Just the Intersection of Opioids and Illicit Stimulants-Part 1.mp3

Introduction [00:00:05] Now, this is recording, RTI International Center for Forensic Science presents Just Science.

Voiceover [00:00:22] Welcome to Just Science, a podcast for justice professionals and anyone interested in learning more about forensic science, innovative technology, current research, and actionable strategies to improve the criminal justice system. In the first half of this two-part episode, Just Science sat down with Dr. Jon Zibbell, a Senior Public Health Analyst from RTI International, to discuss the waves of the opioid epidemic and their impact on communities. The world of medical anthropology offers a very different perspective of the current rise in illicit substance abuse. While much of the research surrounding overdose and drug trends tends to be retrospective, anthropologists like Dr. Jon Zibbell are working on ways to predict trends instead of identifying them posthumously. Listen along as he discusses the waves of the opioid epidemic, the impact they have on communities, and how we can apply the data we're gathering in this episode of Just Science. This season is in collaboration with the Bureau of Justice Assistance Comprehensive Opioid, Stimulant, and Substance Abuse Program funding to respond to illicit substance use and misuse in order to reduce overdose deaths, promote public safety, and support access to services. This season is funded by the National Institute of Justice's Forensic Technology Center of Excellence. Here is your host, Paige Presler-Jur.

Paige Presler-Jur [00:01:50] Hello and welcome to Just Science. I'm your host, Paige Presler-Jur with the Forensic Technology Center of Excellence, a program of the National Institute of Justice. Our topic today is a discussion of the fourth wave of the opioid epidemic pertaining to illicit stimulants and their impact on communities. We hope this discussion will provide ideas and guidance for communities such as those with the Bureau of Justice Assistance Comprehensive Opioid, Stimulant, and Substance Abuse Program funding to enhance their efforts to support access to timely and accurate information about the drug environment and increase the capacity of communities to develop effective responses based on the data. Today, our guest is Dr. Jon Zibbell, a senior scientist in RTI International's Community Health and Implementation Research Program. Welcome, Jon.

Jon Zibbell [00:02:46] Thanks, Paige. It's a pleasure to be here.

Paige Presler-Jur [00:02:48] According to your bio, you are a medical anthropologist. Can you tell us what that means?

Jon Zibbell [00:02:54] Yeah, absolutely. It's a confusing term. You know, in public health, I mostly go by behavioral epidemiologist because that's more akin in the professional space of what I do. But, you know, anthropology is one of the social sciences. It's been around for about 200, 250 years. And it's object of inquiry is the human condition. In fact, it's really about the study of the human condition and the diversity of the human condition. It deals with language, it deals with the past as in archaeology, it deals with evolution and biology, and it deals with culture. And so I'm on the last one, I'm a cultural anthropologist and really it's just studying human beings. And some of the topics that anthropology covers are all the universals, the human universals that we think about. That's kinship and education and child rearing and food production and religion - all those kind of categories of human experience that's shared across all different cultures. And when I was taking classes years ago, the subject of drugs came up, specifically psychoactive drugs and recreational drugs. And I had a professor at the time and we got into a back and forth when we were thinking about universal behaviors and practices that all cultures practice. And I brought up the

subject of drugs and we had a nice debate. And we came to the conclusion that like those other universal categories - as kinship, as religion, as the way people eat, as how they raise kids - every society and every culture has an aspect of recreational drug use to it. We've traced back drug use to the Sumantrans eight thousand years ago B.C., finding stuff - it was in the archaeological record - that shows that people used poppies and other substances. I became really interested in the problem of drugs as a problem that's experienced in every country and every society. The interesting thing about the discipline, too, Paige, is that the main method of anthropology is observation. It's about going in the field and it's observing people, observing people in their quote-unquote "natural lives" as they go about their day. And so that method of fieldwork, going into the field and observing people, is really akin to epidemiology. And so as I got into public health, I transitioned my methodological skills in anthropology to the study of public health.

Paige Presler-Jur [00:05:16] Can you tell listeners a little more about your community-based research on risk factors and health outcomes associated with the opioid epidemic and injection drug use?

Jon Zibbell [00:05:26] When I started to get involved in the question of drugs and drug use within the context of anthropology, I was just really fascinated of why people do drugs, why people do illegal drugs. What are some of the forces that drive people to do that? In studying drug use, I came to the understanding that in all societies, in all cultures, people have done substances both to change the way they feel, as medicines to better the way they feel, to cure diseases. And you know why people do specific drugs and not others, why some societies have had drug problems and not others - these were questions that really fascinated me. And the- really the discipline of anthropology gave me the tools to kind of compare drug problems across different areas. And as I said before, one of the field methods of anthropology is participant observation, and participant observation is about going in the field and documenting what people do. This is really different than just asking them questions qualitatively in an office face-to-face or doing a survey and having them answer 50 to 100 questions in a survey. This is really about being in people's natural environment and studying a certain phenomena by looking and observing how that phenomena unfolds and evolves.

Paige Presler-Jur [00:06:50] What led you to your research focused on drug use and health?

Jon Zibbell [00:06:53] Yeah, the biggest impetus that led me was the AIDS epidemic. I was studying drug use at the time I was in college. I was very interested in drug related health issues, and the AIDS epidemic really put that front and center. And specifically my research was how does the behavior of injection drug use, what is entailed with that, what drugs people are using, where they're injecting, who they're injecting with? How do all those together either increase negative health outcomes or ameliorate that risk? So that really kind of was the impetus, and the focus of my work in the community has been looking at drug use behavior specifically and how do behaviors lead to negative health outcomes. And this is where really anthropology fits in, because if let's say we're at CDC or at a state health department and we're trying to understand the behaviors that are putting people at risk for certain infectious diseases - whether that's hepatitis C or whether that's HIV or even endocarditis or bacterial infections - the first thing you need to know is how are people using? What are their behaviors? What literally are they doing - everything from how are they preparing their drugs, how are they getting them, what equipment are they using to inject them? All of these are really important questions that we can't weigh the level of risk associated with behavior if we don't know how people are using. And so

really, this is the impetus of my work is going into the community, talking with people, figuring out what they're doing, how they're doing it, with whom they're doing it, and try to figure out how all that together is creating risks both at the individual level but also at the community and population level, and then thinking about how we can reconfigure people's risks in collaboration with them in order so they consume healthier, they practice healthier behaviors, especially when they're unable or unwilling to stop using drugs. And that's the important part. People that can't stop or don't want to stop, how do we keep them safe while they're continuing to use and in the throes of their addiction so they don't have to get an infectious disease and live with that? How do we prevent the spread of that by really making their drug use behavior safer?

Paige Presler-Jur [00:09:01] Fantastic. Your background really points to this topic today, which is so critically important to communities across the nation. So I'm really excited to dive right in. But first, I think it would be helpful to orient our conversation by having you explain the current status of the stimulant crisis, which has been described as a fourth wave of the opioid epidemic. Can you tell us what that means and who is being affected?

Jon Zibbell [00:09:27] A really important question to understand new and evolving drug trends, especially those that evolved within the last 15 or 20 years. And you really can't understand the current stimulants crisis or the increase in stimulant use and related harms without understanding the opioid epidemic. So let me just go for your listeners and just give a brief explanation of that. We usually talk about the opioid epidemic and what I mean is the current opioid epidemic that started in the late 1990s. And people really hone that down to the development and distribution of OxyContin in 1996. But the current opioid epidemic started in the late 90s and it was precipitated by prescription opioids. I don't have to belabor the point here, but for a bunch of overdetermined reasons, we started prescribing opioids more and more for chronic pain and not just for cancer related pain or hospital pain or iatrogenic use in medical settings, but for outpatient use to deal with chronic pain. And, you know, most of that can be neuralgic pain. It can be back pain. So we just started to distribute it for chronic pain and that distribution and the diagnoses for chronic pain kind of exploded, so to speak. And, you know, the latest literature I think I read showed that there's about a hundred million people in the United States that report having chronic pain. Right. So we're probably talking about a third of all American adults. And so when we started to recognize chronic pain and prescribe opiates for it, the prescribing of those opiates increased and actually skyrocketed over a number of years starting in 1999. We went on like that for a while and the opioid crisis started to balloon. It started to hit its peak around 2008, 2009. Right around that time, we started seeing the increase in heroin use. And what the literature tells us now is that a lot of the folks that got exposed to prescription opioids or started taking prescription opioids for a chronic pain condition or that were just more prescribing prescription opioids around at the time, they got exposed to them through diversion - those folks started to not be able to afford the prescription. So they lost their insurance. And there was a transition to heroin and heroin being molecularly similar to prescription opioids. We saw a big increase in heroin and the change from prescription opioids to heroin is what we call the second wave and we call it- they're interrelated because a lot of people that started with prescription opioids transitioned to heroin. And so we had a heroin crisis from about 2008 to 2011, and that hit its peak around 11 and 12. And then in 2013, we started to see an increase in illicitly manufactured fentanyl, and fentanyl is the third wave. And fentanyl is molecularly similar to heroin, which is molecularly similar to prescription opioids. And so if you're a user of one, you can traverse those three drugs, and they'll all cure cravings and withdrawal symptoms. So there's a natural progression for someone to go from prescription opioids to heroin to fentanyl. Fentanyl started really in around 2013, and this is what we call the third wave. So

the first wave being prescription opioids, the second wave being heroin, and the third wave being fentanyl. And this third wave for fentanyl started in 2013, and it's still increasing now. We haven't seen really the decline of use or mortality related to fentanyl. And so those are really the three waves. And we're currently in the third fentanyl wave now.

Paige Presler-Jur [00:13:04] Well, can you tell us now about how those three waves of the opioid epidemic relate to the current stimulant crisis?

Jon Zibbell [00:13:12] You have the three waves that I said before, the first wave being prescription opioids, the second wave being heroin, and the third and current wave being a fentanyl. We've always measured those really in terms of mortality. And so the prescription opioid crisis, the increase in prescribing and use led to an increase in morbidity and mortality that transitioned around 2008. And heroin really started to increase - use, supply, and heroin-related morbidity and mortality -that went on for three or four years until 2013 when fentanyl appeared on the scene. And then fentanyl, being stronger than heroin and prescription opioids, that led to sharp, sharp increases in the number of deaths. And so when we talk about waves, we're really talking about mortality waves. And that's really important to understand because we think about the opioid epidemic as a singular epidemic. It's actually not. It's- when it comes to opioids, we've had three waves of them - prescription opioids, heroin, and fentanyl. Over the last three years, we have started to see in people that have died from opioids, mostly fentanyl, an increase in stimulants on their toxicology reports. And so it's really hard to see at the population level what drugs people are doing at any given time. You have to talk to people. You have to go into the field - there's really not any good national survey data that's actually timely that we can get this information. And so the way that we find out what drugs people are doing is we go into decedents - i.e. meaning of dead people - we go into their toxicology report to look what else is on board, what was the cause of death and the contributing cause of death. And that's how we really understand these three waves, and we can look back retrospectively and see the wave of prescription opioids and then the wave of heroin and then the wave of fentanyl. Well, right now, we're experiencing what people are calling the fourth wave. And the fourth wave is because it's the fourth big set of drugs that have really been showing up and seen as a contributing cause of death. And so for the last three years, there's been an increase in the number of people that died from an opioid overdose with stimulants on board. And so this has raised a really big, you know, panic in the public health community because we're like, oh, wait a minute, we've been dealing with opioids for these the past 20 years, but now we're seeing an increase in stimulant use and not just an increase in stimulant use, a large increase in stimulant use in around the country. And this has- this has really increased the cause for concern that we are entering another mortality wave that involves illicit stimulants. And that's why we're calling this the fourth mortality wave.

Paige Presler-Jur [00:16:02] And can you tell us who is being affected by this wave of stimulant usage?

Jon Zibbell [00:16:08] You know, it's important for listeners to understand that, as I said, it's really hard to grasp the type of drugs people are doing in real time. So we're going to people that already passed away from an overdose and looking at the drugs that they did. The problem, though, with looking just at toxicology reports from blood and urine toxicology from decedents, it just doesn't tell you how they're doing them or if they're doing at the same time or if they're using one one day and one the other. It's just a snapshot of what's happening at any moment in time. But what we do know what's happening, if you look at those decedent reports is that stimulants are involved in deaths mostly of people using opioids. So if you look at the decedent data, we're finding stimulants on the

toxicology reports mainly of opioid overdose decedents. We're not seeing a lot of deaths without opioids. And so this is really an important and interesting dynamic of the current increase. And so there needs to be ways to triangulate and not just look at death data and try to look at other data points and data sets in order to grasp how people are using stimulants, what they're using, what they're combining them with in real time, and not- not just trying to get that from death data.

Paige Presler-Jur [00:17:37] This is really interesting to be able to orient ourselves in this conversation. Can you now tell us what types of drugs comprise illicit stimulants?

Jon Zibbell [00:17:46] Yes, you know, CDC has been using the term psychostimulants as a kind of catchall term for stimulants, but they don't include cocaine in there as an illicit stimulant, and so the terms can be really confusing. Psychostimulant, illicit stimulant - where does cocaine fit in? I've been using the term illicit stimulants - we could even use illicitly manufactured stimulants - but stimulants that are illicitly made, that aren't available in a prescription. And so fentanyl being an opioid is a good way to describe this. So fentanyl is a prescription drug. It's offered as a prescription. The fentanyl that comprises the third opioid wave - the fentanyl crisis - is not that - it's not prescription fentanyl. It's illicitly manufactured fentanyl, and that comprises the most of the fentanyl. And so since we have a lot of prescription stimulants on the market, medications that are used to treat ADD and ADHD and some other ailments, it's important not to lump all the stimulants together and to try to parse them out, just like we do with the fentanyl. And so the two main drugs that comprise the majority of substances that we're seeing among decedents, amongst people that have died from an overdose, are cocaine and methamphetamine. Those are the two main drugs. And cocaine also comes in the form of crack. So cocaine would be the powder salt form and crack would be the smokeable base form. And then methamphetamine, and methamphetamine is usually coming in a crystalized form where the colloquial term is ice. And those are the two main substances. So cocaine and crack and methamphetamine. However, within the stimulant category, there's some other drugs. And so CDC, their psychostimulant category, they include prescription stimulants. And those are mostly methylphenidate, which is Ritalin, or amphetamine salts, which is Adderall. So prescription stimulants are involved in there as well. We do see them on decedent's toxicology so they are a player, but also CDC includes the cathinone group of drugs as well. And these are the designer drugs - this is like the MDMA and the Molly, which are stimulant backbone drugs - a lot of people don't consider them stimulants because they're kind of an hallucinogen and a psychedelic. And so that's really the gamut. Prescription stimulants, cathinones like MDMA and then you've got cocaine and methamphetamine. But to answer your question in a terse form, cocaine/crack and methamphetamine are the two illicit stimulants that are the majority to blame and the ones that we're seeing on overdose decedent's profiles.

Paige Presler-Jur [00:20:28] And what are the known health outcomes and behavioral risks associated with illicitly manufactured stimulants?

Jon Zibbell [00:20:35] You know, it's interesting. We have a lot of experience with drugs generally in the United States. So we don't have to come and answer these questions as we're answering them right now. We can really go back in the historical record and really look and see kind of the harms and the dangers around these drugs. We've had- we have had stimulant, quote-unquote, "crises" before. In listeners' minds, the most salient might be the crack epidemic of the 1980s and early 1990s. And so we know that we as a country were struggling with that for about 15 years. We've also had more recently, quote-unquote, "methamphetamine crises," and that's mostly around the domestic manufacturing of

methamphetamine. In 2001, George W. Bush identified methamphetamine as the most dangerous drug in America, and he actually attached it to the Patriot Act Bill as a way to kind of loosen up some law enforcement funds to address it. And so we've had a cocaine epidemic before and we've had a methamphetamine crisis before. What do we know about those two substances in terms of health risks? They're very interesting. For a long time, we've known cocaine does present cardiac risks. It does deal and interact - it's mechanism of action - with the heart, with cardiac. We know it's related to ischemic attacks. We know it's been related to other strokes and heart attacks. There's really a kind of a thick medical literature on the risks associated with cocaine in terms of heart attacks and strokes. So that's the more dangerous of the two. We also know that cocaine and crack, they're psychologically dependent drugs, but they're not physically dependent drugs like heroin or alcohol, meaning when you use repeatedly and you stop, you don't go through withdrawal symptoms like you're experiencing the worst flu you've ever had that you do with benzodiazepines, with opioids, or with alcohol. The stimulant class is usually more of a psychological dependent substance. And so with the risk of cocaine, we have heart attack. We have heart-related risk, cardiac issues, and we also have addiction risks, right? We know that crack addiction and cocaine addiction, stimulant use disorder is a real disorder that can be treated. Methamphetamine, on the other hand, very similar to cocaine in that it's only psychologically addicting - it's not a physically dependent drug so it's not like heroin. However, it's much more stable than cocaine in the body and it's a slower metabolism. And so it's not the same bang for your buck, so to speak. It's a strong drug, but it lasts longer. Cocaine, the peak goes up quick and comes down quick. Methamphetamine really is a more longer mechanism of action. And I think what your listeners will find really interesting is that, you know, methamphetamine was invented about one hundred, one hundred and twenty years ago, and since then, we've never had any mortality risk associated with it. We haven't had any mortality crises associated with it. Even in the 2001 Patriot Act, when the president called it the most dangerous drug in America, it doesn't have a history of killing people. Cocaine, however, it's definitely addictive. It's psychologically addictive. It's been known to kind of contribute to social decay and family disintegration like a lot of addictions do, but it's not fatal in itself. And that's really interesting. And so, you know, to summarize really, just briefly, cocaine in the literature is a risk factor for cardiac-related issues - strokes, heart attacks, et cetera. Methamphetamine doesn't have that. The lack of mortality risk around methamphetamine is very interesting. And so there are two drugs that are being used quite a lot now, but they both have separate health risks, cocaine being much more deadly in terms of cardiac than methamphetamine.

Paige Presler-Jur [00:24:32] What trends are we seeing and how do these trends intersect with the current opioid epidemic?

Jon Zibbell [00:24:38] What we're seeing is a still high, high trend of opioid overdose deaths in the United States. In 2019, we had about seventy thousand drug overdose deaths and about 70 percent of those were due to opioids. And for 2020, CDC is estimating that we're going to go past that. And we're looking at about seventy five thousand drug overdose deaths and about 70, 75 percent of those are related to opioids and about 80 percent of those are related to fentanyl. So the drug overdose crisis we have in the United States right now is fentanyl - fentanyl is killing the majority of people in the United States and North America more generally when it comes to overdoses. But what we've started to see over the last three years was an increase in people that died from an overdose, from opioids, with stimulants on board, meaning their blood and urine was tested and we've been finding either cocaine or methamphetamine in their system. And this has been increasing pretty precipitously. Me and my research team are looking at

Ohio, the state of Ohio, specifically just to get a case study of this, and we're seeing since 2017 deaths involving stimulants have been increasing. And that's an important distinction to make - deaths involving stimulants or deaths caused by stimulants. So, again, we're seeing fentanyl deaths increase and we're seeing the number of people that have stimulants on board when they died also increase. And so what that's telling us, and this is triangulated with a lot of state level and local level data, is that what is happening is you have people that are using opioids, specifically fentanyl, that are also using illicit stimulants, and they're using them together and they're dying from a fentanyl overdose and stimulants are on board. So the question for me, as a drug researcher looking at these data for the last three years is how much - so what's the proportion of these deaths that are really caused by stimulants? So when you look at the toxicology data, we definitely see an increase in use, and it's really hard to get state level or national level data on use. So if we're going to say how many people are using stimulants or using cocaine in the last 12 months, we have that data but it's three or four years old. SAMHSA collects that data, Substance Abuse and Mental Health Services Administration, but it's not timely. And so we don't get really a current understanding of those patterns. And so looking at the data, looking at the increase in decedents that have stimulants on board, me and my research team have been trying to ask, OK, so what part is stimulants? Is stimulants actually contributing to this increase in deaths or are we just seeing an increase in stimulant use and people are really dying from fentanyl? So this was really our question. I think the answer to this is really important because if you just look at the tox data, you can really say, oh, we're really- we're really in trouble. Stimulants are killing people. They're being used more and they're killing people more, right? So that can lead to a really important public health response if in fact, they are. Why I had skepticism on that is that if you go into one hundred years of literature on methamphetamine, and I said this earlier, you'll be hard pressed to find any mortality trends associated with it. Meth historically just doesn't kill people. It creates addiction. It creates social decay, right. It can really create family disintegration and employment issues, but it generally doesn't kill you. Cocaine as a mechanism of action for a stimulant does have more lethal risks, but if you go into the death data and even look at cocaine deaths, they're always usually with something else, with another opioid, with something else. And so you control for other drugs and cocaine and methamphetamine just don't have the amount of depth to explain the level of mortality we're seeing in the opioid overdose epidemic. And so it was with that question that we started to look at the Ohio data. And what we did is we looked at all the people that died of a drug overdose in Ohio for a bunch of years. And what we found was that the majority of deaths were fentanyl opioid overdose deaths. And when you control for fentanyl, right - you take away all the deaths that included fentanyl - methamphetamine and cocaine barely even make a blip on the mortality curve. And what this tells me is that, yes, people are using more stimulants. Right. And right now, I'm researching, trying to figure out why - why is that happening? And they're definitely using them with opioids and fentanyl. What we don't know is how much that those stimulants are responsible for deaths and for this mortality wave, which is why it's problematic to call the stimulant crisis a fourth mortality wave. We don't have the evidence yet to say that methamphetamine and cocaine are responsible for the increase in overdose deaths. We just don't have that right now.

Paige Presler-Jur [00:29:59] So what are the best sources of information that people are using to capture the increase in stimulant use and its relationship to morbidity and mortality?

Jon Zibbell [00:30:09] The question of what data sets can you use in addition to decedent death data, right, that has toxicology on it because again, that's just a snapshot in time, right? So someone that has methamphetamine on their tox and has fentanyl on their tox -

you don't know if they injected both of those at the same time, like speedball or a goofball. You don't know if they use sequentially - one, then the other one after. You don't know if they use stimulants the day before and fentanyl the day that they died. So it doesn't really tell you enough. And controlling for fentanyl in the death data, we don't see a lot of mortality related to stimulants. So what other data can we get at to try to see other factors going on? And the most important for me and my research team has been working with law enforcement and using their drug seizure data, and that's data of the drugs seized during drug arrests. States and localities, when they make an arrest, they test the drug to make sure they have a case in court and that it's actually the drug, and then they put that information into a database. And some of that data goes into a national system, and DEA runs that national system - it's called the National Forensic Laboratory Information System - NFLIS as the acronym - and NFLIS collects drug seizure data. And if you even actually go to states and localities, you can go to state crime labs that are the ones doing all the testing of these drugs. And so what that'll give you is the supply. Has the supply been increasing? So for prescription opioids, we knew the supply was increasing because prescribing has a record and you could- you can go see, oh, what was prescribed, what was the kilogram prescribed, how many MMEs were prescribed? So there's a record of that. So we can see oh, wow, prescription opioids have increased precipitously in the number of prescriptions. There's no PDMP for the illicit drug market, right. So we don't know how much of something is coming into the country or how much of something is available. And so the law enforcement data allows us to look at changes in supply and they test all their drugs. They're testing them for fentanyl, they're testing them for methamphetamine, they're testing them for cocaine. And so looking at the supply is really important. And what we found looking at the supply, Paige, is that stimulants - specifically in cocaine and methamphetamine - the illicit supply has been increasing precipitously at really the same pace and longitudinalness as the deaths. And this is what we found for fentanyl - in 2013 as fentanyl deaths started to skyrocket, we didn't know if they were prescription deaths or they were related to illicitly manufactured fentanyl. So we went into the prescribing data. We didn't see any increases for fentanyl prescribing. So then we went into NFLIS and we went into state crime labs and voila. What did we see? We saw really sharp increases in seized cocaine and methamphetamine in areas that also had really high overdose rates. And so supply is really important because it can tell you the levels of exposure, just like if you're looking at an infectious disease and you're trying to find risk in a community or even COVID risk in a community, you're looking at the amount of people infected per 100000 or you're looking at the amount of deaths from the virus per 100000. And that gives you a proxy indicator of the risk in that area. Supply side information around drugs gives us that as well. Where are the drugs being seized? What are the drugs that are being seized? How much and have they changed over time? And so this is really important. And what we're seeing across the country is an increase in cocaine supply and more importantly, methamphetamine supply. So we know there's more drugs available, and if there's more drugs available in a market, people are exposed to them and they will use them. So we know from history the relationship between supply and demand and supply and use so that's a really big data set to use. And then I think that the prescription drug monitoring programs is another one as well, making sure that it's not prescription stimulants and how are prescription stimulants related to the illicit stimulant problem. So understanding trends in prescribing as the licit supply, if you will, understanding trends in the illicit supply through NFLIS and crime lab data, and then juxtaposing that with local level overdose data and the ability to triangulate starts- the ability to look at trends related to supply, consumption, and related morbidity and mortality.

Paige Presler-Jur [00:34:58] We have covered so much in part one, Jon. I look forward to next week when we can continue this important discussion.

Voiceover [00:35:07] Next week, Just Science continues the conversation with Dr. Zibbell as he discusses generational drug trends and the differences between various illicit substance epidemics in the United States. Opinions or points of views expressed in this podcast represent a consensus of the authors and do not necessarily represent the official position or policies of its funding.