

Neuroendocrinology Part 2 with Dr. Daniel Pfau

Ologies Podcast

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Oh heeey, it's still your uncle who swears that you can cook fish in the dishwasher and you're still like, "Eh that's okay, I'm okay," Alie Ward, back for Part 2 of an exciting, and timely, and proud episode of *Ologies*. Part 2, it's the follow up episode to Part 1 in which our amazing ologist covered gender, and biological sex assigned at birth, and hormones, and genes, and brain structure, and sexual preferences, and gender unicorns, and so much more. So definitely start with that episode. If you landed on this one first, just hop, skip, and jump back to that one and then go ahead and leap on back here for Part 2, featuring all kinds of questions from patrons of the show.

Thank you to everyone on [Patreon.com/Ologies](https://patreon.com/Ologies) who make it possible for this podcast to happen. Thanks to everyone tweeting and 'gramming about the show, and rating it, and subscribing, and leaving reviews to keep it up in the charts, and also so that I can read a new one each week, such as this one from ajoellesmith who says:

Let me start with the embarrassing fact that I've been attempting to write this review for the better part of 6 whole literal months but have failed continuously due to the sole fact that I can't adequately express my LOVE for this podcast.

They also said a bunch of other nice things, it was absolutely worth the wait. I loved it.

Okay, Neuroendocrinology: Part 2! Your questions. This awesome ologist took a break from quarantine parenting their three adorable kiddos - thank you to their partner, by the way, for this time with them - and chatted with me on a warm May day.

You may hear their AC faithfully rumbling in the background, and there are fewer asides in this episode than usual, I just kind of wanted to let the conversation breathe. So get ready for a great talk about gender, and chromosomes, and hormones, and transitioning, and how to raise a kid who feels free to be themselves, and TV shows that get it right, and how science can include transgender and non-binary folks in studies, and dysphoria, and authenticity, and more, with once again, the charming, candid, patient and lovely Neuroendocrinologist, Dr. Daniel Pfau.

Alie Ward: We have some questions. Ashley Kalkofen asked: Are there more than two genders? I remember in anatomy, my teacher talking about males who are XY and females who are XX, is this a thing? But as we were talking before, gender and sex are different?

Daniel Pfau: Yeah. It's interesting because when we start talking about sex and people talk about chromosomes, it's actually much more complicated than that. So on the Y chromosome, the one thing that's really important is this gene called the SRY gene. It's the testis-determining factor or testis-determining gene, and when a person has the SRY gene, the development of their gonads will shift towards developing into testes. And so this is a gene that activates downstream effects that will eventually lead to the testes, and those testes will start producing the hormones that are typical of a male.

In other areas, there are other genes that control this process. For example, there's the DAX1 gene, and DAX1 is a gene that is actually going to push gonadal development

towards ovaries. It's really interesting because people talk about, like, "Oh yeah, XY, XX," but you have genes on other chromosomes that influence sex development.

So we have the SRY gene that will lead to testes development, but then we also have the DAX1 gene that will lead to ovaries development. And so even if an individual does have an SRY gene that's going to be like, "Hey, make testes, make testes, make testes," [*clip from The Rocker: "Testes one two, testes, check check."*] if you have this double DAX mutation, you'll have two DAX genes and it'll end up overwhelming the SRY signal. And so an individual with double Dax and SRY will develop ovaries.

Alie: Oh!

Daniel: It's a lot more complicated than just looking at these singular chromosomes themselves. One of the things that is also really interesting, I think, is the idea that, the androgen receptor gene - which allows testosterone to have its effects - is actually on the X chromosome.

Alie: Oh, well look at that.

Daniel: I know. So we always think of things like, "Oh yeah that's the female chromosome," but it has the receptor for the testosterone molecules, so...

Alie: Wow. That's fascinating.

Daniel: Yeah. It's really interesting to break down these ideas, and really a lot of things have come from the patriarchy, basically. It has reduced the complexity of sex development, such that we see a male development as a very active process whereas becoming a female was really considered more passive. We're seeing that that's not true at all.

Alie: Yeah. I love that, of course, patriarchal science is like, "Well, a woman is what occurs when the biology is lazy and nothing happens." Like it's the default. "It takes a lot of energy to become a man!" Fuck off!

Daniel: Exactly. Very, very true.

Aside: So the era of assigning value or judgement to a person based on the shape of their body parts will hopefully be a thing of the past for humans. Someday soon. What is happening in the out-of-doors, in the forests, and the deserts, and the animal kingdom?

Daniel: There are animals that obviously have different sex chromosomes, like in lizards and birds, but at the same time they have these interesting differences within sexes. In whiptail lizards there's one species that's all female. All these female lizards are reproducing but through a process called parthenogenesis, where they actually just clone themselves. In this one specific species, they don't do this unless they have another female of their species perform this sort of mounting ritual that's typical of a species where there's two sexes.

Alie: Oh my god.

Daniel: Yeah. And so these females, they're all females! But in science we sort of reduce the idea of male and female to simpler ideas, like you're saying, chromosomes, or even simply behaviors like, "males will mount, females won't," but here we have an example in these lizards where the females are mounting and it's somehow, in some way, leading to reproduction.

Aside: I looked this up and it's the New Mexico whiptail lizard, and according to my friend Werkerperdia, the whiptail engages in mating behavior with other females of its own species, giving rise to the common nickname "lesbian lizards." One theory is that this behavior stimulates ovulation, as those who do not, do not lay eggs. You grindin', you gravid. Rules.

Have people sketched up Pride tattoos featuring these 'leaping lesbian lizards'? They have, and they're spectacular. I asked Daniel what the evolutionary benefit is of everyone carbon-copying their genes - which, let's be honest, you know at least one person in your life who absolutely would just clone themselves, because *why mess with perfection?*

Daniel: There's definitely benefits to both sexual reproduction and cloning. Sexual reproduction, as you say, is really going to help ensure that more genes are brought in and bad genes are gotten rid of. But that can occur when they're cloning them, but also when you're cloning, it also ensures that, for example, if they're doing great, they're doing a great job, they don't need to change anything, the environment is stable, everything's been good, then sexual reproduction can be quite costly. So just cloning yourself can be a lot easier, and if things are going well, you don't really need to be addressing all those other issues by changing your genetics around. Obviously, that's not always true, and so some species of whiptail lizards can actually switch between being this parthenogenic animal to having sexual reproduction.

Alie: Oh, that's so interesting!

Aside: Parthenogenesis, sidenote, creepily translates to 'virgin birth'. So maybe it's time to replace that word, I don't know. One thing that is replaceable: hormones! Take it from someone with broken ovaries who replaces their estrogen *and* testosterone. Other folks had questions about gender-affirming hormone replacement therapy, or HRT, such as Kate Stomps, Tamara Mann, Joe Porfido, Ronan, Tay, Kelly Semon, Elizabeth Rich, Marissa Laws, Celestina Garcia, Rachel, Sophia Dill, and Alie DadWard vonPodcast all wanted to know about latest research.

Alie: Let's see, I have some questions about HRT too. Catherine Gilbert asked: Is my husband doomed to stab himself forever to get his hormone? Or is there hope for something better?

Daniel: That is a great question and one I've been asking myself and, honestly, in my future research, I am hoping to look for new therapy options and HRT. I think that's been a really long time coming. For the transgender community, the treatment has basically remained unchanged since its inception. We've sort of added a few more things like specific molecules that can block the androgen receptor. But honestly, these don't just specifically block the androgen receptor, they can have off-target effects. And HRT itself really hasn't been studied outside of humans. There's about four research articles out that actually look at animal models of HRT.

Alie: Oh really, like mammals, mostly?

Daniel: What they're doing is basically looking at mice, and what they would do is provide HRT treatment as they would a human. In terms of the model, it was a masculinizing HRT model. These mice that were XX were treated with masculine hormones, but they also took a look at what would happen if they introduced low levels of feminine hormones. They rescued some of the issues that appear during HRT. They were able to prevent bone

density loss. They were able to prevent some issues related to atherosclerosis in individuals who might be at risk for heart disease. So these kinds of studies can do a lot to really help our understanding of transgender medicine, that's the kind of work that I'm really hoping to do in the future.

Alie: Oh, for sure. Rachel asked: With testosterone HRT there are some permanent, irreversible changes that happen to the vocal cords. Are there any permanent body changes that happen during HRT that estrogen influences?

Daniel: One of the things about HRT is, we really don't have a lot of longitudinal studies that show us exactly what does and does not happen. And one of the reasons why I'm really a big advocate for looking in animals is because doing longitudinal studies where we are able to look in aged populations of mice takes a much shorter time and it's much better to the animals. Mice grow up much faster than humans, and right now we can only really look at the transgender population to gain an understanding of that. We haven't done anything beyond that, and so our understanding right now is very limited simply because it's difficult to do those kinds of studies. If we want to improve HRT, then it's gonna have to take more than just looking to the transgender community to do the work, in a way.

Aside: So more people working on this would be boss. So many people would say, hey, thanks for giving a shit about how HRT affects alive people - love, your trans, non-binary and even podDad friends with broken ovaries.

Alie: I am on estrogen patches, and for a couple of years I didn't have a doctor that asked about what my testosterone was doing. And it turned out that it was like... I had like untraceable levels, like none. Does testosterone... what effects does it tend to have neurologically and... We got a question from Sarah VanArsdal who says estrogen makes them feel very down and depressed. They're on estrogen pills for painful periods. And "when I told my doc, she said that she was surprised and looked doubtful because 'estrogen is the happy hormone'." Like, is she right? Or do all these hormones affect us, neurologically in really different ways?

Daniel: Oh, they definitely affect us in different ways. Absolutely. Like I was saying earlier, we have variations in sensitivities to different molecules, and studies have even shown that the gay brain versus the straight brain, in men, reacts differently to testosterone.

Alie: Really?

Daniel: Yeah. And so when they're looking at the brain in scans and they administer testosterone, it's just a different response in terms of whether or not the individual is heterosexual or homosexual. And these kinds of differences are really, sort of, interesting, as you say, because it's sort of like every individual is going to have differences in the way that these hormones interact with them. And I think that that, to me, is why I find hormones so fascinating; the receptors we have, whether or not certain areas of the body are sensitive. We even have the ability to change hormones into different hormones, turning testosterone into estrogen or testosterone into DHT, which is the more stable form that's considered more powerful in terms of having an effect on cells.

And so there's just so much variation that I think it's difficult to say any one hormone's going to be the happy hormone. Like you were talking to the other doctor about serotonin and how like, oh, it's the 'happy drugs', we think of like SSRI (selective serotonin reuptake

inhibitors) and how those are able to treat depression, but like serotonin does so much more than that. And it's the same with hormones. They do so much in our body that it's really difficult to be like, "Oh yeah, it's going to absolutely do this with you."

Alie: I'm trying to think with progesterone too, where does progesterone fall in all of this?

Daniel: Oh yeah. So progesterone is another, sort of, sex steroid hormone. And it's really interesting because in men and women it has effects, but it's often really only discussed in women in terms of the reproductive cycle. I was actually recently looking into androgens in sports. One of the interesting things that I found out about was that the progesterone levels... not necessarily the levels, but when you compare levels of estrogen and testosterone and progesterone, when you're comparing those together, they sometimes have interesting effects when they're at different levels or varying levels.

Aside: Okay, we're gonna get back to sports in a minute, but sidenote for folks on HRT or birth control pills: I'm just going to use this moment as a tiny, tiny platform to mention that progesterone can make ya *real* depressed, if you happen to be prone to that, and in case you feel like you're losing your marbles. While I was going through ovarian failure and wasn't on the right HRT, I was on a progesterone supplement that I realized later, was making me wish I could launch my body into the vast uninhabitable vacuum of space. So, as a lot of people with uteruses know, we take all kinds of pills to make periods more regular, to not have babies when the time's not right, etc., and Whooooo Nelly! That can that affect you neuroendocrinologically. So can not having the right amounts naturally.

Also super sidenote: Daniel sent me that incredible, wonderful diagram of the Gender Unicorn, and guess what? Bonus! There was a second page! I never saw the second page! So I want to read it to you now because it's wonderful and helpful and I should've read it the first time. It's amazing. It gives awesome definitions:

Gender Identity is: One's internal sense of being female, male, neither of these, both, or another gender (or genders). Everyone has a gender identity, including you, it says. "For transgender people, their sex assigned at birth and their own internal sense of gender identity are not the same." Female, woman, and girl and male, and man, and boy are also NOT necessarily linked to each other but are just six common gender identities.

Gender Expression or Presentation, it says, is: The physical manifestation of one's gender identity through clothing, hairstyle, voice, body shape, etc. So most transgender people seek to make their gender expression (how they look) match their gender identity (who they are), rather than their sex assigned at birth.

And Sex Assigned at Birth, it says is: The assignment and classification of people as male, female, intersex, or another sex based on a combination of anatomy, hormones, chromosomes. And I learned something new here it says: It's important we don't simply use 'sex' because of the vagueness of the definition of sex and its place in transphobia. So 'sex assigned at birth' is the way to express that. And: Chromosomes are frequently used to determine sex from prenatal karyotyping (although not as often as genitalia). Chromosomes do not determine genitalia. So, sex assigned at birth! That's a great thing to know.

Sexually Attracted To is another aspect, and that is Sexual Orientation. And it's important to note, it says, that "sexual and romantic or emotional attraction can be from a variety of

factors including but not limited to gender identity, gender expression or presentation, and sex assigned at birth.”

And then of course, on the Gender Unicorn, there’s also Romantically and Emotionally Attracted To, and Romantic or Emotional Orientation. It says: It’s important to note that sexual and romantic or emotional attraction can be from a variety of factors including but not limited to gender identity, gender expression and presentation, and sex assigned at birth.

Ahhhh, so those are such good things to know, and an even better and whole representation of the Gender Unicorn. So thank you, Daniel, for your very kind and gentle email saying, “Did you seeee... the second page?” An angel, here on Earth, they are.

Also, when we originally were set to record this episode I had to postpone a few days because it was during the time of curfews being imposed in LA and I had missed going to the pharmacy several days in a row, because they closed early, to pick up my medications and let’s just say my brain just opted instead to cry. We just chalked it up a mental health day and rain checked, and Dr. Daniel was so, so understanding. Some days your brain just needs a time out, which is a very clunky segue back to athletics, which is what I promised at the top of this aside. Okay.

Alie: Courtney Ross asked a question: How can science play a role in better addressing the divisions in sports over trans athletes? And Megan C would love to hear your take on this too.

Daniel: Yeah, you know I really find it interesting that we focus so heavily on testosterone. It’s just one aspect of this signaling cascade that, obviously different aspects of the hormone system like the receptors and what genes are expressed and all those kinds of things, that can really sort of affect that.

Aside: So it’s not just testosterone that affects sports! There are growth hormones, estrogen, thyroid hormones, cortisol. They’re *all* ingredients in the juicy ambrosia that is our mind and bodies. [*squishy splat*]

Alie: Chris Baumann and Schmitt Thompson, both said that they’re non-binary but, in Chris Baumann’s words: What does that mean with my brain chemicals? It almost feels like I got a middle amount of hormones, but I don’t know how that would be. So what about us neither gender peeps?

Daniel: I honestly feel, sort of, like either I got none at specific times or I’ve got just like all of them all at the time, so for me it’s been a similar question. I think what it really comes down to is just that there’s variation, and when it comes to science and the research that’s coming out regarding the gender queer brain, or the gendered brain, or sexual orientation in the brain, we as queer individuals, should be able to simply look at them and say, “Hey, yeah, I really identify with that,” or, “You know, that really doesn’t sound like me.” And honestly, in my opinion, I believe that queer individuals probably have a pretty good idea about what’s going on, and should honestly trust ourselves and feel... I often say that, like, no science is needed to affirm queer experiences, simply because we don’t necessarily need evidence to believe what people are telling us, or we need scientific evidence to believe what people are telling us.

And so if a genderqueer individual hears something about like, “Oh yeah, during certain periods of development, you usually have low levels of hormones, but some individuals have high levels,” and they're like, “Hey, that's something that might be related to what happened to me.” And it's like, absolutely, yeah, that's a really awesome exploration of your identity, in my opinion. I honestly do feel like that's a big choice, though, for each individual. One of the things I often *don't* like is how scientists often sort of force this idea of biologically-driven identities on to individuals. One of the things that I struggled with in my own field is this idea of the transgender typology, which was a notion that was developed a long time ago, sort of just assigning individuals that are transgender, based on their biology and saying like, “Oh, so we know this sort of biological development will lead to this kind of transgender individual.”

And we know, obviously, now that there's variation and, honestly, even if those individuals at the time didn't intend to say there were only two types, they were sort of the heads of the field. And so when other individuals who are not experts were reading that, I mean, obviously they're gonna be like, “Oh, there's only two types!” And it's really frustrating because then, I feel like, a lot of queer individuals don't want to connect to science for those reasons. And I understand that completely.

So I think it's really beautiful for any queer individual to look at spirituality, or religion, or science to help them conceptualize and understand their identities. I really do believe that, as I say, queer people understand themselves, and if they feel that some science aspect jives with them, then yeah, definitely. But if something doesn't, then no, don't let that guide your thinking or change your thinking if that's not what you identify with.

Alie: Right. That's excellent. You don't need someone else's paper necessarily to tell you that what you feel is right or wrong. Felix had a great question. They say: I'm a non-binary trans guy, and Aaaah, so excited about this episode. There is a belief that beginning testosterone hormone replacement therapy makes a person angrier and/or more violent. Is this flimflam? Many trans guys say this isn't the case. Is the anger, etc., just because you're going through puberty. Is it because of social expectations of men? Any thoughts on it?

Daniel: Yeah. Several studies have shown that that's not true. So yeah, it's not true that testosterone's going to lead to increased aggression, but there is something true to the sense of, sort of, suddenly having changes in hormones, causing alterations in behavior. And honestly, like you were talking about, it's one of those things where it's like a mental health day that you might have to take simply because you're introducing your body to a whole new environment and sometimes it's going to react in a weird way.

So if someone is saying like, “Oh, look at this example, this individual is on T and they're acting this way.” It's most likely that, but again, it all comes down to individuality. If someone is saying like, “This testosterone is making me feel more aggressive,” then I would believe them. At the same time, I would never say that testosterone *does* make people more aggressive because when we looked at the research in general, it just isn't true.

Aside: Okay, so I'd mentioned that my hormone factories have been shuttered - just cobweb-strewn and rusted into premature antiquity. And yes, of course I have a very cute estrogen patch stuck to my ass at all times, but also that means I get to rub medical-grade testosterone cream into my sexy, crepey skin, when I remember to use it.

Alie: That's so interesting. Probably consistency with hormones is probably really important?
Says the person with... *[both laugh]*

Daniel: No, no. Our hormones vary so much, both across the day and across our lives. Just testosterone itself can vary from the morning to night, and we see that these kinds of variations are occurring in men and women, in all individuals, all people who have hormones. *[laughs]* And so when we have these variations occurring, these big changes, we don't really understand them all too much. *["How does this work?"]*

And like I said, we focus on testosterone levels so much, but even when we're thinking about testosterone levels, we don't know exactly why they're shifting so much and what influence these shifts have on, for example, sports and testosterone. Like, if you're working out during a time of the day when your testosterone is lowest, what does that mean?

Alie: This is making me realize though that I should definitely be more consistent, at least to give my body a fighting chance. *[laughs]* There are days when I'm like, "Oh, I haven't used my testosterone cream in, like, three days. What am I doing?" And I'm like, probably putting my brain through a little bit of *["You are inconsistent."]*. But it's good to know that it just fluctuates in general.

Daniel: Yeah, and keeping it in an equilibrium, and that's really what the hormones are doing, is keeping you in an equilibrium. Giving it the chance to do that is what's most important. And if we're naturally varying so much, then it's sort of important that we understand what's going on before we make any big assumptions, ya know?

Alie: Yeah. Evan Jude had a great question: Trans non-binary person here. And they say: They're bipolar. And they've have been on a low dose of T for about a year and a half. And despite being already properly medicated and under psychiatric supervision, I've noticed that my moods are way more stable while on T. Emotional regulation is so much easier for me, and I was actually able to decrease one of my medications. So I know that being on T relieves some dysphoria, which contributes to less depression, but I know my mind well enough to know that that isn't the whole of it, and it definitely feels like a drop in my estrogen levels has mellowed me out. And they've heard that other bipolar trans folks share similar experiences. Is there any basis to that, to something like bipolar and hormone?

Daniel: You know, that's really interesting. And I love that this individual is finding that testosterone is really helping them in that way. A lot of mental health issues are thought to be related to hormones, actually. So, individuals, as they're going through puberty, oftentimes those are periods of development when mental health disorders might actually appear, and it's thought that it is related to these hormone changes. I do think there is something to be said within the transgender community, in that simply taking these hormones and being able to take them themselves is somewhat of a therapy in and of itself.

Alie: Absolutely, yeah.

Aside: I love how I had just become acquainted with Daniel an hour or so before, but they're so warm and smart and non-judgy, and made me feel so comfortable about talking about neuroendocrinological issues, such as, for example, my busted ovaries and my glitchy anxiety. And one way that they foster that is by being so authentically themselves and candid, like sharing their own health journey.

Daniel: So, I have bipolar disorder too, and I have ADHD, and when I did come out as genderqueer, I found that being authentic allowed me to really feel equipped to tackle the expectations that were put on me, in a way. When I was identifying as a man, it stressed me out to feel like I needed to respond in a way typical of a man, if that makes sense.

Alie: Yes, absolutely!

Daniel: And I gave myself the freedom to identify as genderqueer and see myself as genderqueer in these situations. I felt more equipped and empowered to handle these barriers, conceptualize them in a way that I could address, I could handle.

Alie: Yeah. And that authenticity and that freedom of authenticity is kinda like an anxiolytic in and of itself, I imagine. I have anxiety disorder. My therapist once said that a lot of anxiety can come from acting one way but feeling another, and that pull and that frustration of feeling the need to do something or say something that is inauthentic, that is what can cause a lot of anxiety. If you're suppressing frustration because you're not supposed to act frustrated, that could cause... So I can only imagine that on the scale of your entire identity in a society that can be, oftentimes, not understanding at best and hostile at worst, you know?

Daniel: Yeah, and I oftentimes feel like science doesn't necessarily help. I've been thinking... I've been conceptualizing it recently, the idea of, like, as a queer person trying to interact with science, we're often given these limited options of our experiences. And if you've been getting anything on email from the Trump administration or anything, sometimes they have these quizzes, like, "How would you rate the president's reaction to blah-di-blah?" And the options they give you are like, "A: perfect. B: not as perfect. C: the bare minimum for perfection. D: other." And it's like, "Oh my goodness, my experience is not reflected in this quiz!" [*both laugh*]. That's not exactly, but similar to what it feels like when you're trying to interact with science as a genderqueer person. And you're like, "My experience is not reflected here!"

Alie: Yeah, oh god, that's hilarious. A ton of people had questions about dysphoria.

Aside: Okay, quick aside. What is dysphoria? It can feel different at different ages for different people, but it boils down to a discomfort or a distress when embodying the gender assigned to you at birth and being comfortable only when in the role of your preferred or your true gender identity, which may include also non-binary. And when experts say 'discomfort', that's kind of a mild expression. Adults with gender dysphoria can feel stressed out, isolated, and depressed at much higher rates than folks who are cisgender. And those are statistics that are staggering and heartbreaking.

Experts note that the rigidity of "social norms" and gender roles contributes a lot to that. So, transphobia kills. Plainly put. This stuff is important for everyone to know and care about. There are so many trans, and non-binary, and LGBTQ Ologites; bisexual folks, asexual friends, and aromantic friends, I see you, and inclusion and freedom to be yourself really, really matters.

But getting back to dysphoria. Patrons had questions, such as Sophia Dill, Matthew Sparks, C McG, George Farrar, and first-time question-asker Jules Hepp, who phrased it: Any thoughts on the brain and gender dysphoria? It does me a bamboozle every time.

Alie: Is there something hormonally happening when it comes to dysphoria? Does that affect serotonin, does that affect anxiety levels? And also, do we know exactly kinda chemically where that comes from?

Daniel: Yeah, so that's a good question. Personally, I see gender as something that is somewhat intrinsic to an individual. There are a lot of individuals who sort of conceptualize development as pathways. And to me, your gender is the pathway that is most easiest for you to travel along, and it becomes like a habit over time that you travel along that pathway. So as you are developing your gender identity, if it isn't in the same direction as, for example, your body, or how society is interacting with you, then it can make you feel very much like dysphoric, that's what brings about that dysphoria.

In terms of the body, there's been some research that shows how there's associative areas in your brain, associative areas that connect who you are to your body. And in some trans individuals, it's been shown that there's weaker connections between these areas. There are different ways that you can conceptualize this, and so to conceptualize it in a way that I think is very positive is to say that the brains of trans individuals are working correctly, showing that there is an incongruence between their gender identity and what their bodies are, or how society interacts with them.

Alie: Really? Wow! Kourtney Ryan said: question from their non-binary partner. Why do we feel dysphoria in some parts of our bodies, but not others? And this person's partner says: I know I'm not a woman and I hate my boobs, but I'm cool with my hips and butts.

Aside: Why did I read that as *butts*, plural? Can you imagine having a double-decker butt? Like, four buttcheeks? That would rule. Anyway, they said, hate the boobs, buuuuut:

Alie: ... my hips and butt. What's going on in our brains that makes that happen? Do you think that those pathways might be, kind of, stronger to certain parts of the body in that way?

Daniel: Oh, absolutely. Honestly, I feel somewhat similar about certain things. *[laughs]* But when we talk about the brain, like I was saying earlier, different parts of it develop at different times. And like I was saying, taking it back to my PI's work, Dr. Jordan, and how there's different sensitivities and different ways that you can sort of tackle the problem. When you are developing as an individual, for example, your association with your body might be stronger at a certain point of development than it was at other points.

So when fat deposition was occurring in the hips and butt, it was like, "Oh yeah, let's feel happy about this." But as soon as fat was like, "Let's go here to the chest," that's when things during that developmental period were like, "Oh, no, no, no, we don't want this." And I mean, like I said before, the variation aspect is what's most important, and honestly, we just don't know that much about it.

Aside: Again, more research in this area is needed! How exciting is this?! It's a new frontier of science, and medicine, and identity, and sexuality, and freedom from gender roles that, deep down, nobody likes! When I was six, I dressed up, of my own volition, as Snake Plissken from *Escape from New York*, and it was one of the best days of my life. And cis men, how annoying is it that our society says you're just not allowed to wear a skirt or lip gloss? Skirts are so comfortable, and airy, and fun to swish in, and lip gloss is hydrating and oftentimes very delicious. Expectations of our so-called 'gender norms' are just harmful, soggy, old garbage.

Alie: Last listener question. Travis Brooks says: My sister is trans and waited until her mid-thirties to come out about it. Is there anything, Travis, this listener, can do as a parent to know if my child is trans sooner so that he or she doesn't have to struggle for as long?

Daniel: The advice I'd give is to make sure that people have the power to identify, the power to live authentically, in a way. So, if you give your child the opportunity to express themselves in a way that is most comfortable for them, then they should feel comfortable saying what their gender identity is. And so you create that situation where your child feels comfortable discussing gender, discussing aspects of their identity without fear. And when their identity sort of solidifies – and that can happen really early, that can happen as early as five years old – then that will ensure that they're comfortable with voicing that. But there's no real way to determine whether or not your child is one gender or the other. It's something that they have to identify and express. But the best way to ensure that they're able to do that is to make sure that they feel safe doing so.

Alie: So just always kinda have an open place for conversation and expression.

Daniel: Yeah, and I think actively discussing topics like gender identity. There's this show called *Steven Universe* that I absolutely love, because it really does a great job of showing gender diversity. And it's a kid show, so it's a pretty rare thing.

Alie: Yeah! What is it called again?

Daniel: *Steven Universe*.

Alie: *Steven Universe*. Okay. I'm gonna look that up. I was just going to ask if there were any movies that you feel like are getting it right?

Daniel: Oh yeah. Rebecca Sugar is the producer and they are amazing.

Alie: Oh that's great. I want to look that up.

Aside: Ok, I looked it up and it's magic. It's a world of gemstone humanoid alien superheroes who bend gender roles and are strong and loving. It also features a proposal that was more thrilling than anything you've seen on the trash *Bachelor*.

[Clip from *Steven Universe*]

Ruby: Sapphire, will you marry me? [Romantic music begins to play]

Sapphire: What? [laughs with surprise] Marry you?

Ruby: Yeah, this way we could be together even when we're apart! This time being Garnet will be our decision. Whaddya say?

Sapphire: [pauses as the music swells] Of course.

So yes, *Steven Universe* – on point. Daniel also emailed me a follow-up note about making sure that the kiddos in your life feel free to express themselves. If anyone wants to learn more about supporting transgender children, they should seek out information put out by transgender individuals or trans-led organizations. Why that's important is that research shows that self-harming behavior is less common among trans folks who said their family ties had remained strong after they came out. Transgender women of color in particular face higher rates of homicide, homelessness, and incarceration, and in a lot of regions, there are no legal protections for people based on gender expression or identity. It's June

2020, and in the US we're still fighting rollbacks of protections to LGBTQ folks in healthcare. It's boggling.

On that note, each week we make a donation to a cause of the ologist's choosing and, like last week's Part 1, this week a donation went to MarshaP.org, the Marsha P. Johnson Institute. Marsha P. Johnson was an advocate and a Black trans woman responsible for so much social progress that led to the Pride Movement. This episode is dedicated to her memory, and to all of the strength and contributions that Black trans women, trans men, and non-binary people have made in establishing traditions of Pride and for the effect that has had on our culture.

The Marsha P. Johnson Institute protects and defends the human rights of Black transgender people by organizing, advocating, and developing transformative leadership, and promoting collective power. They were founded both as a response to the murders of Black trans women and women of color, and how that's connected to their exclusion from social justice issues, namely racial, gender, and reproductive justice, as well as gun violence.

So a donation was made to MPJI to help keep funding their incredible community organizing and artists fellowships, which was made possible by sponsors of the show.

[Ad Break]

Okay, wrapping up...

Alie: What's the most frustrating thing about your work or the most annoying thing? Lab work, or emails, or fighting bigotry? This is a question I ask every episode, but it seems like an incredibly stupid one to ask here.

Daniel: No, it's a good question I think, especially for individuals who often have to face barriers. I think one of the most difficult things about my field is seeing scientists complain when the transgender community speaks out against them. It's this constant thing where people are like, "Oh, are we allowed to do research on the transgender community?" And I'm like, "Yes, if you listen to them." I just don't understand because it feels like every time the transgender community says, "Hey, wait, this research puts us in a negative light," researchers are like, [*dumb, bro voice*] "Oh gosh, I guess I can't research you." It's such a childish reaction to me instead of being like, "Oh, okay, wait, how can we fix it so that we can do research that you won't be upset about?" They're just like, [*dumb, bro voice*] "Oh, I guess we can't do research. But we're going to do it anyway and ignore you again."

I continually see these articles by scientists saying, "We should be allowed to research the community." Obviously, there are individuals within the transgender community that are getting it wrong and they're not necessarily being helpful in terms of being like, "Hey, this kind of research is not okay and this kind of research is." But at the same time, you could easily alter your methods so that you're including members of the transgender community in the studies rather than simply relying on your own conceptualization, the wording *you* would use, and *your own* idea of what the transgender experience is.

Alie: For sure. When you were saying some types of research is just not cool, the way they've gone about it or their methods, and others are considerate.

Daniel: Yes. One example is the idea of rapid onset gender dysphoria. This is an idea that came out of a study that was done on a population of parents who were trying to understand their

children's coming out as a specific gender identity. These parents were like, "Oh goodness, their other friend, and this friend, and this friend, they all know each other and are suddenly identifying as genderqueer, or transgender, or expressing that they have gender dysphoria." They were suggesting that it was a sort of social contagion. This social contagion theory was being put forth and the transgender community quickly rose up, and was like, "No, that's bollocks. This is probably what's happening. Remember that you were just looking at parents, you weren't actually talking to trans people. There's a lot more variation than what you're suggesting here."

The researchers came back and they were just like, [*belligerent voice*] "Well, we think this is a phenomenon worth discussing." And it's like, why not just come back and say, "Okay, what should we do?" It would be the simplest thing in the world. But they simply can't bring themselves, I think, to put transgender individuals on the same level as them.

Alie: Right. I think that such a huge barrier is when people put their defensiveness before inclusion, when people put their need to be on the right side of things before the feelings of the people that they're including, or that they should be including. I think that there's... in the most malignant forms of discrimination, people who make light of pronouns, people who express their own frustration with not being educated enough, or people express frustration because they're ignorant because they haven't been exposed to or taught, or they haven't sought out the inclusive information. I think a lot of people focus on being upset that they were caught doing it wrong instead of understanding that it's about how right they could get it. They're focusing on their bad feelings if they mess up, instead of how good they can make people feel just by including them, you know?

Daniel: Absolutely. I think too, that there's an amount of pride that scientists have with their work, like, "I've created this new knowledge." And when someone's like, "That's horrible, you're wrong. You don't know what you're talking about," I think a lot of scientists balk at that. They'll say, "Oh, well I am the expert." But no, transgender people are the experts on their experiences.

Alie: Right. Absolutely.

Aside: Sidenote, just want to pipe up and thank all the Ologites who have messaged me over the years and told me what it means to hear themselves acknowledged in media. After I was super uninformed and made the Gynecology episode about women's health, that episode went up and you taught me so much about gender identity and opened up my whole world. That is a privilege that I'm grateful for every day.

If you want to be an ally or an accomplice to any marginalized group, stop thinking "I'll get cancelled if I do it wrong." That's not it all. You will make so many people happy when you understand how good it feels to be included, and when you switch to that motivator it feels so pure and expansive. It is genuinely so rewarding. Operating from a place of love for each other and not fear is the whole name of the game. Even if you didn't know better on something or you messed up, think of anyone who corrects you as giving you an upgrade to your operating system and making you even better than you were the day before.

Learning about people is one of my favorite things, and thank you to everyone who has spent your energy on the emotional labor of teaching others. We are grateful for that. Speaking of favorite things:

Alie: I know this is going to be hard, but what is your favorite thing about neuroendocri...
neuroendocrinology. [*laughs*]

Daniel: Neuro-endo-crinology.

Alie: Neuroendocrinology, so many syllables! What is your favorite thing about what you do?

Daniel: Honestly, there are times when I can go up to posters at conferences and I get goose bumps because I find what they're doing so interesting. It's almost always really basic things. One of my favorites was learning about the pineal gland.

Alie: Ohhhh yeah!

Daniel: When you were talking to the neurochemist about the "lizard brain," I love that they were like, "No, no, no, it's not a lizard brain because the lizard brain is really cool in and of itself." If you remember, they talked about how the cortex in the lizard is very small. Lizards do have a cortex, but it's much more reduced. On top of their cortex is this little penial gland. It is something that helps them with their circadian rhythm. It releases hormones based on the time of day. When the penial gland is on top of the cortex, there's enough light that gets through the thin brain of these lizards that it's actually able to detect light and signals.

In fact, some lizards have what's called a penial eye, which is this little thin, area of the bone and an opening where the pineal gland can be directly exposed to the ambient light. In other animals like fish, they have a stalk that allows the pineal gland to get to a place where it can sense light.

I find it really interesting because this hormone gland had to switch how it works because as our cortex develops, it sits on the top of the cortex in lizards. As the cortex got bigger in humans, it squished that penial gland all the way into the center of our brains. So instead of being able to directly see through a penial eye or through a thin skull, we actually tell our penial gland information through our retina. It's a cool evolution that happened with this hormone-secreting organ that relates lizards – my favorite things – to the evolution of the brain. I don't know why I find that story so fascinating. I just find it so cool.

Alie: Just getting to learn how the brain works as your job, does that ever feel surreal? Like, "It's my job to ask questions about the brain!"

Daniel: Oh, absolutely. It still feels somewhat surreal that I'm a doctor. I love that.

Alie: [*squees in excitement*] I love that as soon as they're like, "Okay, Doctor," you're like, [*cute demanding voice*] "Everyone call me doctor!"

Daniel: Yes exactly, that gender neutral honorific. Yes please!

Alie: [*laughing*] It's the best. Oh my gosh. This has been just so awesome talking to you. Thank you so much for talking to me for so long. I'm sorry that I had so many questions.

Daniel: Oh, no, you're fine. This is great. It's been a great respite from screaming children. [*laughs*]

Alie: [*laughs*] Tell your partner, thank you so much for letting me borrow you for this long.

Daniel: Will do.

So as always, ask smart neuroscientists earnest questions because they know a whole boatload about our brains. You can follow Dr. Daniel Pfau at [@Endokweer](#) on Twitter. You can see more about the Marsha P Johnson Institute at [MarshaP.org](#). There are links to all those as well as to sponsors in the show notes. We're @Ologies on [Twitter](#) and [Instagram](#) and I'm at [@AlieWard](#) on [both](#). There will be more links up at [AlieWard.com/Ologies/Neuroendocrinology](#) (easier to spell than to say).

[Ologies Merch](#) is available at AlieWard.com as well. Thank you Shannon Feltus and Boni Dutch of the comedy podcast *You Are That* for managing merch. Thank you Ernie Campbell Talbert for adminning the Ologies Podcast Facebook group, which is all cotton candy and rainbows. Thank you to Emily White and the team of transcription heroes making transcripts. Those are accessible for free at [AlieWard.com/Ologies-Extras](#). There are also bleeped episodes for kiddos up there – I'll link those in the show notes. Thanks to bleeper Caleb Patton.

Thank you Noel for all of your scheduling help, Kelly Dwyer updates the website, and thank you Jarrett Sleeper of Mindjam Media and the mental health podcast *My Good Bad Brain* for assistant editing. And of course to a magical gemstone unicorn superhero Steven "Universe" Ray Morris who lead edits and uploads this into your ears. The theme music was written and performed by Nick Thorburn of the band Islands.

And if you stick around until the end of the episode, I tell you a secret. Sometimes you want to hear it, sometimes you don't. I tell you anyway. This week my secret is that some anonymous Ologite mailed me six cans of smoked oysters, and I am going to eat at least one of them, room temperature, with a tiny fork standing over the sink as soon as I get this episode up. Also, fireworks have been absolutely bananas all over the country and I don't *not* have conspiracy theories about it but... tales for another time. I love you. You're beautiful. Be who you are. Happy Pride. Black Lives Matter. Trans Lives Matter. Your voice matters.

Okay, berbye.

Transcribed by:

Elinor Austin

Your pal up North on Musquem, Squamish, and Tsleil-Waututh lands, Aska Djikia, with help from the vocal and enormous furball Len.

Emily Staufer

Hana Snook, London, England 😊

More links you may enjoy:

[The Gender Unicorn](#)

[Amazing GLAAD + Refinery29 glossary of gender identities](#)

Dr. Daniel Pfau's paper: [The De-Scent of Sexuality: Did Loss of a Pheromone Signaling Protein Permit the Evolution of Same-Sex Sexual Behavior in Primates?](#)

[Cats and vomernasal organ](#)

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[What Neuromuscular Systems Tell Us about Hormones and Behavior](#)

[Gender Reveals Gone Wrong](#)

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