. And the first one is if we think that there is an environment with high levels of violence, you are going to have some individuals that are going to be directly exposed to violence. And individuals who are going to be directly exposed to violence might suffer from post-traumatic stress disorder, which can affect their mental health. If we see like this effect that these could affect aversion towards risk. And there are two papers that have made important contributions to understand this

mechanism. One is a paper by Andrés Moya that investigates the effect of violence on risk attitudes in a group of individuals who were directly victimized in Colombia. And he finds that among those individuals who were directly victimized, risk aversion is going to increase. But importantly, he has suggestive evidence showing that this effect is driven by anxiety disorders. So this tells us something about policy implications, particularly for Colombia. So if we think our reparation, then how we need to think about policies that are going to try to repair the damage of the conflict in victims. We need to think also about those psychological effects and how could help them to get out from the effects of that shock.

Andrea [00:08:40] And similarly, there is a paper by Michael Callen, Isaqzadeh, Long, and Sprenger. It's in the AER. And they explore the impact of violence in Afghanistan. And interestingly, on average, they find no effects on risk aversion. But when individuals are primed to recall a fearful experience that they had in the past year, they show an increased preference for certainty. So this is like our first mechanism that tell us the effect of trauma can have an important effect on risk aversion. And here I want you to do a little detour, given the current circumstances that we are living with—COVID—because when we think about trauma and the effect that this can have on risk aversion, the literature has explored not only the effect of violence on risk aversion, but also, for example, exposure to financial crisis or a financial experiences in daily life. So, for example, Malmendier and Nagel have a very nice paper where they show that exposure to financial experiences like the Great Depression in early life can affect investing behavior in later life. So when we think about what we are experiencing now, it would be interesting to try to figure out if exposure to COVID and how exposed you have been to it, can that affect certain behaviors and can that affect like some, I don't know, health outcomes or even like investment in the future. If you are like more cautious about the future, if your optimism or changes because of this exposure.

Andrea [00:10:19] Another mechanism is fear. And this might be more relevant to our context, because as I'm going to discuss later, when we measure violence, we are not going to measure this as direct exposition to violence. So I don't have direct victimization. I'm going to have homicides in a municipality. So, fear might be more relevant in our context because measures both potentially direct exposure but also indirect exposure to violence. And living in an insecure environment could manifest into fear, which can affect, again, optimism about the future and risk aversion. In trying to understand the mechanism of fear, there is important studies by Lerner and Keltner that explain that the lack of control associated with fear can lead an individual to make risk averse choices. Another potential pathway is financial, and my own work has found that the violence in Mexico had a negative effect on labor outcomes, particularly among self-employed workers. And previous studies in economics have shown that there is this link between income and risk aversion. So that could be a pathway that particularly could could work in Mexico.

Andrea [00:11:41] And finally, living in a violent environment has the potential to adversely affect physical health. And this could be through various channels. That could be through, of course, direct victimization. It could be through stress or reduced access to health care. And recent studies on work that we have conducted in Mexico have shown that actually exposure to violence in Mexico has affected health outcomes, particularly blood pressure and heart disease. So this could be another potential mechanism through which we see this effect on risk aversion. So just to summarize, we have this trauma, fear, financial pathway, or health.

Jennifer [00:12:25] Great. And you mentioned a bunch of other studies in there, but I guess summarize in one place or elaborate a little bit more. So before you all started this study, what did we know about how crime affects risk aversion?

Andrea [00:12:39] So actually, this was uh- when we started to work on this was the perfect timing to work on this question. Because there were these two very influential papers that were the one that I was telling you of, Callen, this is in Afghanistan. And there is another paper that is by Voors and coauthors, and they examine the impact of a civil war in Burundi. And what is interesting and why we felt we could make an important contribution is that both papers tell a different story. So just to remind you about the other paper, the one in Afghanistan shows on average, no effect on risk aversion. But if we prime individuals to recollect the fearful experience, then certainty is going to be preferred. Now we're going to see a context of civil war in Burundi. So the civil war in Burundi lasted between 1993 to 2003. And they are going to ask about risk aversion in 2009. So six years after the end of the civil war. And in this case, they find actually that exposure to violence increases risk tolerance. So a completely different story.

Andrea [00:13:51] So these were the papers that were out there. And it was, as I was telling you, the timing was perfect because at the same time, Andrés Moya was working in Colombia with direct victims of conflict. And Jakiela and Ozier were working in Kenya with like the Kenyan Life Panel survey and a strategy that is, I think, is the closest to our paper. So we didn't know that much. I mean, the Callen and Voors were there and other papers were happening up at the same time. And there was mixed evidence. So we come up to a scenario. We are not going to look at direct victimization. We're going to see if these- like the average exposure in in municipalities. And we have these unique survey that is going to allow us to compare the same individual during low levels of violence and high levels of violence. So we are going to bring something to this mix, that is we are going to be able to control for this unobserved heterogeneity that other papers haven't been able to do that. We're going to try to figure out if that can explain some of these differences.

Jennifer [00:15:00] So let's talk a little bit more about that. Why was it so difficult to measure the causal effects of crime on risk attitudes? Was it really a data problem or an identification challenge or both of those things?

Andrea [00:15:11] Yeah, so the problem is we want to know what are the determinants of risk aversion. So we need to have a shock or something that is going to induce that change. So if we think precisely about we want to know how violence affects risk aversion, we need that shock. Right. Otherwise, we are going to have individuals that are going to self-select into places that have more or less violence. So if we have an environment in which, I don't know, maybe they have a long lasting conflict or violence has persisted for a while, then we think that there's- there are going to be behavioral responses to that violence. So we could think that the most risk tolerant individuals are going to self select into leaving into places with high violence and then we're going to see a biased result. So that is the basic problem.

Andrea [00:16:06] So then what has on the literature? The literature has tried to find these local area shocks, such as floods, earthquakes, violence. But now the problem is that whether these are really shocks or not, could they have been predicted or not or are they really unexpected? I think we need to try to figure out, OK, is our cross section going to be able to capture the effect of the shock? Is our cross section going to be enough to try to disentangle behavioral responses, selected migration into these places, unobserved at the originate- at the individual level? Are the shocks that we are using really these unexpected

shocks that we can argue will give us these quasi random variation? On the other hand, you need like this shock to happen, but also you need the survey, right? So you need the survey that measures the risk preferences. So everything kind of like needs to align that aligned very well for us, fortunately.

Jennifer [00:17:11] Yeah. So you're going to use the Mexican drug war as a natural experiment to see how people's risk attitudes change when they experience an increase in local violent crime. So tell us about Mexico's war on drugs. What is the policy change you're interested in and how did it affect violent crime across the country?

Andrea [00:17:29] Yeah, so if anyone is interested about this, I really recommend looking at the work of a lot of Eduardo Guerrero-Gutiérrez; Molzahn, Ríos, and Shirk; Melissa Dell has made an important contribution; Castillo, Mejía, Restrepo; and actually there is a new book by Guillermo Trejo and Sandra Ley that explained the political logic of criminal wars in Mexico. So there is a huge literature trying to understand the causes of of this increasing violence. So I will just summarize the story of like the narrative of some of this work that I have just told you about. So one strand of the literature explains the spike of violence. And let me just give you a background so you can see the map in your head. So just imagine that you have the years and you have homicide rate. And from the 90s to 2007, there wasn't a positive homicide rate. I mean, drug cartels already existed in Mexico. So there existed a homicide rate, but it was pretty stable. So there was like this oligopoly of power between the cartels that were in Mexico. So you see, if you plot the homicide rate, you see something very stable. And then in 2007, you see this spike of crime. And actually you still see it, if you plot it until 2020, you see that they haven't been able to go down to those initial levels of violence.

Andrea [00:18:52] So, of course, there's a lot of literature trying to explain what happened, what explains this spike of violence. And one strand of the literature explains this spike as a byproduct of the military strategy that was implemented by President Felipe Calderón when he became president in 2006. So he becomes president in December of 2006 and in 2007, he implements this military strategy of confrontation with organized crime groups. And the idea was to target the main leaders, the capos of the cartels, with the goal of destabilizing the old oligopolistic equilibrium that existed, like with the organized crime groups and the government. And the thing is that if you see the map, you see that like it was pretty stable and you see that in 2007, like the first military strategy was pretty successful. And then it was like, OK, we did it with this cartel, let's go with all our force against all the cartels. And that's where things started to become very messy.

Andrea [00:20:02] So what Eduardo Guerrero-Gutiérrez explains is that when you confront the main leader of a drug trafficking group, you can create two types of violence. And this is what is this scene in Mexico. The first one is that within the cartel, an internal conflict is going to arise because you can think about like this pyramid of power in which you have the leader, but then come like three people, let's say. Once the leader is gone—because he was either incarcerated or because he was killed—then these three people that are going to contest for the power. So you are going to see this conflict within organizations to try to take power on the cartels. And second, you are going to have confrontations with enemy organizations that seek to wrest territorial control. So what we see between 2007, the beginning of the spike of violence, and 2010 or '11 is this huge increase on homicides. So we see this temporal variation, but also geographic variation. And this is key for our identification strategy because we see this temporal variation, but also now the violence is spreading to municipalities that before had not seen drug related violence. And we see also that the number of cartels multiplied from 9 in 2007 to 16 in

2010. And in that sense, Viridiana Ríos has very nice work explaining the location of the cartels and mapping the cartels out.

Andrea [00:21:38] So another thing that is important, too, is that the dynamics of violence also change between 2007 and 2010. Before you had like nine big cartels that the main financial resource was financed by drug of a business. But now, since you started to have like smaller cartels, they also started to rely on other times that- types of crime. So at the same time that you see that homicides are increasing, we see that also other types of crime is increasing, like kidnappings, extortions, and car theft that are going to target the civilian population more directly. Another thing that is important to highlight about this period—and I don't know if you remember like the news when this was all over the news when we were seeing what was happening in Mexico—is that narco messages started to be a very popular method to signal territorial presence of a cartel in an area and to spread fear. So you would start to see these narco messages that the bodies displayed out there. So the idea was precisely to spread fear, not only across all their organized crime groups, but also to authorities, journalists, and any citizen that wouldn't support the actions of that particular cartel. In addition, there was a lack of trust in the state's institutions, and the high levels of corruption and abuses from the police also exacerbated that sense of fear by the civilian population. And that's why, with everything that I'm telling you, that's why also trying to understand fear as a mechanism has been so important in all of our work.

Jennifer [00:23:23] So that is the natural experiment. That series of events is creating new variation in the timing and geography of violence. But then, as you said before, you also need data and you have this great survey. So tell us about the data that you're using in the study.

Andrea [00:23:38] So in order to measure violence, we are going to use homicide rates. So if anyone is interested in doing- in pursuing research agenda with this, all the data is publicly available. These are homicides that are available in the National Institute of Statistics and Geography. And this is going to be homicides at the municipality and month level. So we have that part of the violence. But now we need to match that with risk aversion, ideally with a data set that is very rich on observed characteristics of individuals and households. And that is where the Mexican Family Life Survey becomes very handy. So this is a longitudinal survey, and as I was telling you, is representative of the Mexican population at the national level. And the timing is very important for us. The baseline was conducted in 2002. The second wave started in 2005. And importantly, in 2005, questions about risk aversion are being asked. And the third wave started in 2009. It was on the field from 2009 to 2012, but like 95 percent of the surveys happened between 2009 and 2010. So we are going to have the survey that is going to follow the same individual and we are going to have information about the same individual during low levels of violence in 2005 and high levels of violence in 2009, 2010. And it's going also to collect important information of socioeconomic and demographic indicators. So we are going to be able to control for every set of characteristics, both at the individual level and household level.

Jennifer [00:25:22] OK, and then how do surveys like this measure risk aversion? Could you give us some examples of those questions?

Andrea [00:25:28] Yeah. So, and something that has been established in this literature is our survey method in which these are going to be all hypothetical questions in which respondents are going to choose between gambles that are going to have different payoffs. So the idea is that you are going to have options that offer higher expected payoff and those higher expected payoffs are associated with greater risk. So just to give you an

example, and importantly with these, these are questions are all hypothetical. These are not lab questions, so we are not going to provide any monetary reward. So the first thing that we want to make sure is that people understand the gambling, because sometimes people don't understand really well, like what is the idea with the expected utility or the risk. So in the MxFLS3, we have like in the third wave, we have a question in which we are going to say, OK, look Jen, I'm going to offer you two gambles. In one, you are going to receive either 250 dollars or 500 with equal probability. So you can play that game. Or you can have a dominated sure amount of 250 dollars. Right. So that case is just like, look, this is just gambling and it is just to make sure that they understand that what the gambling is telling you. So if they respond they prefer the latter, then we explain the question again.

Jennifer [00:26:58] Right. So basically what's going on here is you've got- you can get 250 dollars for sure or a chance of getting higher than 250. And so that first one is what economists would call the dominant choice, where it's like a clear winner if you understand the game. So this is basically checks whether they understand the game.

Andrea [00:27:16] Exactly. So we wanted to make sure that this is not going to give us too much noise. And then we OK, we explain again and from the people that had chose the 250, the dominated option, like two thirds go to that gamble. It's like, OK, great. If you say it like gamble lovers, then we're going to call you gamble lovers, and you are going to be the most risk averse individual. You might be worried about these individuals, but they are only seven percent of the population of the sample and we have tons of robustness checks, like having them as gamble lovers or just completely just dropping them from the sample. And everything is robust to that. So let's just go with, OK, what happens if you want to gamble? So here the idea is that every time I'm going to tell you, look, you are going to have this dominated option of the 2500, but I'm going to give you a gamble in which now the risk is going to be higher. Before it was between 250 and 500. If you want to gamble, then you are going to move to 200 and 500. If you now want the sure amount, you exit, and I'm going to give you a risk aversion like, number, let's say.

Jennifer [00:28:31] And just to clarify for folks again, so now the gamble there's a chance you could get lower than the certain amount. And so the question is just like how big is that chance or how much lower might you wind up?

Andrea [00:28:43] Yes. So if you want to keep gambling, every time I'm going to offer you a less attractive gamble. So if you keep playing, you are more risk loving. So the questions continue, a few more questions, and then I'm going to generate the risk aversion index and then we're going to have individuals that are going to be the most risk averse and that like moves to the most risk loving. Importantly here, you might think that, well, I don't know, you are not offering them money, this is super noisy, and you are totally right. And actually, there is a literature focus, particularly on these questions and how maybe these hypothetical questions really are not measuring risk aversion correctly. So we were very lucky because in 2005, at the same time that these hypothetical questions were happening, there was a parallel study of Amar Hamoudi that also worked with MxFLS and with Duncan Thomas, and they actually run an experiment eliciting risk aversion in the same- in one community of the MxFLS where they gave these monetary rewards. And when they compare the risk aversion with a hypothetical questions and with a monetary one, they are very comparable. So that was OK. That made made us feel really good about it.

Andrea [00:30:08] The other thing that we do to make you feel comfortable about these questions is that since the MxFLS has tons of information. We have risky behaviors or

what you could think are risky behaviors. So, for example, if we consider that occupational choice is a risky behavior, like there's more risk from being self employed, then we're going to see whether there is a relationship between our measure of risk aversion and the probability of being self employed. And there is. And this is all only associations. Right? There's nothing causal here. We just want to know whether they are related. We also see women. We see risky sexual behavior. So whether they use contraceptives or how many sexual partners they have. And we also see the the relationship that we would expect. So we see that these hypothetical questions are related with real life, let's say risky behaviors, that also makes us feel more comfortable.

Andrea [00:31:04] And the last thing that I want you to have in mind to feel comfortable with- like this measure is so important that you need to feel comfortable with how we are measuring it. Is that now you are going to imagine that you have the whole sample. I'm telling you that I'm going to classify them, let's say, in six groups, depending on how risk averse they are. But of course, like even now that I'm telling you, OK, what do you prefer, 200 or 250? What do you prefer, 100 or 250? You might imagine that people are just going to start to day dreaming and they're not paying attention anymore. Right? They're just going to answer whatever. So what we do is say, let's look at the extremes. We know that maybe between those in the middle, it might be very noisy. So we are going to look at the extremes. What is the probability of being the most risk averse? And we categorize that as like the two last groups or the last three groups. And as you can imagine, we run tons of robustness checks with that. We also actually use the linear version and everything is very robust to that.

Jennifer [00:32:12] Great. OK, so you have this panel survey data telling you people's risk preferences over a time period that spans Mexico's war on drugs. So walk us through what you actually do with this data to measure the causal effect of the change in crime rates on risk attitudes.

Andrea [00:32:27] Yeah, so everything until now, maybe with all these questions was the complicated part of the paper, maybe. But the empirical strategy—and this is something that I really like about these papers—is that the empirical strategy is very simple. And as I was telling you, the idea is that we have this longitudinal survey in which we are going to follow the same individual. We observe the same individual in 2005, where the levels of violence were normal, let's say, so low levels of violence. And I'm going to observe the same individual with high levels of violence. So there is like this shock. And I'm going to say this an arguably unanticipated shock that we are going to consider quasi random. If these was unanticipated, then the effects that we are going to see in risk aversion should not be related to anything else. But what is cool about the survey is that I'm going to be able to control for any unobserved time invariant and heterogeneity that could be related both with exposure to violence and with risk aversion. So this is the part that previous literature hadn't been able to tackle as directly because of lack of data, because they don't observe the same individual before the conflict and after the conflict. So now, if you think about any I don't know, maybe the ambition or any unobservant heterogeneity that is timing variant that is related both with exposure to violence and risk aversion, we are going to be able to control for that. In addition, since we observe these individuals before and after, we are going to directly test whether there are behavioral responses such as migration and control for that.

Jennifer [00:34:21] All right. So first you analyze the data in the way that it might have been analyzed in the past by researchers who weren't able to observe people at multiple

points over time just to get a sense of how your results might compare and if they would look similar to what those previous papers found. So what do you find when you do that?

Andrea [00:34:41] Yeah, so what we do first is just trying to emulate as close as possible what the previous papers had done. So the first one that we do is like, OK, let's assume that we don't have a longitudinal survey. So let's say that we have only the 2005 data and we are going to exploit geographical variation. Right. And this would be in a setting where there is like long lasting levels of violence. And here, the important thing is to think that I mean, the levels of violence in Mexico before the spike of crime were very low compared to the homicide rates in the region. But there was like if we if we think about what was happening in Mexico, there was still a presence of cartels so we could still think like yeah there's like some level of violence. Even if we see the maps in 2005, you can see that there is like there are regions that have more violence, particularly through the drug corridors and where is presence of cartels. So what we're going to say is we have this environment where there is long lasting levels of violence. We want to see whether this exposure to violence has an effect on risk aversion. And when we do that, we see that exposure to violence actually increased risk tolerance. Very similar to the conclusions of the paper, of Voors and coauthors in Burundi. So that is where we start to think well yeah, but maybe this is all about selection into these places, right? It makes sense to think that individuals that are more risk tolerant are going to self-select into living in those places and without a history of migration or without being able to control for these potentially unobserved heterogeneities at the individual level, we don't know what is driving this effect. So that is like the first piece of evidence.

Andrea [00:36:33] Then we say, OK, maybe you might be concerned about this comparison. OK, maybe the violence in Burundi was very different to the levels of violence in Mexico. We need to try to exploit this increasing violence. So maybe we need to- if someone would do this in Mexico without a longitudinal survey, maybe they wouldn't do it in 2005. They would do it in 2009, where now they can exploit this increase in violence that again, we are going to argue that is unanticipated so we can think there is like this quasi random variation. So that's what we do. Now, let's try to do this using the MxFLS3, and in this case, we find no significant effects. So this is more similar to what Michael Callen and coauthors had found, that on average we see no effects on these attitudes. And here what we can think is that we could see like in this cross section, we could have attrition because of nonresponse.

Andrea [00:37:31] We could also, as I was telling you, you can imagine trying to have low levels of attrition was a challenge. And the providers and the team in Mexico worked so hard to keep low levels of attrition. And in many times, what we found is that people would say, look, I cannot answer now, but come six months later and we will do it. Then the teams would go to other regions and they would go back. But if that person is systematically different, right, if that person is saying that they just wait a little bit, then we are going to have like some biased results. So we need to control for that unobserved heterogeneity. OK, so maybe we are going to have individuals that are going to choose when to answer these questions, but with a cross section we are not going to be able to control for this unobserved heterogeneity. What this longitudinal survey allows us to do is to say, OK, yes, you are answering in different times. We think that is selected into by both violence and risk aversion, but we are going to be able to control for that unobserved heterogeneity. And that is what these individual fixed effects do. So that is just in other words, just saying, look, all your unobserved heterogeneity, everything that I cannot observe about an individual—so I don't know, your ambition or your intelligence, anything that is not measured by this observed unmeasured characteristics—if we think those are

time invariant, the individual fixed effect model is going to control for that. So if we think that these could potentially bias the results, we are going to find different effects and that is exactly what we find.

Jennifer [00:39:13] Yeah, yeah. So let's- let me just explain that individual fixed effects thing slightly differently. So basically, imagine I'm in your survey, you're talking to me at these like three different times, three different waves. So anything about me that doesn't change over time, those fixed effects are going to are going to be controlling for. So my general- a whole lot of like preferences or my gender or those sorts of things are all going to be because you're looking like within me, you're going to be comparing me to myself at previous times, it's much better than trying to, like, find similar people in a cross-sectional survey.

Andrea [00:39:49] Yeah, exactly. And I think what if- this is what we see as one of the main contributions of the paper is that the data allows us to walk the reader through- let's picture all these different scenarios. And maybe the individual fixed effects don't bias anything. That could be a case, but if they don't, then we should find consistent results and we don't. So. So that tells us something about well, in this case, there's something about this unobserved heterogeneity that is important to control for. And this is where like these longitudinal surveys are going to be very helpful.

Jennifer [00:40:27] Right. OK, so you add in these individual fixed effects. So, again, you're considering the change in risk preferences for a specific person over time. And this is going to avoid the concerns about compositional effects or people moving and so on, like just as you described. So what do you find when you do that?

Andrea [00:40:44] So now we find that there is a significant effect on risk aversion, which is going to have, again, this important policy implication and potentially long lasting effects on the well-being of individuals. If we if we think about like all those potential consequences that have on decisions of investment and so forth. Just to give you a number, we think about the average increase in homicides between 2005 and 2009, it was close to one homicide per ten thousand people. So for each additional homicide between 2005 and 2009, there is an increase in the likelihood of becoming the most risk averse—so entering into the most risk averse category—that likelihood increases by 1.5 percentage points, that at the average of the population of the sample is a 5 percent increase in the probability of becoming the most risk averse.

Jennifer [00:41:45] And do your results vary at all across different subgroups?

Andrea [00:41:48] Yeah, so short answer, no. We were so surprised about this. Because I don't know, working on these on these papers was very interesting because all these papers were happening at the same time. I mean, we were working on all of these questions at the same time on these I don't know, the creative process was so interesting because it was like- oh, this is affecting labor outcomes and self-employed people. So, of course, what is happening to the education of these individuals, and if- in self-employed individuals, this is what is happening. Oh, there's risk aversion needs to happen. Something needs to happen for them.

Andrea [00:42:23] So what we did was just trying to look at heterogeneous effects based on characteristics based- measured at baseline. So we are not worried that they are endogenous. So we looked at effects on by gender, by socioeconomic status, by age, by the level of like urbanicity, of where they live, whether they are self employed or not—

because this is where we find the larger effects on labor outcomes—and there's nothing. There's no differential effects. So of course, this is not a perfect test to look for mechanisms. But it's started to tell us something about, well, maybe in Mexico is nothing related to this financial pathway, maybe something else. This was like the first test to try to figure out we see that there is this effect on risk aversion. It doesn't seem to impact some part of the population differently. But why is this happening? Which is going to be so important to try to say something about policy implications.

Jennifer [00:43:27] Right. So then you dig in a bunch to try to figure out those potential mechanisms and what's driving that effect. So walk us through what you do there and what you find.

Andrea [00:43:37] Yeah, so this was empirically the most challenging part of the paper. And this was very, very challenging because what do we want to try to test? Let's use the literature and let's try to figure out, is this something related to economic wellbeing, mental health, physical health, or fear? And something here that I want to highlight is that thanks to the survey having like this information, we were able to directly test whether these are potential mediators or not. So we have, of course, information about labor outcomes and earnings per capita expenditure. We have questions that measure mental health, emotional status. We have physical health as well. We have blood pressure, but also self reported health measures. And importantly, we have measures about fear. And we have those measures in every wave. So we have questions about direct victimization, but also perceptions of fear. So that's why we can test all of these mechanisms, which is very special.

Andrea [00:44:44] But now the challenge is that we can argue that there is a causal effect from violence to risk aversion, because this change in violence, it is random. And I'm going to tell you more about what we can feel comfortable with this assumption. But the changes in the mediators, so the changes in economic well-being or mental health or fear that, is not exogenous, right? When it's a change of violence, who gets afraid or not, that is not exogenous anymore. So when I use that as a mediator, since it is not exogenous, you might think, well, this is all endogenous. You cannot say anything about causal effects. So that's what was very challenging. But let me tell you what we did. And again, this is the part of the paper that we say like is suggestive, but we do as much as we can to try to figure out whether we can disentangle this as the main mechanism.

Andrea [00:45:46] So the first thing that we do is something very simple. That is just saying, well, does violence has an effect on these mediators? So, for example, if there is an increase in violence, do I really feel more afraid or if there is an increase of violence, is my physical health going to be affected? So we do that for the mediators that I'm telling you about: economic well-being, mental health, physical health and fear. And we find significant effects only for physical health and fear. And fear is important to tell you to just to try to put all the papers together that when we look at the average effects on economic well-being, we find no significant effects. But because this is all driven by self-employed people. Wage workers, at least in the short term—right, these are all short term effects— we find no economic effects on wage workers. So we find like a first evidence, like if there is an increase of violence, there is going to be a negative effect on physical health and fear don't seem to be affected. So then the next step is trying to say, OK, what if this mediator has an effect on risk aversion? So we are going to run these simple regressions in which changes in these mediators have an effect on risk aversion. And in this case, we find that only fear has a significant effect on risk aversion.

Andrea [00:47:15] So then what we do is a fully interactive model that is just like stratifying. It's just saying, OK, what about people that have fear or no fear or physical health? Let's try to see what is the effect now of violence and risk aversion, stratifying our sample or in a fully interactive model. And in this case, again, this shows that those are suffering, that the higher increase on fear, those that the effect of violence on risk aversion is stronger for these individuals. So we have like this first piece of evidence that is highly suggestive, that fear might be the most important mechanism. But again, we have this concern that these changes might be endogenous.

Andrea [00:48:03] So what we do next is complementing all of these estimations with a mediation analysis and a mediation analysis is- what we do is very intuitive. So the idea is the following. The idea is that in our main regression, we had a model in which we are going to have changes of violence, explaining changes in risk aversion. So what you do is just you going to change your dependent variable and you are going to change it for a demiated version of it. So pretty much what you are doing is just saying I have all the variation in risk aversion. Let me get rid of the direct effect of my mediator on risk aversion. So we have all the variation on risk aversion. And I'm going to take out the direct effect of fear of what I think is the mediator. So now I'm going to have only the part that that of risk aversion that is changing, but that is not related to changes in fear. And I'm going to run my regression and I'm going to do that for each of my mediators. And what is the idea, when I run this regression on each of these demediated versions, if I still find both a significant effect on the magnitude of the coefficient hasn't changed, that tells you that is not the main mechanism. But if you find that the main effect has gone away, that suggests that that is an important mechanism. So we do that for each of the mediators that I was telling you about. And for economic well-being, physical health, and mental health, we find that the effect of violence on these demediated version of risk aversion doesn't change. I mean, it's still- it has the the same significance and the magnitude of the coefficient doesn't change at all. But when we use fear, the significance goes away. And actually now the coefficient is only 12 percent of the original size, which is again, suggestive that fear is playing this important role.

Andrea [00:50:04] Now, this still is suggestive because this mediation analysis relies on two important assumptions. And the first one is that this mediator could be related with many other mediators, right? It couldn't be fear, it could be something else. But we couldn't come up with something else other than the ones we had tested. And again, we were lucky that we had the data to be able to test whether the other mediators were playing a role or not. So given that we tested this idea with the other ones and we didn't find any suggestive evidence that the other ones were playing a role, we felt comfortable thinking this is the only one that that is explaining. I mean, of course, if you think about something else, we could test it.

Jennifer [00:50:49] Yeah, no, I totally understand all the caveats and concerns and appreciate them. But I found this part of the paper super compelling. I was convinced by all of your analysis. OK yeah, so from there you of course run several robustness checks to convince yourselves that you're isolating the effect of violent crime on risk preferences and that those results aren't confounded in some way by other factors. So tell us about maybe one or two of the things that you really wanted to check and how you did that.

Andrea [00:51:18] Yeah. So the first one is that I have been telling you from the beginning, this is arguably exogenous variation, but I haven't talked to you about any empirical evidence backing up that. So that is a key assumption. Right. Is this really exogenous because you can think, look, people knew exactly where cartels were going to go. So all

your idea that this is exogenous, I don't believe it, and this is key for us. So we are going to do two things. We're going to use administrative data from the INEGI. They have a rich information at the municipality level. So we are going to use everything we can think about, like economic outcomes, socioeconomic outcomes, everything measured at the municipality level before the spike of violence. And we are going to see whether these predict the increase of violence. And we don't find any significant effect. The other thing is that you can think that these individuals, the people that you see, that risk aversion is going to increase were already on a trend that explained this risk aversion. So it wasn't violence. It was something else that was happening in their lives. What is good is that so far I have told you, look, we have also this data in 2002. We haven't used that so far, but now we can use it to create these pre-trends. Pre-trends in, again, fear, economic well-being, everything you can think about. And I'm going to see whether these pre-trends are related with exposure to violence. And none of that is related to exposure of violence, which makes us feel comfortable about this assumption of the quasi random variation in violence.

Jennifer [00:53:00] OK, so let's let's go back to the why does it matter question that I asked earlier. So why should we care that violent crime makes people more risk averse?

Andrea [00:53:12] Yeah, we should care because we have strong evidence that risk aversion is related to crucial decisions that individuals make that can have long term consequences on an individual's well-being, savings, investment decisions, fertility, human capital, and technology adoption. Now, when we see this relationship with violence, episodes of high levels of violence have a strike like developing countries like low and middle income countries, particularly. And these are the countries that don't have perfect credit markets. So now if we see that there is this connection about- there is violence that is going to affect risk aversion, and now you are going to be more- less willing to take certain risks. These vulnerable individuals can end up in a poverty trap. And the problem is that when we think about policies aimed at helping the victims of violence, we never think about this psychological effect. We never think about how can we help them? Because I don't know, there was like a mental health issue or because now they are more risk averse. And this is just showing you there is yet another pathway through which conflict and crime can affect the wellbeing of individuals. So we think about how to help the victims and we think about policy implications in post-conflict or post-violence environments, this is a pathway we need to understand and consider.

Jennifer [00:54:43] So this is all been your paper. Have any other papers related to crime and risk preferences come out since you first started working on the study?

Andrea [00:54:50] Yeah, so as I was telling you, many papers were happening at the same time, which was very, very cool from a creative point of view to see all the other papers happening at the same time. I haven't seen so much like violence, particularly on risk preferences, but there are two papers that I want to talk about that inform us on on this topic. And one is a very nice paper of Shanthi Manian. She's an Assistant Professor at Washington State University and she actually looks at the effect of the violence in Mexico. She uses another data set on risky health behaviors. So even though it's not risk attitudes, it is very informative and compelling to our results because she looks at these risky health behaviors. And she makes an important contribution to the literature because the canonical model predicts that when violence increases, risky health behaviors should increase as well. And what is the idea behind these results? The idea is that, well, if you think that the chance of survival is going to decrease because you are living in a high level violence, then there are no incentives to take care of your health. So you are going to be

more willing to take risks. But what she finds in Mexico, particularly using data of- she has a panel data of female sex workers in Ciudad Juárez, is that actually there is a reduction in risky sex transactions, which is consistent with the fact that risk aversion is increasing in Mexico. So I think this is a nice a nice paper that shows us that, look, these measures might tell you something important about our behaviors. And the effects of those behaviors is something that we need to understand better.

Andrea [00:56:41] And there is another nice paper by Teresa Molina. She's an Assistant Professor at the University of Hawai'i at Mānoa. And again, she doesn't look at particularly violence on risk attitudes, but she looks at whether when violence increases in the Philippines, whether there is an effect on the utilization of curative and preventative care. Actually, what she finds is that when violence increases, the probability that a mother takes a sick child to a health facility decreases. What she talks about about the mechanisms is the fear, the fear of being harmed. And again, this talks a lot about, well, if fear is an important mechanism on risk aversion and actually this is going to affect behaviors like going to the doctor, this is going to have huge implications, particularly in developing countries where the use of preventive care is already so low. So if this is diminishing because of this pathway, we need to understand more that and we now need to think about how do we help individuals in these settings.

Jennifer [00:57:48] Yeah. So related to that, what are the policy implications here? What should policymakers take away from your study and other work in this area?

Andrea [00:57:57] That is a very challenging question because I think- when we think that, I don't know, there are like more tangible things in conflict. Right? I don't know, like if education is decreasing, then you can think about, well, if it is the schools that- if it is the supply side, let's try to work on that. If it is the demand side, maybe a cash transfer could play this interaction effect that that is going to incentivize individuals to go. In this case, we are talking about this risk aversion. So I think—and this is something that I was telling you before—I think this has to push us to understand if we want to alleviate the effects of conflict and violence for the victims of it, we need to think about the psychological effects as well. We need to think about the effects on mental health.

Andrea [00:58:45] And overall, when I think about what we are living now, with COVID as well, I have been thinking so much about this research on crime because although they are completely different shocks, we can see similarities. We can see that there are effects on mental health. We can see that there are differential effects on the labor outcomes of women, for example. So these are all these unintended consequences on the psychological effects on mental health that we need to understand better. And now we need to push towards how do we tackle that? How can we alleviate these effects? I don't know. If we think, for example in Mexico, that this violence increased risk aversion, then we need to think about post-violence assistance programs that are aimed at helping individuals that now have a lower willingness to assume risky behaviors. So how to define those programs with that in mind, with having in mind that you have risk averse individuals that are less willing to take certain risks.

Jennifer [00:59:48] Right. So if you really want people to start businesses, say or go to college or a variety of other things that one could easily view as a risk in some way, you don't know what the payoff is going to be on the other side, building in more of a safety net maybe than you would have in the past might wind up being required. Yeah, super interesting. So what's the research frontier here? What are the next big questions in this area that you and others will be thinking about going forward?

Andrea [01:00:15] So I think it is very related to what we were talking about about the policy implications. I'm totally passionate now about this new research that looks at, for example, the interaction effects of climate shocks and safety nets, for example. So I think we need to understand now what are the policies that could help and whether really there is an interaction effect here or not. So if we thought that this was driven more by a financial mechanism, something that could be nice to see in Mexico that actually has been seen with climate shocks is whether individuals that have access to a safety net like Progresa, now called Prospera, whether the effect for them is less strong. Right. But now we need to think about the fear factor, the fear mechanism. So we need to think about like what potential programs could be given that have this interaction effect. So I think what we need to understand is we have the short term. What happens in the long term? Are these preferences really going to change in the long term or pretty much what we care about is that even if it was in the short term, there was a change in your behavior and this is going to drive these long term effects in your well-being and what are the programs that can help to alleviate that effect? So I think now it's like, yeah, we need to try to understand how to diminish that initial negative effect and what are the long term effects.

Jennifer [01:01:45] My guest today has been Andrea Velásquez from the University of Colorado, Denver. Andrea, thanks so much for talking with me.

Andrea [01:01:51] Thank you, Jen. It was very fun.

Jennifer [01:01:58] You can find links to all the research we discussed today on our website, probablecausation.com. You can also subscribe to the show there or wherever you get your podcasts to make sure you don't miss a single episode. Big thanks to Emergent Ventures for supporting the show. And thanks also to our Patreon subscribers. This show is listener supported, so if you enjoy the podcast, then please consider contributing via Patreon. You can find a link on our website. Our sound engineer is John Keur with production assistance from Haley Grieshaber. Our music is by Werner, and our logo was designed by Carrie Throckmorton. Thanks for listening and I'll talk to you in two weeks.