Dr. JOHN BERARDI SHOW

Illuminating the SEX & GENDER Spectrum

PART 1

The Dr. JOHN BERARDI SHOW

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Illuminating the Sex & Gender Spectrum – Part 1 Transcript

Janae Kroc:

"Boys have a penis, girls have a vagina. That's hashtag science." No, that's a third grade understanding of science. That's not reality, that's not the truth. Talk to any advanced biologist and they will explain to you that it is not that simple.

John Berardi:

This is The Dr. John Berardi Show, a podcast that seeks important lessons in a seemingly unlikely place, amid competing points of view. In each episode, I look at fascinating, sometimes even controversial topics, through the minds of diverging thinkers, and together we tease out unifying threads from ideas that may feel irreconcilable.

John Berardi:

Today's topic? Illuminating the sex and gender spectrum. In this series, we'll explore how modern scientists and sociologists are thinking about biological sex development and gender, and how that differs with past ideas.

John Berardi:

Along the way, we'll talk to one of the world's top molecular geneticists, one who was actually part of the team that in the nineties discovered what's been called the sex-determining gene, SRY. We'll also hear from a social scientist, former professor of gender studies and former policy writer for a prominent gender-focused think tank in Toronto. And two well-known trans women, both scientists, both elite athletes, about their lived experiences being non-binary in a binary world.

John Berardi:

This is, as you can imagine, a broad and complex topic and it's a divisive one. So, my goal in creating this series was twofold really. First, I wanted to learn more about sex and gender and myself. The stuff I was taught back when I was in school, even grad school, is antiquated. Some of it has even debunked. So, I wanted to get up to speed.

John Berardi:

Second, I wanted to share what I'm learning with you in a neutral, evidence-based, non-politicized way, because, chances are, if you're like I was your understanding of sex and gender may be in need of an upgrade. And without it, you'll have a hard time understanding a lot of stuff that's presented in the media nowadays. Stuff about gender pronouns and trans rights and non-binary identities and inclusiveness and more.

John Berardi:

Now, I'm not trying to change your mind about anything here. I'm just here to present some of what's known today and let you make up your own mind. With that said, let's get started.

John Berardi:

Okay, I'm going to start this episode with something familiar, a story about one of my kids. We were at a Shoppers Drug Mart. And, for those who don't live in Canada, that's like a Walgreens or a CVS in the United States. And, as we're checking out, we meet a really friendly cashier. Now, the cashier presented as, or appeared to be, biologically male, but was adorned with female signifiers like lipstick, earrings, painted nails and colored hair.

John Berardi:

Also, our cashier spoke with what's called, quote, unquote, "Gay male speech." Now, that's a phrase used in academia. I didn't make it up. There is linguistic research looking at how gay men tend to use pitch, phrasing and phonetics differently than straight man. But anyway, our cashier spoke using some of these characteristics.

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John Berardi:

Now, I was with our oldest daughter. She was about nine and a half at the time. She was just kind of watching this cashier very closely. So, when we got to the parking lot, I asked her if she had any questions.

John Berardi:

Do you remember asking me about that cashier at Shoppers?

Kid:

Yeah.

John Berardi:

And do you remember what you wanted to know?

Kid:

Well, I was just wondering why what seemed like a male cashier was doing female things, like wearing makeup or nail polish and earrings? And he spoke a little differently than you, so that was another thing I was wondering.

John Berardi:

So, we got to talking about it. By the end of that conversation, we'd covered a lot. We explored ideas about biological sex, which I'll let my friend, Dr. Krista Scott-Dixon, former professor of gender studies at York University, define for us.

Krista Scott-Dixon:

Sex is this collection of characteristics, biological characteristics that we would cluster into male or female or intersex. We know that male and female are not opposites in the way we tend to think of them. Really, it's more like a continuum.

Krista Scott-Dixon:

So, humans are a sexually dimorphic species, which means that there's more or less two biological sexes but there's lots of stuff in the middle. So, when I'm saying the term sex, I mean biological sex, this collection of characteristics that we identify and use to divide most humans into male and female, or, again, intersex.

John Berardi:

If you're unfamiliar with the term intersex, that's okay, we'll talk about it later. For now, though, I just wanted to level set on the fact that biological sex is a grouping system humans currently use to sort people based on things like their chromosomes, gonads, internal reproductive organs, external genitalia and hormone levels. I also wanted to mention that this grouping system isn't perfect. It's certainly not black and white, as we'll see later in the show. And I wanted our daughter to know that.

John Berardi:

Beyond talking about biological sex, we also talked about gender, which refers to the socially-constructed roles, behaviors and symbols associated with, quote, unquote, "Being a man," or, "Being a woman." Things like whether you wear pants and keep your hair short versus wear dresses and keep your hair long. Things like whether you're accommodating and emotional or competitive and calculating. Things like whether you take care of the children and the meals or do home repairs and work on the car.

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Krista Scott-Dixon:

There's lots of different aspects of gender as well. And so, gender norms and roles and how to perform your gender vary quite widely across cultures. So, while all humans more or less will have similar sexual characteristics, they're not octopuses, they're not birds, they're not fruit flies, globally there are all kinds of ways to do gender.

Krista Scott-Dixon:

We can think of gender as something you perform, something that you do, something that you bring into being. Just to even break it down further real quick, when I say gender identity, that's like your deepest felt sense of who you are. Right? Who is John at his core? Who is Krista at her core? What's the deepest sense of identity? You have who you are as a gender.

John Berardi:

It's an interesting thought, really, one that a lot of us haven't likely spent much more time. The idea that there's some deep part of us located in our consciousness, wherever that might be, that actually feels male or female.

Krista Scott-Dixon:

And then we have gender roles, which is what we expect people in different societies and cultures to normally do. And of course, gender roles change. Then there's gender performance, how do you show to the world who you think you are and what you think you are. And that can change, right? We think about drag performances or even just the outfit you wear today versus another day. So, there's lots of these different kind of granular elements to gender too.

John Berardi:

So, that's also something I wanted to talk to our daughter about, the different aspects of gender from gender identity to gender roles to gender performance.

John Berardi:

Also, how a person might see themselves with respect to these roles. Maybe they were born a man and that's what they feel like. They embody more of the male traits and are attracted to more of the male behaviors. They feel most themselves when they look like a man, dress like one, act like one. But maybe they were born a man but feel more like a woman. Despite having male parts, they embody more female traits and are attracted to more of the female behaviors. By the way, this is what some people call trans. Or maybe they were born a man but feel like a mix of the two genders, or they don't feel like either. This is what some people call non-binary. Others might call it gender queer.

John Berardi:

Again, we talked about all this, matter of factly, not judgmentally. I wanted her to know what different people could be like and why they might appear to be one sex but present as a different one, or neither one. We even ended up discussing sexual orientation, which describes people based on who they're emotionally, romantically or physically attracted to.

John Berardi:

And I wanted to cover this because it seems like people continue to confuse biological sex, gender identity and sexual orientation. As my friend, Janae Kroc, a trans woman who you'll meet later in the show told me ...

Janae Kroc:

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It's still a common misconception in a lot of circles that gender identity and sexuality are the same thing or that they're interwoven, and they're completely separate. In reality, trans people can be attracted to the same sex, the opposite sex, both sexes, neither. The same as cis people. It's just that that's when people find out that I'm trans but I'm still primarily attracted to women, they find that really confusing, because there is this whole idea as well, "The only reason you want to be a woman is so you can date men," and no, absolutely it's not. It has nothing to do with that.

John Berardi:

So, with respect to orientation, we discussed how you could be born a woman and be attracted to, want to live with, want to marry a man, or you could be born a woman and feel that way about another woman, or you could feel that way about both men and women.

John Berardi:

And we discussed how there could be all sorts of combinations because you have three variables: biological sex as distinct from gender, as distinct from sexual orientation. So, yeah, it was a longish conversation, and by the end I was feeling pretty pleased with myself as a science-based, progressive, modern parent. In my mind, I was winning the parenting game. At that point, our daughter paused ...

John Berardi:

Do you remember what you told me that day about who you wanted to marry?

Kid:

Yes. I said I think I wanted to marry a girl.

John Berardi:

Okay. And do you remember why you said that?

Kid:

Well, I told you that I wanted to marry a girl because I totally want to have kids but I don't want to have kids. So, I'd let my wife do that part.

John Berardi:

Okay, so this is your way of making another woman do the hard and painful part?

Kid:

Yeah.

John Berardi:

Thanks for sharing, buddy.

John Berardi:

Now, I can hear it already. Some out there will say that our daughter was too young to know about these sorts of things. And I get why some might have that opinion. Not every nine-and-a-half-year-old is ready for this conversation. Based on their maturity, education and understanding of the world, many won't be. But I felt like ours was. Even more, ready or not, there's JoJo Siwa. Can you tell me about JoJo Siwa?

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Kid:

Well, she's this teenage girl who wears this big bow, loves bedazzling and likes to act and sing.

John Berardi:

That's a good description. Do you remember when you made me take you to her concert?

Kid:

Made you? You wanted to go. Anyway, it was a fun night. You and me and 10,000 screaming girls with their moms.

John Berardi:

Now, if you're the parent of a tween, you probably already know about JoJo. If you don't, don't sleep on this bow-wearing and sparkly 17-year-old Nickelodeon phenomenon. She was on Time's 100 Most Influential People of the Year list last year. In recent news, she announced that she's dating a girl.

John Berardi:

I share this because for kids growing up today, there's a broader exposure to the sex and gender spectrum. It's just part of life. A Gallup survey released in February found that 16% of Americans born between 1997 and 2002, so-called Generation Z, self-identify as LGBT. Compare that to the 9.1% of Millennials and the 3.9% of Generation X, my group.

John Berardi:

From these data and others, many are starting to think that, while it may never be easy to talk about being non-binary and non-heterosexual in a binary world, it's getting easier. That people don't necessarily have to come out nowadays, they just are, or at least that's the direction things are headed.

John Berardi:

So, I worry less about the kids and more about the adults, because many of us adults are woefully ignorant about sex and gender issues, still relying on the 1990s classic Kindergarten Cop to define sex and gender for us. "Boys have a penis, girls have a vagina." And as Janae said at the top of this episode ...

Janae Kroc:

That's a third grade understanding of science. That's not reality, that's not the truth. Talk to any advanced biologist and they will explain to you that it is not that simple.

John Berardi:

Humans love binaries. It's probably the simplicity of it. When things are either good or they're bad, they can be clear-cut. Well-defined lines can be drawn in the sand. But binaries operate in a unique way. They're both diametrically opposed and forever linked. Can we actually have the concept of good without the concept of bad? And when we talk about binaries, we don't just describe the attributes of the one thing, we also include how it's not the other thing.

John Berardi:

But the absolute truth of binaries falls apart quickly, even with a surface-level examination. For example, at what point during dusk does the sky go from light to dark? When you feel unwell but your doctor runs tests to say there's nothing wrong with you, are you sick or healthy? When it comes to biological sex, if you were born with a penis but also develop

breasts during puberty, are you a boy or a girl? What about if you were born with a vaginal opening and a penis? Yes, these biological variations exist and they occur more frequently than you probably think.

John Berardi:

That's what we'll explore now, the question of sex as a binary. Remember, I'm being very specific about words here. I'm not saying gender. I'm saying biological sex. And I might as well state it outright: the scientific consensus, today in 2021, is that neither sex or gender should be viewed as binary. To understand all this, I think we have to go back to junior high science class.

Alaina Hardie:

What a chromosome is, is a large chunk of the section of your DNA that tells your body, gives your body the instructions for making all of the parts that it needs.

John Berardi:

This is Alaina Hardie, who I'll more fully introduce later in this series. Here, she'll give us a really brief primer on how boys and girls are made.

Alaina Hardie:

Chromosomes will coalesce, and they have a certain shape that you can see under a microscope.

John Berardi:

These chromosomes are like tidy ways to package up DNA, your genetic material, your blueprint. They make it easy to organize the material and easy to carry out the DNA instructions.

Alaina Hardie:

And most of the time you have this certain number of chromosomes, there's 46 chromosomes. 23 from your mother, 23 from your father.

John Berardi:

So, these 46 chromosomes are paired up, making 23 pairs in total, and they're in every cell of your body. Imagine these as 23 little packets of information, with each packet containing half of its data from your mom and half of its data from your dad. Now, all these pairs look the same in both males and females except the last pair, the 23rd. In that last pair, we have what are called the sex chromosomes.

Alaina Hardie:

The sex differentiation process that happens in development happens based on whether everybody has one X chromosome, or whether the other chromosome is an X or a Y.

John Berardi:

So, what most of us have been taught is that we all inherit an X from our biological mother, and from our biological father we get either another X, making us XX, female, or we get a Y, making us XY, male. Now, most of us have heard this story before and it seems simple enough. There's either XX or XY. The problem is sexual differentiation is far more complicated than this because biology is rarely so neat and tidy.

John Berardi:

For example, a body can be XY, again what we think of as male, but for other genetic reasons, like variations on other genes, develop female parts and characteristics. This can happen when one's cells are resistant to masculinizing hormones, testosterone and other androgens. In fact, many XY women, who have the male chromosomal pattern and male testosterone but whose bodies look fully female, don't discover that they were born XY until they hit puberty and don't end up menstruating.

Alaina Hardie:

If you have testosterone or any of the androgen hormones, there is a receptor which is like a protein molecule ... And it's a little bit more complex than this because of how sex hormones work. The testosterone connects to this protein molecule, this androgen receptor. And there are people in the human race where there's a mutation in that where the entire androgen receptor cannot form. The body could be XY and would produce testosterone, but the body can't use it. And since during development testosterone is one of the hormones that happened, that body can develop female.

John Berardi:

Essentially, the body makes testosterone and it has the testosterone receptor to use that testosterone to do, quote unquote, "Man stuff," but the receptor is broken. And because of that, it's like the person never had any testosterone at all.

Alaina Hardie:

Again, there's a whole range of what happens with androgen. I just gave you one version of androgen insensitivity syndrome. But now, I can't even say someone with XY is going to become visibly male with an outie instead of an in, because it's not always true. I think, because the thing that we're biased to our sample, right? And our sample is boy, girl. But it's much more complicated than that. Like you said, people who actually understand how this works, people who do their research in sex differentiation or developmental biology or gender, they understand all of this.

John Berardi:

Similarly, a body can be XX, again what we think of as female, but look male during development. This sometimes happens when an OI chromosome gene sneaks in from dad and ends up on another chromosome. Another interesting development is that some bodies can actually inherit extra chromosome copies and end up as XXY, XXX, YYY and so on.

Alaina Hardie:

Sometimes, what happens is that there are multiple copies of a chromosome. So, there are people who have two X chromosomes and a Y chromosome.

John Berardi:

So, they are XXY?

Alaina Hardie:

Correct. There is an XYY, so someone has two copies of the Y chromosome. There's XXXY.

John Berardi:

There are a lot of possible combinations here, and in general these types of phenomena, where bodies are chromosomally or developmentally ambiguous, are known as intersex. Now, I told you we'd come back to this. It's estimated that about one in 1,500 people are intersex in some way.

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John Berardi:

And this category exists because they're not entirely male or female, as conventionally defined by their chromosomes, their gonads, internal reproductive organs, external genitalia and hormone levels. They're a mix of the two, another category, intersex. If it's surprising to you that this even exists, well, that's understandable. Most of us aren't walking around with our genitals exposed all the time, thankfully. As Alaina jokes ...

Alaina Hardie:

I've never seen the junk of anyone I work with.

John Berardi:

Meaning, how could you know about all the varieties of sex differences unless people actually told you, and what incentive would they have for doing that? We don't live in a world where sex differences are accepted. So, who's going to tell you about their non-binary chromosomal differences or their, quote unquote, "Unusual genitalia," and risk being mistreated for something that was hidden under their jeans, their pants, or their DNA anyway?

John Berardi:

Now, to help us further unpack this idea of a biological sex spectrum versus a binary, I spoke with Dr. Vincent Harley. He's a geneticist at the Hudson Institute of Medical Research near Melbourne in Australia. He leads the Sex Determination and Gonadal Development Research Group, and his work dives into different aspects of sex and gender, including children born with ambiguous sex. He was actually part of the British team in the early nineties that fundamentally changed what we know about how embryos in the womb develop to be either males or females.

John Berardi:

Now, this was before the Human Genome Project was complete. At the time, there was a worldwide arms race to reveal what secrets were held in DNA, and Dr. Harley's lab made a breakthrough.

Vincent Harley:

You probably know that males and females have different sex chromosomes. Males have an X and a Y, and females have two X chromosomes. Our laboratory in London discovered the gene on the Y chromosome that made males male, and it was quite a sensation. We had even more press a couple of years later when we proved the gene was in fact the only thing you needed. The gene is called SRY and it's a tiny part of the Y chromosome. We put that into an XX mouse and it turned that, what should be a female mouse, into a perfectly happy, healthy, male mouse called Randy.

John Berardi:

This is what I mentioned earlier where a Y chromosome gene can sneak in from dad onto an XX offspring, again totally naturally, except here they did it in a lab.

Vincent Harley:

And Randy had normal copulatory behavior. And Randy was on the front page of The Times and The Independent, English magazines, showing his genitals. So, rarely does a transgenic mouse end up on the cover of the newspapers. It was a very exciting time in the early nineties. I've continued working on this gene ever since, this boy gene. Mainly how it makes us a boy, but more recently I found it was in the brain.

John Berardi:

Now, we'll come back to that brain part in just a second because it's important. But for now, we should talk about how this SRY gene works.

Vincent Harley:

When you go way back to about week seven of human gestation in the human embryo, the gonads are just developing as a thickening of the kidney. That gonad is called bipotential. That means that gonad can develop into a testes, which will then secrete the testosterone etc. that will virilize the embryo, or that gonad could develop into an ovary.

Vincent Harley:

The switch that determines whether it becomes a testes or an ovary is the Y chromosome gene, SRY, in mammals, but in crocodiles it's temperature and in birds it's the Z chromosome. There are different mechanisms that make that switch. But back in week six and seven, male and female, our gonads were identical, they were indistinguishable. So, we have the potential to take one course or the other. And during that course, we have the potential to flip, even post-natally. It's incredibly plastic.

John Berardi:

From the genetic point of view ...

Vincent Harley:

There are a whole bunch of genes that help to make a testes and will antagonize an ovarian pathway. And converse is true as well, to be a typical female, there are a whole bunch of genes needed to make an ovary that promote ovary development and suppress testicular development.

John Berardi:

Maybe it's helpful to think about the human genome as a set of light switches. Turning them on or off is what determines all our different attributes, including our appearance, our personalities, even our predilection for disease. But there's not any one master switch. There are tons of little switches that taken together make you unique. Same goes for biological sex. Let's say that you have a big wall of a hundred light switches. Each of them controls a part of a person's genes [inaudible 00:27:19] code for sex.

John Berardi:

In this example, if every one of those hundred light switches were turned up, you'd be a hundred percent female. If they were all down, you'd be a hundred percent male. But what we're learning, what Dr. Harley has been studying for 30 years, is that it's way more likely that you'll have a mix of up switches and down switches, and that makes it clear that sex isn't really binary, it's more of a spectrum.

Vincent Harley:

These processes are all stochastic and they're all about thresholds and they're often not reached. You end up getting a spectrum. And even if you look at genitals, I'm not a clinician, but there is a staging process of the way the penis looks and the intermediates between a penis, a small penis, a large clitoris and a clitoris is a spectrum.

Vincent Harley:

And whether you call something a micropenis of a penis, it's cultural, it's contemporary. That scale has been shifting around over the decades. So, it's pretty loose and it is a spectrum, visibly, at that level. If we look biochemically it's a spectrum. You can measure levels of things and it's a spectrum.

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John Berardi:

So, visualize a line across a page, on the far left of the line is a hundred percent male. For example, XY, testes, fully-formed and functional penis. And on the right is a hundred percent female, so XX, ovaries, fully-formed vaginal opening, clitoris.

John Berardi:

In between the two we find various degrees of differences where there are varieties of chromosomal differences, anatomical ones, differences in hormonal sensitivities and differences in hormone production and more. Actually, in the September 2017 issue of Scientific American, there's a great illustration of this called Beyond XX and XY. You can find it freely available on the internet, and I really encourage you to check it out.

John Berardi:

Intersex, then, is the category given to folks who live between the polar ends. They're not typically biologically male, and they're not typically biologically female. They're intersex. And again, intersex births are more common than you think. In general, as I mentioned earlier, it's about one in 1,500 who are born so noticeably atypical in terms of their genitalia that a sex differentiation specialist is called in.

John Berardi:

However, the total number of people whose bodies differ from the, quote unquote, "Standard male or standard female," again based on chromosomes and gonads and reproductive organs and genitalia and hormone levels, that number is one in a hundred. This is where any rhetoric insisting that biological sex isn't a spectrum, that it's a simple binary, just doesn't hold up.

Vincent Harley:

This is nature. Intersex conditions occur in all animal species. Humans are no different. And they occur naturally in crocodiles and birds and mice. We studied some of those naturally-occurring situations. So, I don't buy into it.

John Berardi:

The idea that biological sex is binary, as simple as man versus woman ...

Vincent Harley:

I see it as a spectrum and it's part of natural, biological diversity.

John Berardi:

We'll explore some important lessons that flow from this after the break.

John Berardi:

Okay, we're going to take a little break here so I can talk about one of our sponsors. Precision Nutrition. The world's largest nutrition education, coaching and software company. I wanted to start by telling you that Precision Nutrition is kind of different. That's because their programs uniquely address the needs of individuals across the sex and gender spectrum, as well as the age spectrum, ability spectrum and more.

John Berardi:

Their core philosophy is centered around something they call deep health. This is the idea that one can't truly be, quote unquote, "Healthy," unless all dimensions of health are in sync. So, it's not just about how we eat or move, although those are important. It's about a multidimensional thriving of the whole person in the context of their whole life. If it sounds deep, well, that's the point, and it's what's made them the biggest nutrition coaching, education and software company in the world. So, if you'd like to learn more about Precision Nutrition's renowned coaching program for clients, or Precision Nutrition's number-one rated nutrition certification program for fitness, wellness and healthcare professionals, please visit www.precisionnutrition.com/jb, my initials, where you can check out PN's programs and, because you're a listener, get early access and a nice discount. Again, that's www.precisionnutrition.com/jb. All right, back to the show.

John Berardi:

One conclusion that I draw from my chat with Dr. Harley isn't that biological sex is a myth or that it's unimportant. Neither is true. There are biological sex markers. And something else that Dr. Harley studies is how those markers correspond with diseases.

Vincent Harley:

More recently, I'm interested in why males and females are susceptible to different neurological conditions like Parkinson's disease and schizophrenia, and there are sex biases in those conditions. For example, in Parkinson's disease we think there are mechanisms underlying sex bias. And we know that estrogen is a good guy in females, in animal models and primate models for Parkinson's disease, and it can protect the neurons.

Vincent Harley:

But it doesn't protect the male neurons, it does damage. And on the other hand, our recent work, published last year in the National Academy of Sciences, showed that there are also factors in the male which are deleterious, such as the Y ... or become deleterious, at least in experimental models so far, in Parkinson's disease.

John Berardi:

Likewise, women have a higher lifetime risk of developing Alzheimer's. Men who contract COVID have poor outcomes, which is probably in part related to immune responses. And while women seem to have stronger immune responses, which is great for COVID, it may make them more likely to get autoimmune diseases.

John Berardi:

So, knowing more about someone's biological sex, their chromosomes, and their gonads, and their reproductive organs, and their genitalia and their hormone levels, especially if they're typically male or typically female, is really useful when looking at questions like this. And remember, 99% of the 140 million human births each year are typically male or typically female.

John Berardi:

Yet, it's important to also leave room for the 1.4 million people born every year who are not, quote unquote, "Typically male or female." This is something that doctors and activists have wrestled over since 2005, when the term DSD, disorders of sex development, came into use.

Vincent Harley:

That's the clinical term, but it used to be called intersex, and I think the intersex community at large, and it's a very diverse community, seemed to prefer intersex. I could spend a while on that issue alone. I tend to use intersex more than DSD because disorders is a pejorative word in itself. However, historically, when that meeting occurred in Chicago-

John Berardi:

Here, Dr. Harley is referring to a meeting that took place in 2005 and the medical position statements that came out of it, the Chicago Consensus of Intersex Disorders. The meeting, which included around 50 doctors from various countries, is often criticized for failing to include a suitable representation of intersex individuals. It's also criticized, as Dr. Harley mentioned, for pathologizing intersex by renaming it DSD. Yet, as Dr. Harley also mentions, there was a reason for that.

Vincent Harley:

There were intersex people in the room who needed the word disorders in the title of the renaming in order to get health insurance and the like. So, there are some historical reasons why the word disorder is there. It wasn't just a bunch of clinicians. There were people like me and there were intersex people in the room. There were about 50 of us when the name changed and we redefined it as DSD.

John Berardi:

I should probably say that some intersex individuals across species do experience clinical pathologies as a result of being intersex, but some don't, and that's the con with reframing intersex as a disorder. It does help those who need treatment get it more easily, but it also pathologizes everyone in this category of biological variation. It's not a perfect analogy but it would kind of be like calling red hair a disorder of follicular pigmentation. Yet Dr. Harley mentioned that the name is likely going to be changed.

Vincent Harley:

It'll probably change and it's softened to differences of sex development. You may see the word differences of sex development instead of disorders of sex development.

John Berardi:

When it does change, this will definitely steal a plank from the argument of those who continue to insist that biological sex is binary. I've seen it many times. People argue that because they're called, quote unquote, "Disorders of sex development," that male and female represent order, a correct binary, and that anything else represents disorder, an incorrect biological outcome, a mistake. But that was never the intention. Disorder was used simply to help intersex individuals get needed medical support. Sadly, it's been weaponized against them. So, what Dr. Harley now uses in his publications isn't disorders.

Vincent Harley:

I use differences in my scientific literature now, or intersex. Colloquially I use intersex because most of the intersex people I know prefer intersex.

John Berardi:

Yet he's careful to mention that ...

Vincent Harley:

Some intersex people are not intersex. They are XY girls. They've never felt intersex, if you know what I mean. So, it doesn't work for everybody.

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John Berardi:

In the end, these are important examples of how these questions that Dr. Harley and others are working on can really affect people's lives, both those in the intersex community and those in the trans community. Maybe we should pause now for a definition. Again, trans individuals are those whose gender identity, whether they feel like a man or a woman or neither, isn't aligned with the sex they were assigned at birth. Historically, this was seen as a psychological issue, yet scientists are now finding early evidence that gender identity may be just as biological as sex determination.

Vincent Harley:

I think, as a biologist and a scientist, what intrigued me was why we identify as male or female.

John Berardi:

Like why people born with typical male bodies also feel like males, and why people born with typically female bodies also feel like females. It's an interesting question.

Vincent Harley:

And the trans community is an example that we can draw from to study these questions.

John Berardi:

Because they help us tease out the difference between sex and gender. As Dr. Krista Scott-Dixon mentioned ...

Krista Scott-Dixon:

Some people will say, "Sex is between the legs, gender is between the ears," which is a handy way to think about it.

John Berardi:

Back to Dr. Harley.

Vincent Harley:

I think there's a few lines of evidence to suggest that there is some hard wiring. If you do MRI studies, there are regions of the brain that are different in size and neuronal density and the like between males and females. And there are regions in the trans brain, in a trans male, that are more female like. The problem with MRI is it's not perfectly reproducible yet. The technique's not that refined. But I'd say there's about a dozen studies now in that direction and most defining something. Sometimes they're overlapping, sometimes they're not. So, in the last five years I'd say there is a trend towards some evidence from MRI.

Vincent Harley:

There are some PET studies as well that involve smelling hormones, and the brain region that activates when we smell testosterone versus when we smell estrogen is different in males and females. Different regions activate. And when trans people are given those tests, the brain regions tend to lean toward those regions that are the sex they identify as. That study got me onto hormones and maybe thinking there's some underlying hormonal basis to that, which is why I started looking at hormonal genes. From separate kinds of independent research, it's pointing toward some biological basis.

John Berardi:

Illuminating the Sex & Gender Spectrum – Part 1 Transcript

Now, I wanted to bring up gender here in the midst of our biological sex discussion, because our sometimes militant need to categorize people into male or female, especially when doctors and parents learn that a newborn is intersex, can cause both sex and gender problems.

Vincent Harley:

Historically, people would look at the genitals of a child and make a decision. That is a fraught process because many times in the seventies and the eighties they were getting it wrong and they were calling the child a female, because that was convenient to surgeons and surgery, when the child ended up having a male gender identity and was traumatized.

John Berardi:

Here, what Dr. Harley is referring to is the fact that before doctors understood the genetic complexities of sex determination and gender identity, and when faced with a newborn with ambiguous genitalia, surgeons were brought in and asked to decide whether the baby should be, quote unquote, "Turned into a boy or a girl."

Vincent Harley:

I don't know if you've heard of John Money. In the 1970s, he was a New Zealander based in Baltimore at Johns Hopkins University. I think he felt that give him any child and, as long as you don't tell them what sex they were at birth, if you raise them in one sex or the other, that's all that matters. So, that was a prevailing view that affected the way surgery was done.

Vincent Harley:

It was also easier to make a female than a male, surgically speaking, in terms of vaginoplasty and stuff. I'm not a clinician, I'm not a surgeon. This is just my reading of the literature. That led to hundreds and thousands ... I mean, even in Melbourne there were cases and lawsuits brought from surgeries done in the eighties where intersex were turned into females, surgically into females, but identified as males later in life, traumatized. Many, many cases ended up in the court.

John Berardi:

That's changed however in a lot of places. Dr. Harley and other experts recommend that unless there's a medical necessity to do surgery on a newborn, for example if they're unable to urinate, then leave the child until they're old enough to understand and express their gender and be a participant in gender assignment surgery, or opt for no surgery.

Vincent Harley:

Often, there's pressure, particularly from parents as well, to have that child a boy or a girl. I think people have to understand that it's important to wait and delay. There is some life-threatening surgery that has to happen because there are some conditions where surgery is necessary, sometimes immediately, a medical emergency. But most of the time it isn't necessary. And more recently, I've been studying gender identity and I'm learning that what sex you identify as can be manifest in that child as early as three years of age. So, preschool age. If you can wait at least that long, if not as long as possible beyond that, and do no surgery, then you would less likely make a mistake.

John Berardi:

I know that for some people that's hard to picture in this age of gender reveal parties and categorizing toys as boy toys or girl toys, but it's important. And in part two of this two-part series, we'll talk more about why.

Illuminating the Sex & Gender Spectrum – Part 1 Transcript

John Berardi:

Okay, so this is where we're going to end part one of this two-part series. In part one, which you just listened to, we covered the complexities of biological sex, discussing how, whereas in the past sex was viewed as a binary, it's now viewed as more of a spectrum with, if we need to make hard line categories, at least three of them: female, male and intersex.

John Berardi:

And we discussed how this spectrum plays out based on biological variability seen across many species in things like chromosomes, and gonads, and internal reproductive organs, and external genitalia and hormone levels.

John Berardi:

In part two, we're going to spend a little more time on gender identity, and what we can learn from folks whose biological sex never matched their felt sense of who they were.

John Berardi:

Along the way, we'll talk with a male-to-female trans person who once served in the Marine Corps, was part of Bill Clinton's security detail, and who once bench pressed 738 pounds, the weight of a Harley-Davidson motorcycle.

John Berardi:

So, I hope you'll come back and listen to part two.

John Berardi:

Again, my goal in creating this series was to do a deep dive into sex and gender to upgrade my own knowledge and to pass that along to you, because without it we'll both have a hard time understanding a lot of the stuff that's presented in the media nowadays. Stuff about gender pronouns and trans rights, and non-binary identities and inclusiveness and more.

John Berardi:

Before we end, I want to make sure you don't miss out on something. Editing this show was sad for me because I did in-depth interviews with each of the guests, most of them lasting 90 minutes or more, and we had to whittle them down, which means a lot of insights were left on the cutting room floor. However, we're making those full interviews available right now for you, totally free, at The Dr. John Berardi Show website. These interviews really are treasure troves of information, and to access them, as well as a transcript of this main episode, just pop over to www.drjohnberardishow.com.

John Berardi:

Also, one more thing. If you like what we're doing with the show, please consider reviewing it on Apple Podcasts. Clicking that little subscribe button on Apple or Google, or wherever you listen to us, also makes a difference. So, reviewing and subscribing, it helps a lot. Thanks for considering.

John Berardi:

Before signing off, I'd like to thank our production team, Marjorie Korn, my research partner and co-writer on the show, Martin DeSouza, our producer, Dylan Groff who edited and sound designed this episode. And thanks to you for listening.