

Dave Asprey: So if the pill might not be the right choice for you, what do you say is the right choice?

Sarah E. Hill: Right. I mean this is a really tricky issue. But I mean it's getting out what you're saying. I mean, it's like when you have hormonal contraception, right. When you have the birth control pill, you're rewriting women. You're just rewriting who they are in the service of making this one, small change, which is suppressing ovulation. So is that the best way to do it? Is the best way to prevent pregnancy to totally rewrite everything that creates the experience of being a who a woman is?

Announcer: Bulletproof Radio. A state of high performance.

Dave Asprey: You're listening to Bulletproof Radio with Dave Asprey. Today's cool fact of the day is that hormonal contraceptives can effect a woman's anxiety. Psychologists in Germany, at a university whose name I'm not even going to try to pronounce, but it probably rhymes with botchum, have studied in what way hormonal contraceptives effect anxiety therapy. They found, in a pretty good study, that women who were on the pill benefited less from exposure therapy than women who didn't use oral contraceptives. They looked at 28 women who had contraceptives, at least the hormone contraceptives, and 26 who didn't use any oral contraceptives. All of them had the same kind of anxiety and took part in the same treatments.

Dave Asprey: The hypothesis from the study, they're saying these results might be caused by the fact that oral contraceptives effect central learning and memory processes in exposure therapy and exposure therapy, if you don't know about that, is called extinction learning, where previously learned associations between stimuli and your phobias are unlearned. So you expose yourself in small amounts to something that scares you until you learn not to be scared. But if you're on the pill, apparently you stay scared. That's not a good sign.

Dave Asprey: There are other studies on animals and humans that show extinction learning itself is impaired by oral contraceptives. They think it might be because of the reduced estradiol level from the contraceptives themselves. If you read my very, very, very first book from 2011, The Better Baby Book, I wrote about this. And if you read Super Human, my very latest book on how to live to 180, I talk about hormones and what they do to your aging and your brain and everything else. Bottom line is you want to pay attention to these things.

Dave Asprey: Today's guest is Sarah E. Hill, PhD and a leading researching in the field of evolutionary psychology. She wrote a book that made me actually do a little dance. Trust me, you don't want to see that. Her book is called This is Your Brain on Birth Control: The Surprising Science of Women, Hormones and the Law on Unintended Consequences. Sarah's a quote real scientist because she has 50 scientific publications, some of them in multiple prestigious research journals and multiple grants to her credit. She's really an authority on applying evolutionary thinking to human behavior and psychology. You'll see quotes from

her in, I don't know. Scientific American, The Economist, New York Times. Just little magazines and newspapers like that. So she's a big deal. So Sarah Hill, big deal, welcome to the show.

Sarah E. Hill: Thanks for having me.

Dave Asprey: That was probably the most fun introduction I've had in at least a year. I'm genuinely happy that you wrote about this because it's a controversial topic. I mean, birth control is a fundamental thing that allows women to have control of their own biology. That's at the core of biohacking. And here you are, standing up here, as a woman going, "Maybe the way we're doing it isn't so good for us." Have you just taken a lot of flak for this?

Sarah E. Hill: You know, I was actually expecting to take a lot more flak than I've gotten so far, you know, knock on wood. Whenever people raise questions about birth control for women, there's a reflex that happens if you're a woman where your fur stands on end and you get ready to attack. Especially in this current political climate. There's a lot of people trying to attack women's ability to regulate their fertility and our ability to choose and all of these things. But this book is really just about giving us all the information that we need to be able to think about birth control in an informed way and in ways that women just haven't been told about until now.

Sarah E. Hill: Most of the conversations that women have about the birth control pill over the last 60 years, since it came on the market, have been about how it makes them feel psychologically and the experiences that they have and these experiential things. Their doctors aren't talking to them about that. So this is really, finally giving women the information that they need to just really think about, is this the best way for me to be regulating my fertility? If it is, how do I troubleshoot and how do I unpack my birth control prescription? If it's not, then what else can I be doing?

Dave Asprey: My wife, Doctor Lana, Karolinska trained physician, real MD, she does exclusively work with women who are trying to get pregnant. She does it all over Skype. A lot of them who've been on the pill, they're having a hard time when they go off the pill, or it takes six months or a year to get things mostly normal before they can have kids. They didn't know it when they went on it when they were 16 or 18, because they had PCOS or endometriosis or they just decided it was the right time. So your idea of a law of unintended consequences, it's a real deal. What are the big things that happen, aside from your anxiety therapy might not work? The big things that happen in women's bodies they might not know about from birth control pills?

Sarah E. Hill: I mean, the thing is, first of all it's just this idea that our sex hormones are part of the signaling architecture that our brain using to create the experience of being the person that we are. So when we change women's sex hormones, which is what we do with the birth control pill, it's going to change all sorts of activities in terms of psychological functioning. What the research shows is that

when women are on the birth control pill, it does influence everything ranging from their ability to learn and remember things, it influences potentially who they're attracted to, who they choose as romantic partners, it influences the nature of the stress response, it influences their tendency toward things like anxiety and depression and it also influences a whole host of other bodily systems, ranging from thyroid function to the immune system.

Sarah E. Hill: Changing, you know, when women go on the pill, they always just think about what it's doing to their ovaries. But hormones just can't work that way because hormones go and they travel everywhere in the body that blood goes. So when you take a hormone, it's going to influence every single cell in your body that has receptors for those hormones. For women, because reproduction and pregnancy is something that requires almost all of women's bodily systems to have a workaround, right because you can't work the same way if you're a circulatory system when you have two humans instead of one. You can't work the same way when you're a digestive system if you're trying to feed two humans instead of one. The immune system has to change what it's doing. Every single one of the body systems has to change what it's doing in response to pregnancy.

Sarah E. Hill: Because of this, almost all of the systems in women's body are sensitive to sex hormones. So when you change that and you blunt the activities of women's own naturally, cycling sex hormones and replace it with this daily dose of these relatively low levels of estrogen and then these relatively high levels of synthetic progesterone, or progestin, it's going to have pervasive changes on the body from top to bottom, including the brain. That's where, like there's so many receptors for sex hormones in the brain. So that was really what I was interested in, is what is it mean for women and the way that they think, the way that they feel, the way that they experience the world, to have this change in sex hormones.

Dave Asprey: The very first book that really brought my attention to this came out I think in 2001. It was by this renegade researcher named T.S. Wiley. It was called Sex, Lies and Menopause. Very well researched, lots of little links in the back of the book that said, "Hey, there's a downside. Particularly cancer and heart disease and things like that from the birth control pill." Since then, based on a pretty good body of evidence, I've been telling the women that I care about like, "Hey. This is not how you prevent pregnancy in a way that serves you. You should get pregnant when you're ready to get pregnant and not before then. You deserve and have a right to all the support necessary to do that, but if you could do it without self-harm, that would be better for you and better for everyone."

Dave Asprey: But it's, people who are my friends, they understand where that's coming from, but a lot of people, especially when that book out, this was almost 20 years ago, man it was like, it was super unpopular. Like an assault on fundamental freedoms. How do you tell women, okay, so if the pill might not be the right choice for you, what do you say is the right choice?

Sarah E. Hill: Right. I mean, this is a really tricky issue, but I mean it's getting out what you're saying. It's like, when you have hormonal contraception. When you have the birth control pill, you're rewriting women. You're just rewriting who they are in the service of making this one small change which is suppressing ovulation. So is that the best way to do it? Is the best way to prevent pregnancy to totally rewrite everything that creates the experience of being who a woman is? I don't know. That's a really-

Dave Asprey: That's some thin ice. Everything that makes a woman who she is?

Sarah E. Hill: Well, it is I mean because when you understand the role that hormones play in terms of influencing the activities of the brain and when we remember the fact that we're biological creatures and that the experience of being the person that we are is the result of chemical and electrical signaling going on in our brain, chief among which is directed by our sex hormones, I mean that's really what we're doing. We're rewriting women.

Sarah E. Hill: So hormonal contraception, it may make sense at some points in your life, even all of this being aside but are there other options? Yeah, there's other option. I think that, in particular, there is non-hormonal IUDs. So the non-hormonal intrauterine devices, those are well tolerated by a lot of women. They're not tolerated well by everybody because those do cause a local inflammatory response. Inflammation, just like hormones, they influence what the brain does. So for some women, even though the non-hormonal IUD is supposed to not have any psychological side-effects, it can. It's because inflammation is known to influence anxiety levels, influence depression, influence sleeping patterns and other things. So even the copper IUD, which if women tolerate it well, because some women don't really, they're not very sensitive to changes, like small changes in inflammation. Other women are. For women who are, it's not going to be a good choice.

Sarah E. Hill: Then the question becomes, all right, what then? There's cycle tracking and the fertility awareness method, where women are able to keep track of where they are in terms of their fertility across the cycle and then using barrier methods during times in the cycle when conception is possible. Or just using barrier methods all the time. I mean, really.

Dave Asprey: We were indoctrinated, at least when I was in middle school and all, like, "You can't rely on fertility awareness and other related methods." But the science is very clear. When a woman's health is reasonably okay, not even great, and you have a relatively regular cycle, you know, and it's not that hard to learn. Apps can be really helpful. Jolene Brighten's been on and talked about her perspective and her book on cycle syncing and things like that. What ends up happening is you know. You're like, "Okay, I'd better not have sex in this five day window without a barrier method because then there's a risk." You actually know. The rest of the time, you can say with 100% certainty, "I'm not going to get pregnant here."

Dave Asprey: If you're just coming off the pill and your cycles are regular, you don't have 100% certainty. But it's one of those things about just taking responsibility for learning how your body feels and works. I can say this as a guy who doesn't have to deal with that, but being married to a woman who focuses on fertility, is a doctor and knows when she's fertile and she'll tell me, "I'm fertile now." The thing that most people don't talk about though is, when a woman's fertile, what is she most likely to do?

Sarah E. Hill: Yeah, she wants sex.

Dave Asprey: Exactly. Darn, stupid evolution.

Sarah E. Hill: Yeah, stupid evolution. It's like, evolution would have it no other way. Like no other way. Yeah, so this is the time when women want to be having sex. I mean in fact, that's usually how I'm reminded of where I am in my cycle. If I'm not looking directly at my phone, it's like, if I'm really wanting sex, I'm like, "Yeah, no, I'm guessing that, oh yep. Lo and behold, look where I am right now."

Dave Asprey: If you're ovulating and you walk into a room full of guys, what happens?

Sarah E. Hill: Right, they also want to have sex with me, the ovulating woman.

Dave Asprey: Yeah, their heads all turn. They don't know why their heads turn. They don't know why you look so hot that day, but it's because you're ovulating and their body knows and your body knows.

Sarah E. Hill: Right, exactly. So yeah, it's a time when sex is most likely to happen, it's the time when men are most likely to be attracted to women. Men prefer the smell of women when they're at high fertility. They prefer the appearance of them. They flirt with them more. They get a big rise in testosterone just from interacting with ovulating women. They think that it's because of picking up on the scent related cues. The thing that, another thing that kind of sucks about the birth control pill is because it's keeping estrogen really low, because the money maker in all of this stuff in terms of women being really attractive and desirable in the way that they smell and the way that they look to men and their own feelings of being, sort of feeling sexy and alive and they want to have sex, all of those things are linked with estrogen. Those are driven by estrogen. So when you take the birth control pill and you kill fertility and you kill estrogen. The amounts that you get in the pill are so low, it's like you're never getting any of these benefits.

Sarah E. Hill: So what happens a lot of time with women when they're on the birth control pill is they kind of feel like a blah, blah, blah version of themselves. They don't feel sexy and vibrant. They sort of lose touch with those sorts of parts of who they are. What I've heard from a lot of women coming off the pill, and I had this experience myself, is that once I transitioned off of it, I just felt like, "Woah." Like, "Hello. I forgot about this. I forgot that I was a sexual creature and I forgot

that I really liked noticing men and I forgot that I like to have sex and I like to think about it."

Sarah E. Hill: Because I wasn't doing any of that when I was on the pill. I mean I was having sex, but I wasn't thinking about it. It was something I was doing like going to the grocery store. Like, check mark. Have sex, check mark. Empty the dishwasher. It wasn't something that was a part of who I was. Was like being feminine and being female. Then once I went off of it, I was able to experience all of that again. It really can make your life feel kind of flat. It kind of kills your vibrancy, to go so long without a peak of fertility.

Dave Asprey: John Gray, author of the Mars Venus series and a dear friend, has been on the show a couple times. He talks a lot about how what really raises testosterone in men is actually doing things for women during certain parts of the cycle. Like, so I would argue that there's other unintended consequences, even beyond what is in your book, This is Your Brain on Birth Control. It's that when women suppress those cycles, men who respond very handily to those cycles, we will also change in response to that.

Sarah E. Hill: Right, yeah, no for sure. I mean there is research showing just even men smelling the scent of women. They took armpit swabs but they also took vaginal swabs of these women. Men, they loved the smell of women when they're at high fertility. They just liked the way they smell all over the place and it increases their testosterone all over the place.

Sarah E. Hill: So imagine if your partnered with a woman who's not having these estrogen surges and you're not getting the benefit of having this partner that just smells and tastes and just seems so delicious and yummy to you. That can't be good for the relationship. It can't be good for how men feel about their partners and the degree to which men are motivated to please their partners. So I mean, I think that the ricocheting effects of the birth control pill on what women's brains are doing and what the rest of their body is doing and then their relationships with their partners. Then just the world at large is something that we've just begun to scratch the surface into looking at.

Dave Asprey: I have an unsubstantiated theory that I am betting will be substantiated.

Sarah E. Hill: I love it. Let's hear it.

Dave Asprey: I've looked at mitochondrial biology and systems biology in a pretty heavy level, from the perspective of a computer hacker. I have a concentration in one of my degrees, it's in a form of artificial intelligence. I think like that. I looked at where you find mitochondria in the human body. In our brain neurons, 15000 mitochondria. In your heart neurons, 15000 mitochondria. That's about as big as it gets.

Dave Asprey: Except a few cells in the ovaries have 100000 mitochondria. The role of mitochondria is not the power plants of the cells. That's one of the roles. They actually make hormones. They're receptive of and responsive to hormones. But what they're doing is they're sensing the environment around you and then doing what they think, as individual, little, tiny processing nodes, there's a quadrillion of them that drive a lot of your behaviors, including that I must have sex now behavior.

Dave Asprey: I think that what they're doing is they're sensing the environment around you and saying, "You know what? This is the right egg for you right now, to have the most optimal chance of surviving." Because some mechanism, we don't know, decides which egg gets dropped. I think it's mitochondrial. Because that's what they do and that's why there's so many of them there, otherwise why would Mother Nature put so many of those expensive little power plants right by the ovaries. Does that make sense?

Sarah E. Hill: Yeah, yeah, yeah. That's... it does.

Dave Asprey: If that's true, and it may or may not be. We don't know. Then if you take the pill and it changes the way you respond to the environment around you and it messes up that system, it's going to mess up the way people smell. We know there are studies like that. Women think their mate smells sexy, then they go off pill and they're like, "Oh my god, he stinks. I can't have sex with him." How big of a deal is that?

Sarah E. Hill: Right, no that's a big deal. I mean, this is a really big deal. These are women's lives. I mean, these are women's life choices that they're making. The idea that we're setting up this situation where we can have women making major decisions about their lives, whether it's who their partner is or the degree to which they want to be investing in their work versus life. At times when a lot of them are on the birth control pill and then what happens to women and how they feel about their choices after they stop taking.

Sarah E. Hill: The same thing with... I mean, it's the same thing with the rest of the body. Who knows what's going on with fertility. You were talking about the fact that your wife interacts with women who are having challenges with fertility after being on the birth control pill for so long. There isn't, currently there's not a lot of research that suggests that being on the pill does anything to harm fertility, but I keep hearing this reported with such frequency that I think that we probably just don't really know what the full picture is. Anyway, yeah.

Dave Asprey: In your book you say straight up, pill taking women exhibit an unwavering preference for the types of relatively less masculine faces and voices preferred by naturally cycling women.

Sarah E. Hill: Yes.

Dave Asprey: So remember what I said earlier about how guys respond to women? Daniel Amen, a dear friend who's been on the show several times, the Change Your Brain, Change Your Life, a big deal in psychiatry. He just interviewed me this morning about my new book. And he said, "Dave, do you have any thoughts about why teenage males and young males are having an epidemic of low testosterone? I've never seen anything like it in my career." Do you think it's possible that guys are like, "Oh wow, the women around me aren't doing what they normally do hormonally. I'm going to tweak my own testosterone production in order to do that." Because guys, we're pretty much slave to women, like biologically.

Sarah E. Hill: Well, no. Absolutely. No, absolutely. That's fascinating. No, I think that that abs could be the case. That just really, that just made the little hairs on my neck stand on end because I think that that could be absolutely spot on. I mean, one of the things that I talk about in the book is even, because that's just in, I mean that's obviously an unconscious, biological shift that's going on with men where obviously there's no conscious level awareness that's going on in terms of men thinking and calculating, "Gosh, there doesn't seem to be any estrogen in the air, therefore I'm going to down regulate my testosterone production."

Dave Asprey: I'll just go vegan right now. That'll work.

Sarah E. Hill: Exactly, exactly. That'll do the trick. It always does the trick. Yeah but even at the larger, conscious level, one of the things I talk about in the book is another epidemic that we currently have and you've probably seen the effects of this first hand, is that dudes are not doing a lot. I mean in terms of, in my college classrooms, it's overwhelmingly female. The females are graduating at higher rates. There's more female valedictorians now. Females are entering fields like medicine and law and all these other areas, like getting these advanced degrees. Not only are women doing better, but men are doing worse.

Sarah E. Hill: So men aren't applying to post-graduate programs at the rate that they used to. They're not going into managerial positions at the rate that they used to. I've always sort of thought that in part, there's a motivational shift that's also going on because... and it could be in part because men are actually, they're not sensing that there's any estrogen in the air. So they're just not motivated to really do anything. But also even the behavioral changes that go on with the pill with women being more willing to have sex with men who've achieved less. I think also-

Dave Asprey: Ouch.

Sarah E. Hill: Yeah, well I think that, well it's because we don't have to worry about getting pregnant anymore, so women now will have sex with men that our great-grandmother's wouldn't have dreamed of having sex with because he lives in his mom's basement and plays video games all day. But if he's cute you know, now women, because we can feel completely certain that we're not going to end up pregnant, women have lowered their standards for sexual partners. I think that

also has played a role in demotivating men to achieve anything because if you can get laid without doing anything, why would you do anything, if you're a guy?

Dave Asprey: Hey, don't tell people how guys think. That's not nice.

Sarah E. Hill: Yeah, well it's like there's this, did you ever see the quote from Aristotle Onassis. It says, "Without women, all the power and money in the world would be meaningless." It is absolutely true.

Dave Asprey: Speaking from a guy's perspective, there's a lot of wisdom to that. Even Napoleon Hill, Think and Grow Rich, there's a whole chapter in there and I put a chapter in Game Changers about this. He calls it sexual sublimation. He wrote Think and Grow Rich mostly for men because of the time it was written, in the 30s or 40s, whenever it was. He's like, "Look. Don't waste all that energy. That desire to procreate is the same as the desire to create." Whether you're creating a company, a career, writing a great book. Whatever it is. If you waste it, then you get guys where we're not getting environmental, feminine cues the way we would have and there's an abundance of porn and distractions and bad sleep and all that. No wonder you just want to live in your grandmother's basement.

Sarah E. Hill: Yeah, exactly, exactly. Playing video games. That's really fascinating. I don't know that I'm going to get that out of my brain. That idea of, because if you're not getting the normal fertility cues that historical men have used to gauge what the level of quality of women is in the environment, if they're not getting any of the typical cues, why invest in testosterone production when it's physiologically and metabolically costly to do so? Why invest in an advanced degree to get you access to women when there aren't really any worth fighting for anyway? I don't know. In my mind, it's fascinating.

Dave Asprey: There's a lot of probably put upon guys right now going, "Wait, we care about more than women." Of course we do. We're mission driven and all that. At a bottom line, though is, and you know this because you look at evolutionary psychology, but for listeners, it's that look. A huge number of your behaviors are unconscious and designed to keep you alive. I am 100%, 100% certain that those behaviors all, 100%, come from mitochondrial rules in a distributed operating system in the body. I could be wrong, I'm just not. How's that for academia?

Sarah E. Hill: Yeah, yeah, exactly, yeah. And I always, I'm so used to... I talk about these things and they sort of flip in offhand ways. Of course there's more to it than that, but I mean ultimately traits that promote survival and traits that promote reproduction get inherited. Traits that get inherited are those that have led to sex. Our brains are just absolutely wired, from top to bottom, for sex and then caring of course for our children, so that way they can go and have sex and their children can have sex. It's really at the heart of a lot of what it means to be human. Even some of the most profound, beautiful acts of kindness can ultimately... sex has a hand in them.

Dave Asprey: Well I mean there's the stereotypical... in fact, read Robert Greene's *The Art of Seduction*. He talks about the stupid things that guys will do for a woman. There's actually five categories and how you can use those to woo a woman. It's fascinating but you get the guy who will make a total ass of himself to prove himself to a woman. Helen of Troy inspired wars. People would go to war and die for a woman.

Dave Asprey: I think that's actually how guys are wired at a very base level. Of course, if you meditate, if you're conscious and you've done your work, you realize like, I have these urges, I have these desires and I own them and I shape them and I control them and I use them for the higher good. If you're a douche bag, you probably walk around acting like a jerk all the time. We all know those kinds of people. But if we turn down the volume for both men and women through the environment, which includes the pill but isn't just the pill. But I think the pill's a major issue, the way you've called out in your book. I love it that you're willing to go out there and do it. I also like it that it's not a guy writing the book.

Sarah E. Hill: Right, yeah, exactly.

Dave Asprey: Right I mean, you know what it's like.

Sarah E. Hill: Yeah, well I do and I also don't know that a guy could actually do it. I mean, this is a really nuanced conversation to have with women. It's nuanced because this is a really big deal for women, just the ability to regulate our fertility. Having some guy telling us, "Well here's all these things that you didn't think about with the pill." And that sort of thing, I think that a lot of women would have a harder time with the message. Even as it is, I was very careful when I was writing the book just to make sure that women were aware that I'm not trying to scare you off the pill.

Sarah E. Hill: I don't think anything in the book is like scary and it's not alarming like, "House is on fire, house is on fire." But rather it's just like, "Hey. We probably haven't thought about this." I think we've been really cavalier with how we've treated women's hormones. We treat them as being this thing that influences what our ovaries are doing and nothing else. So it's just really about giving women the paradigm shift that they need in order to really think carefully about hormonal contraception.

Dave Asprey: I think that the pill is very disrespectful of women's health and biology and even just the very base of what it means to be feminine. You're turning off core, valuable systems. It's almost a continuation of this mindset that was there in my parents' generation and the one before then. "Oh, you're done with kids? Oh, hysterectomy. We'll just pull that stuff out. You don't need that anymore." It turns out you might have wanted to and it's extremely patriarchal. I would just for all the women listening. In fact there's slightly more women than men who listen to Bullet Proof Radio, but it's pretty well balanced. But all the guys listening have women friends or partners who are also affected by this. It's just worth talking about and I love it that you just came out there and you did it. I'm

curious about pheromones, though. What effect does the pill have on pheromones and how important are pheromones?

Sarah E. Hill: Okay so pheromones, this is one of those things where research doesn't yet quite have a handle on pheromones and what they are and what they do. Presumably there are scent based cues. We know from research that when estrogen is high, again right near peak fertility when women are found maximally desirable and sexy to men, that women are smelling better to men, so surely there's some pheromonal involvement where women are having different types of pheromones at high fertility compared to low fertility and that that's influencing how desirable they are.

Sarah E. Hill: But on the other side of things, we also know that one thing that estrogen does is that it increases the sensitivity of our neurons and our ability to pick up on fine-tuned differences between important stimuli in the environment, including scent. So there's been research showing, like when you compare sensory acuity based on scent, so smell, pill taking women, it takes them longer. You basically have to clobber them over the head with the smell in order for them to detect differences between one smell and another smell.

Sarah E. Hill: Whereas when women are at high fertility in the cycle, their threshold for being able to detect scents is very, it's very low. They can detect really small differences between different types of scents and in particular, male related scents. What they found is that women at high fertility are particularly astute at distinguishing differences between different levels of androsterone, which is a metabolite of testosterone. So women are able to detect really small differences in levels of that compound. Also a musk related scent, which is just sort of a guy smell that sort of approximates differences in male body odor. So in addition to women themselves having different pheromonal profile when they're on the pill versus off the pill in a way that isn't helping their own desirability, women might also be less able to discriminate between high and low quality partners because their senses just aren't very keen. They're not really-

Dave Asprey: Yeah, you can't smell the good ones.

Sarah E. Hill: You can't smell the good ones. You can't smell the difference. Yeah, you can't smell the difference between them. You know there's been a lot of, there's been research showing that women who are on the pill choose partners who are less masculine. They have less masculine faces than partners that are chosen by women who are naturally cycling. It could be that the women who are on the pill, I mean it could be just a facial preference, but it also could be that they're not really tuned into these scent based cues that are linked with testosterone presence. There's also been research showing that women who are on the birth control pill also don't seem to be sensitive to differences in MHC compatibility. Do you know about what MHC genes are?

Dave Asprey: I do, but I think a lot of listeners don't.

Sarah E. Hill: I bet your listeners, yeah I was going to say the listeners. I was asking the listeners, Dave and you interrupted me to say...

Dave Asprey: No I'll speak for them, no, we don't know.

Sarah E. Hill: No, okay perfect. No so our major histocompatibility genes are some of the genes that help code for genes related to our immune system. The idea is that generally people prefer the scent of people whose MHC genes are different than theirs. The reason for this is that when you partner with somebody who's MHC genes are different than yours, it's going to allow your children to recognize a greater diversity of pathogens. The reason for this if you want to nerd out for a minute is that MHC genes are codominantly expressed. So if you have different genes than your partner, everybody's genes get expressed. Your partners genes get expressed and yours get expressed. Because usually there's a thing where whoever has the dominant genes, those are the ones that sort of do their thing. But in the case of this, everybody's genes get expressed. The more diversity you get in MHC, these immune genes, the greater the ability to detect bad guys like germs and pathogens in the environment. So it makes for healthier kids.

Sarah E. Hill: What the research shows is generally people prefer the scent of people who have different immune genes than themselves. So who's MHC genes are different. With pill taking women, they don't find this at all. They don't seem to be able to distinguish. Because some studies have found that women who are on the pill prefer partners who's MHC genes are more similar, that are similar to themselves. Others find that there's really no relationship, like women who are on the pill just don't seem to have a preference for partners based on their MHC gene.

Sarah E. Hill: My guess is that what's going on is that women, again just given everything that we know that estrogen does to the brain, estrogen's like Miracle-Gro on neurons. It makes these little dendritic spines burst out from neurons, making them super sensitive to the stimuli in the environment. Given that the pill keeps estrogen so low all the time so you're not getting these birth of these dendritic spines that allow you to be able to detect fine tune differences between individuals, I don't think that pill taking women are able to detect differences in partners based on their scent in terms of MHC compatibility or based on testosterone presence in the way that non pill takers are.

Sarah E. Hill: And to what effect? There's been some correlational studies. These are very early stage, one study with maybe 2000 families, but there was a study that was done where researchers compared the health of children by women who had chosen their partners when they were on the birth control pill or off of the birth control pill. What this research, this sort of first crack into this research found was that women who chose their partners on the birth control pill, they reported that their children were having more health problems and had to go to the doctor more frequently than the children that were had by women who chose their partners when they were not on the birth control pill. Which is

consistent with this idea that it may be influencing our picker, our mate choice picker and that it might be leading us to prefer partners that aren't compatible.

Sarah E. Hill: It could also be related to these fertility problems that you were talking about. There's no research indicating, so far, again like I said, I just don't think that they've studied this well enough yet. There's no research that has conclusively demonstrated that the birth control pill has any impact on subsequent fertility, just in terms of HPG or hypothalamic–pituitary–gonadal function. So the functioning of your ovaries. But it could be that if you have women who were on the pill for XYZ number of years and they chose their partner when they were on the birth control pill, they chose somebody that they're not genetically compatible with. There's a lot of research indicating that when women choose partners that have very similar MHC genes, that there's a greater rate of spontaneous abortion relative to what you find in couples that have MHC dissimilar genes.

Dave Asprey: That is profound. What's coming out of this? If you were to just play the odds. You're a woman and you're saying, "You know, I think I'd like to meet the right guy and settle down." I've had lots of my women friends say that, in fact some of them get almost a little desperate, who are like, "I just need to do this and it's just not happening." It sounds like it might be good advice to go off the pill.

Sarah E. Hill: Yeah.

Dave Asprey: Because like you just said, you're going to pick the right guy and you're going to feel more sexy and you're going to appear more sexy, so you'll be able to attract the right guy.

Sarah E. Hill: Yeah, no, absolutely. I mean the way I look at it, if I had to redo everything that I've done in my life, I would never have been on the birth control pill when I wasn't partnered. What I did, I did what so many women do and that is that I went on it when I was in my first long-term sexual relationship. I was like 17 or 18. Then I was on it and then I just, that relationship lasted maybe a year.

Dave Asprey: That's pretty good for 17.

Sarah E. Hill: Yeah, I know, what can I say. It's like, yeah. It was a long relationship. But then we broke up and I stayed on the pill. So then I'd have boyfriends who would come and go but I was just constantly on the pill. Because I just never went off it because I thought, "Well why do that? It's easy to take and it cleared up my skin." And all these things. So I was like, I wouldn't do that.

Sarah E. Hill: Knowing everything that I know now, it's like, I may still have made the choice to be on the pill when I was on it because my cycles were not regular and I was a hot disaster. Like I couldn't be counted on to do anything, let alone keep track of my cycles or remember to have condoms somewhere. So I may have still made the choice to be on it, but I would not be on it when I wasn't in a relationship

because there's just no reason to be. I mean except for clearing my skin, but it was like not, who knows how that was interfering with my ability to attract as good of a partner as I might have been able to or to be able to discriminate between different partners and choose the right partner.

Dave Asprey: So are you married or do you have a partner now? Do you have kids?

Sarah E. Hill: Yeah. Yeah, I am married and I have kids. That was a choice that I made not on the birth control pill. So that was fortuitous but it was like a blip on the radar screen. Whatever they say, here by the grace of God go I.

Dave Asprey: Right, right. So you lucked out on that one.

Sarah E. Hill: I did. I mean and knowing everything that I know now, I would have been much more strategic about it and intentional, just because you really do miss out on not only your own apex of attractiveness and desire and feelings of vibrancy and attunement to men and feelings of sexiness, but just also just your ability to discriminate between partners and then choose the right one.

Dave Asprey: I want to ask a really dark question.

Sarah E. Hill: All right, let's hear it.

Dave Asprey: I hope it doesn't piss a lot of people off. There's been this longstanding, throughout the ages ill-conceived, inappropriate perception that the man owns the woman and controls the woman and if another man looks at your woman the wrong way, you have to go get in a fight with him or start a war or whatever. You know, all the negative sides of masculinity.

Sarah E. Hill: Right.

Dave Asprey: If your wife is unattractive because she's on the pill, the pills been around for 60 years. 60 years ago, a lot of people looked at women that way. Is there some dark angle here around controlling women in a way that maybe was on purpose or maybe wasn't on purpose? I don't know. I'm just looking about it. What would the benefit to anyone be of women... something in the book that made me think of this. You talk about how when women are on the pill, when they look at pictures of their partners, they have the same biological response as if they're looking at a stranger. When you're off the pill and you look at a picture of your partner, your reward centers of the brain light up.

Dave Asprey: Like this just seems really scary, to be perfectly honest. Do you think there's any validity? I just made up that idea. I'm sort of like, like this is dark and this is not serving women. So if it's not serving women and pretty much men did this to women. Men invented the pill. So I kind of wonder. Do you think there's a little dark angle to it or am I just a conspiracy theorist today?

Sarah E. Hill: Well I do think that you're a conspiracy theorist. There's no question about that, no.

Dave Asprey: Hey, geez.

Sarah E. Hill: I'm just kidding, I'm just kidding, I'm just kidding. No, but that's actually a really interesting question. Because women are veiled. Women have had their feet bound.

Dave Asprey: Oh yeah, horrible stuff.

Sarah E. Hill: Men have been trying to control women's sexuality. Like year, clitoridectomy. I mean, men have been trying to curtail women's sexuality and keep them chaste and away from other men since the dawn of time.

Dave Asprey: Guys have a pretty bad track record there over the centuries, I got to say.

Sarah E. Hill: Yeah, no kidding, right? It's like now that I'm saying all this stuff out loud, I'm pissed off at my husband and Thanksgiving dinner tomorrow's going to be really interesting.

Dave Asprey: Yeah, let me carve the turkey.

Sarah E. Hill: You're like, George. I see the way you're trying to keep down Aunt Matilda over there. But I mean, it's like, we've been veiling women and doing all of these things as a means of curtailing female sexuality. Is there a dark angle to this? Yeah. Maybe there could be. Even if it's unconscious, who knows? If you notice that your partner isn't as sexy and noticing men. It would certainly be in any man's best interest if his partner is not toying with the idea of another man. Yeah, could this be a means of controlling women's sexuality? Yeah, absolutely. Absolutely. Really interesting angle on that, too.

Dave Asprey: Yeah, so a little dark there. For the record, I think that we're all better off when women are free to be women, even hormonally. Also having trust in my own relationship, I think that's pretty cool when other guys look at my wife, because I'm like, "I have an attractive wife." Like if they're going to go be rude to her or something, that's a different conversation but you know, it's okay to have a really feminine, attractive partner. It's okay if other people know that you're together with someone like that, from a guy's perspective.

Sarah E. Hill: Well so and this reminds me of this study. I talk about it in my book and it's kind of a throw away study where it's like, there was this study where researchers were looking at mate guarding within romantic couples. Mate guarding is a psychologists way of saying the things that you do to keep your partner from straying. This can be things like just sending texts like, "Hey, how's it going? What are you up to?" That sort of thing. But also things like trying to actualize your partner's desires. Like doing sweet things and being loving and caring.

Dave Asprey: Doing dishes.

Sarah E. Hill: Yeah, doing the dishes. What the research found was that when men are partnered to women who are on the birth control pill, they don't do as much of that as men who are partnered to naturally cycling women. It's probably getting at this exact issue where it's like, if a woman's empty womb isn't at stake, so she's not conceptive. Her fertility's low. And she's probably not all that, letting off all these cues associated with femininity and sexuality, the men, it just is demotivating to them. Again, they're not going to conquer Rome if they don't have to. If men's wives aren't giving off these cues, it seems like men are less inspired to need to guard their mate, both in positive and in negative ways.

Dave Asprey: I guess part of mate guarding is bringing home a big paycheck.

Sarah E. Hill: Right, there's a lot of things. Right, mate guarding, it can kind of run the gamut from really positive behaviors to really negative behaviors too of course. Sometimes men, when they're mate guarding, will do things like not threaten their partner not to leave the house and all of those sorts of things. So I guess on the one side, it could have some positive effects that way. Most mate guarding with decent human beings who aren't despots, take the form of trying to actualize their partner's desires and trying to make their partner happy so that way they can maintain the integrity of the relationship. To what degree the birth control pill might be harming our relationships that way is also something that's sort of potentially problematic, I think, for women.

Dave Asprey: It sounds like mate guarding, all in all, in healthy people is something that we want to encourage, which is showing attentiveness, being kind. That sort of thing. If you're one of the other kind of guys, you need to go to a therapist and all that stuff and get your shit together.

Sarah E. Hill: Yeah, exactly, exactly.

Dave Asprey: Let's talk about stress response on the pill. Because you called out all kinds of stuff I didn't know. I kind of have a roster of why I share with friends and followers the pill is not really your best path to being a high performance human. But you taught me stuff in this book about stress response. What does the pill do to cortisol in women?

Sarah E. Hill: Okay, so normally when a person's feeling stressed out, like if you or I had to go give a big presentation in front of a group of people, within a couple of minutes of doing that stressful thing, we would get a big rise in the stress hormone, cortisol. Cortisol is kind of, it's kind of a red headed stepchild of hormones. People tend to think of it as being a bad guy. But cortisol actually isn't what causes stress. Cortisol isn't bad. Cortisol is a hormone that helps our body actually cope with stressful things. So when we experience something stressful, we get this big rise in stress hormones because that's basically changing everything that our body is doing to increase its ability to cope with the stress.

Sarah E. Hill: So for example, one thing that cortisol does is it dumps fat and sugar into your blood stream. So that way if you're being chased by a hungry bear, you can make a fast getaway. Another thing that it does is it primes the birth of new neurons in the hippocampus. This is what allows our brain to encode information as memories. When we're in a stressful situation, we should remember going on, so that way if something similar happens on later on in the future, we're better able to deal with it. Cortisol does a lot of these stress management types of activities. It redistributes energy away from everything else our body is doing and focuses everything on stress.

Sarah E. Hill: Now what happens with pill taking women is that they don't get a rise in cortisol in response to stressful situations. So when you and I go up and give a presentation and a talk, we get this surge in stress hormones, it allows our body to be able to manage the stressor, we remember things better. We absorb the experience that we're having.

Sarah E. Hill: For the pill takers, they don't get this. This is something that it might sound like it's an amazing side effect to the pill. Like, "Wow, so are you trying to tell me that if I'm on the birth control pill I won't experience stress?" But that's not at all the way that it works. You're still feeling really stressed out, you're just not able to cope with it.

Sarah E. Hill: The part of the stress response that makes our mouth go dry and our heart go fast and makes our voice quiver, that part of the stress response is totally intact in pill taking women. It's this cortisol response that's not. This is problematic for a lot of reasons. One of them is that, of course we have the cortisol response for a reason. It helps our body manage and cope with the stressor. That is something that means that pill taking women are less able to cope with stress. There's a lot of research that indicates that that might be the case.

Sarah E. Hill: But the other thing that's potentially even more troubling than that about this and what it means is that the type of pattern that we see in terms of the stress hormone cortisol in pill taking women, looks very similar to the types of stress responses that we find in people who have post-traumatic stress disorder and also people who have experienced any sort of childhood or chronic trauma. Pill taking and this is obviously something that's a little alarming. It suggests that the reason that pill taking women aren't getting a stress response in response to stressful things is because their stress response has shut itself off from overuse.

Sarah E. Hill: There's been some research now looking at whether or not women who are on the pill have other biological markers of having experience chronic stress. They have several markers of chronic stress that look like that of chronic stress victims. For example, they have higher levels of triglycerides, which is what happens when you have a cortisol over signaling. There's the changes in the risk for depression and anxiety that we tend to find in pill taking women compared to non-pill taking women. And their hippocampi, so the hippocampus is an area of the brain that's responsible for learning and memory. That's its big thing.

Sarah E. Hill: What you find in people who have experience chronic stress and also in women who are on the birth control pill is that they have smaller hippocampi relative to their non pill taking counterparts. The reason that you see this, the reason that you see a shrunken hippocampus in the context of chronic stress is because neurons actually start to die because that area of the brain is so sensitive to the presence of stress hormones, so when you get too much cortisol signaling, the neurons in the hippocampus begin to die, which can cause problems with learning and memory.

Dave Asprey: Okay, I got to step in there for a sec. I just wrote this anti-aging book, Super Human and I talk specifically about hippocampal volume as something that you monitor and manage as you age. I'm in the 87th percentile on my hippocampal volume, when you look at the structures inside the brain and I probably wasn't there when I was younger because of all the toxins I've been exposed to and all just the environmental stressors and frankly the emotional stressors that I have dealt with. So if you want to look at how are you going to be when you're 80, if you're on the pill now and shrink your hippocampus and it continues shrinking as you age, doesn't that increase risk for senile cognitive dementia, Alzheimer's and all the other bad things that can happen to an old brain that's not well cared for?

Sarah E. Hill: Yeah, no, probably. I mean that's the thing that's really potentially alarming about this is that having a shrunken hippocampus is not a good thing. It is something that's associated with neuro-degenerative diseases like Alzheimer's disease. We know that Alzheimer's disease is an overwhelmingly female problem. Many more females, many more women are diagnosed with it than men. There is, especially given what the research shows in terms of hippocampal volume and also everything that we know about what estrogen does to the brain. How good our sex hormones are in terms of promoting brain maintenance and allowing these dendritic spines to sprout.

Sarah E. Hill: I don't think that it's probably the best thing for brain health, having long term exposure to the birth control pill, just because you are keeping levels of estrogen so low. We know that estrogen is neuro protective. So what does that mean? There's just not enough research out there into, especially the effects of long term birth control pill use on women and on their brains. So this is one of the next big pushes I hope to see in research is going to be better understanding these processes.

Dave Asprey: Wow, okay. So brain aging, not a good idea. What about anxiety, depression and suicide of women who go on the pill? I did not know this data and in your book it was pretty damning. What did you find?

Sarah E. Hill: Yeah no. I think that this is really damning, too. Some new research has actually come out since the time that the book came out that's even more that way I think. So first of all, the research I present in the book suggests, and it's a really compelling case that's made for the birth control pill. And all of its hormonal analog. So there's a birth control vaginal ring, there's a hormonal IUD. Any form

of hormonal contraception seems to increase a woman's risk for subsequently developing anxiety or depression. Also there's really good evidence suggesting that being on hormonal contraceptives, and again I include in this list everything ranging from the pill all the way down to the hormonal IUD, which by the way, some people's doctors, some women's doctors tell them that the effects of those hormones only act locally.

Dave Asprey: The hormones that are on an IUD. So you can basically coat the IUD in birth control pills and stick it in.

Sarah E. Hill: Right, yeah. Well yeah. So there's an IUD in the U.S., it goes by the name of Mirena. It's the Mirena IUD. It's got sex... it releases sex hormones. It releases progestins which of course travel everywhere in the body because that's what hormones do. They go into the blood stream and they travel from top to bottom.

Dave Asprey: Wait a minute.

Sarah E. Hill: But some women's doctors...

Dave Asprey: Are you telling me that the testosterone pellet that I have just under the skin of my butt doesn't work just on my butt?

Sarah E. Hill: Right, no I know.

Dave Asprey: Who would have thought, eh?

Sarah E. Hill: I know you were just... I know. I know you were just doing that to make your butt really strong.

Dave Asprey: It's pretty obviously to your point.

Sarah E. Hill: Which is like such an important thing. Yeah, exactly. It's so strong when it's squeezing your vocal cords to sound really masculine. Some women's doctors tell them that this IUD is actually locally and it's just influencing what's happening with their ovaries and their uterus. It's ludicrous but anyway I'm sort of making a tangent.

Sarah E. Hill: But basically what this research finds is that all forms of hormonal contraceptives, they actually found the risk was higher with the non-oral products. So for example, vaginal rings, the shot, the hormonal IUD, increases not only a woman's odds of developing depression and anxiety but also their suicide risk. These risk factors are particularly pronounced for adolescent women. So these are women who are 19 and younger who are going on the birth control pill. This research finds that the odds ratio for them of suicide risk and then developing depression and anxiety are vastly higher than they are for non-contraceptive using women of that age range and also for older women.

Because of this, it's super important that we are very careful with adolescents on the birth control pill. It's something that I think that in America in particular, our doctors tend to prescribe the birth control pill to these young girls starting sometimes at ages 13. My daughter, who's 12, has contemporaries at her school who are on the pill.

Dave Asprey: At 12.

Sarah E. Hill: It's not because of sexually active at 12. Because they have their period and it's heavy and uncomfortable. Or their skin is starting to break out and they're feeling self-conscious about it and their doctors are putting them on the birth control pill. Which I think is, especially given the growing body of research linking, especially young ages, pill use and depression and suicide risk, but also it's like, the brain doesn't begin, or doesn't stop developing until you're like 22. During post-pubertal brain development during adolescence, when your brain is changing into its adult form, the head contractor in that remodeling project is your sex hormones.

Dave Asprey: Oh my goodness.

Sarah E. Hill: So your sex hormones are calling the shots in terms of the way that your brain is being organized. Then we're putting these girls on the birth control pill. We have absolutely no idea, because there's really no good research on what that's actually doing in terms of the organization of the brain. To me it just feels reckless. It feels like a total lack of connection between practicing medicine and then actually understanding how the body works and development works. The idea that you would change up somebody's sex hormones when their brain is still developing for something as minor as cycle regularity just seems outrageous to me.

Sarah E. Hill: There was a study that I actually just got sent. It was sent to me by the researcher who did the studies, this guy Larry Cahill who's at UC Irvine. He's a birth control pill researcher and a really good one. He did a study recently looking at adolescent pill use. Again, looking at 19 and younger women and comparing the risk of depression, developing depression in adulthood from women who are no longer on the pill. Just based on whether they used it during adolescence or not. So in other words, does using the pill during adolescence increase your risk of depression in adulthood, even after you're off of the pill? What they found was it does.

Dave Asprey: How big of a difference?

Sarah E. Hill: It was a pretty big difference. It was almost, I don't remember if it was twice the risk factor? I was just reading the paper and I'm actually going to be rereading it more carefully, because I'm actually going to be talking about it next week. So I'm going to sit and just sort of plot the differences down. It was a pretty substantial increase in the risk of developing depression in adulthood. What this

tells us is that there's probably something developmentally that's going on when you go on the birth control pill in terms of the organization of the brain that may change a woman's risk of developing mental health problems later on in life, even after birth control pill use is discontinued.

Dave Asprey: This is kind of a conundrum, because I think your book is reasonably balanced. You talk about the fact that women who are on the pill are statistically more likely to get higher education and fulfillment in fields that women often times didn't excel in, like law, medicine, science, business sort of things. Is that happening just because there are women who are not having kids at a younger age, can actually have the time and the money to go to school. Is that what's causing it? Or is it because of changes in the brain because of the pill? Or do we not know.

Sarah E. Hill: No, it's because, it could be. We don't know for certain. My, if I had to place my money on a bet, I would bet on women... the ability to plan and know that I'm not going to have a baby in the next 10 years because I don't have to because I'm on the pill and I have resources and I don't have to worry about caring for anybody else but myself. That allows women, when they're able to make plans, that allows them to achieve things because they will. Nobody's going to start medical school if they don't think they're going to finish.

Sarah E. Hill: As soon as we gave women access to the pill, what see in 1970 when the pill became legally available to single women, what you saw was that women's, the percentage of female applicants to law, medical programs, PhD programs went from being about 10% to being 50% within 20 years. It was just like bam. It's because it gave us the ability to plan and to feel like, all right, if I start this, I'm going to be able to finish it.

Sarah E. Hill: So the pill has been really amazing for women, just in terms of allowing us to feel like we have control over our fertility. I think that the ability to control our fertility is the biggest women's rights issue out there. We need to really protect women's access to every mode of fertility regulation that's out there that they want to be able to safely use. I think that women need to have their eyes wide open when they're making choices when it comes to the birth control pill. It's like, you can pick your poison. I think there's something to that but with these young girls, with these adolescents whose brains are still developing, that's where I start to say, "Well, let's really rethink this."

Dave Asprey: That's just dangerous at this point. The risk reward isn't there. I'm a human guinea pig. I try all sorts of stuff but I look at risk reward before I do it. So I'm 100% with you and kids. I'm also though, I'm reminded of a guy early in my career, my friend Shiva from India and he worked on my team. He was the top of his class from one of the IITs. These are kind of like the Wharton or Harvard of India. He said, "Dave, things are really different in India." He said, "When I was in college, if a girl tried to talk to me, I would hold my book up in front of my face because I didn't want to be distracted because I had to study."

Dave Asprey: That's just rude. But that was, geez, probably like 30 something years ago when he would have been doing that. But it was that idea of, "I'm going to stay focused." So given what you just told me about the pill and that it basically reduces your interest in men, part of this might simply be, "Okay, I went on the pill and I was able to focus because I was less obsessed with dating."

Dave Asprey: Of course guys, same thing. I can tell you that the vast majority of my time in college was spent thinking about women and food and not really about my studies, because we're wired to do that. Especially when your hormones are surging in your late teens, early 20s. That's what we do. So maybe some of this is actually a benefit of this because if you have a little bit less, or maybe more predictable desire, you'll make better decisions and you'll stay focused on the career track that you've consciously chosen instead of letting your hormones and your mitochondria call the course of action which is reproduce the species right now or we'll all die. Which is what we all believe when we go on a bad date.

Sarah E. Hill: Right, yeah, no. I think that you're absolutely right about that. There's no question about it that when you are on the birth control pill it blunts your attunement to sex related stimuli. So it blunts your attunement to your own sexuality, it blunts your attunement to men, it blunts their attunement to you. Because of this yeah, if you're at times in your life when those types of distractions are counterproductive, you can use the birth control pill as a way to help meet your life goals. If you want to focus on not sex, take the pill. If you want to focus on doing other things besides daydreaming about men yeah, go on the pill and it'll help you to do these things.

Sarah E. Hill: But this is like such, it's really great. It's so important to have this information. We can use this to our benefit because women who are hoping to find a partner, all right now's the time, maybe I don't use the birth control pill. Women who are hoping to get their PhD, now's maybe a really good time to be on the birth control pill. I mean there's a lot we can do with this information to make our lives into the lives that we want.

Dave Asprey: You can also try it and then say, "You know what? My anxiety and depression just went through the roof. Oh now I know that those are common effects. Maybe I'll go off of it because staying focused on my studies wasn't worth it."

Sarah E. Hill: Right, exactly. It's all about picking your poison. It's like, for each one of us, there's tradeoffs that we're willing to make that other people wouldn't be willing to make. This is really about giving people that information. I mean it's like I eat a very clean, healthy diet, I exercise and meditate. I do the whole thing. But I really like whiskey. But I won't drink a ton of it but I'll have a whiskey. I like whiskey, I know it's not great for me. It's not good for my liver but I know what I'm doing. I make the choice to do it anyway. I'll have a whiskey if I want one.

Dave Asprey: You know, there's all sorts of things that everyone does. There's a lot of people, "I'm going to have the cheesecake and I know it's not good for me, but I'll cope."

Sarah E. Hill: Right, yeah.

Dave Asprey: I don't want to be, I don't want to come out from the subset with everyone who's heard this who's going, "Oh my god, I'm on the pill or my daughters on the pill. What have I done? I'm a bad person. How can I ever forgive myself?" Dude, chill. So it's really important you don't develop a panic response about it because what percentage of women, at least in the U.S. are on the pill when they're in their fertile years?

Sarah E. Hill: What the research shows is that about 85% of women will be on it at some point in their-

Dave Asprey: Jesus H. Christ, it's that high?

Sarah E. Hill: Yeah, well we'll try it... I know.

Dave Asprey: This is a population level experiment that's never been tested.

Sarah E. Hill: I know. I know. No, I know. No, it hasn't and it is. So most women will try it. Here's the thing is that about half of women who go on the pill, go off of it right away because they can't stand the way that it makes them feel. Think about this for a minute. Think about the fact that 85%, roughly. I think it's 85% exactly but I don't remember the figure off the top of my head. So let's say 85% of women will go on the birth control pill and 50% of them are going off of them because it's just the way it makes them feel psychologically is intolerable. And yet the pill has been around for 60 years and women have been given no information about what it's doing to them psychologically. It's just crazy, it's just crazy to me that it's taken so long.

Sarah E. Hill: Actually when I came up with the idea that, when it sort of dawned on me that, "Oh my gosh, we're doing this big experiment. We're fundamentally changing generations of women in the name of fertility regulation." What does it do to the brain and then finding this research, I thought, I mean I was shocked that nobody had written the book already. That was when I decided I had to write the book because I couldn't believe it didn't exist and that this information hadn't been given to women and that we had just sort of been led to believe that all of these things that we were reporting were these idiosyncratic things that are just really specific to us and we must be imagining it. It's not real. So it was really time to get this information out there. So many women.

Dave Asprey: I think it is time. It's also time to just say, okay. If you're not going to be on the pill and you want to have a degree of career or academic success, there are longstanding practices that men and women have used. They are different for men and women, to tap into, leverage, control and use sexual desire to create amazing things in the world. Some of it is community. Women have had their women sewing circles and they get together and they talk about whatever they

talk about. I don't know, I don't go to those. And guys get together and, I don't know. Throw darts. Whatever.

Dave Asprey: But a lot of those times where it is talking about stuff that's really specific to your hormone profile. Where a lot of that has gone away and maybe there's a need for that in some of the really old traditions that have largely stopped in the last couple generations around look, the rights of passage and things like there where you're like, all right you've got to own that you're horny all the time. What are you going to do with it? That's a part of being a young adult. To suppress it with drugs probably isn't the best way to handle that because as you just eloquently wrote in your book, there are a lot of unintended consequences here. Now we know what they are and 60 years ago we didn't. 60 years ago this was actually, this was freedom.

Sarah E. Hill: Right well we're in this really weird space right now though where being human is then created... we're taught that it's a problem. It's problematic to have sexual desire. It's problematic to need psychological wellbeing. It's problematic to not be able to work 65 hours a week without making you feel depressed. It's like all of these things that are really just human emotions and experiences have been, like we've been trained that they're problematic. Rather than coping with them we medicate them. Instead of like, wow. I get really anxious around people. It's like, no. Everybody is. We have to learn how to manage that as a human being. You have to learn how to interact with people even though you feel anxiety. You don't medicate that. Like, oh I feel sexual desire and I'm thinking about sex when I should be... here's some medication for that. It's like we're in this weird space.

Dave Asprey: We are. It's like, I feel anxiety. The antidote for that is courage.

Sarah E. Hill: Yeah, exactly.

Dave Asprey: I'm feeling hunger. Well the antidote for that is fast a little bit longer and find out you're not going to die. Own your hunger. I feel like I'm going to die if I don't go on a date. Go on date and don't have sex and see if you die. You probably won't and after a little while you get used to it and then it's called owning your power. But man, I don't know how we teach people to do that anymore. I don't know who taught me how to do that. I think I had to do a lot of work. I'm probably still doing it.

Dave Asprey: But it's fascinating that by writing a book about what the pill's doing to our brains and our psychology and by studying the evolutionary history of that, you've really brought some thought provoking, important things to light. The book is called This is Your Brain on Birth Control and your website is sarahehill.com.

Dave Asprey: I want to thank you for doing that and just encourage listening to this. I guarantee you, given that 85% of women in the U.S. have been on the pill or are

on the pill, this is affecting your life. I don't care if you're a man or a woman, I don't care if you're one of the 15% who's never taken the pill, the women around you are doing that. We didn't even talk about the fact that you don't think your hormones as a woman will change in response to the women around you? We know that they do because if you're with a group of women not on the pill and you stay in a close proximity for a while, your cycles will all sync and they'll sync with the moon, too. We all affect each other all the time. We all send out a hormonal signal to the world around us. Reading this book is going to blow you away, whether or not you're thinking about going on or off the pill.

Dave Asprey: So check it out. This is Your Brain On Birth Control. Totally worth reading. It'll blow your mind. Sarah, thanks for being on the show.

Sarah E. Hill: Thanks so much for having me.