Are gender differences predetermined?

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In the Vienna of 1924, Sigmund Freud wrote, "Anatomy is destiny." Fast-forward to the 21st century culture of genome-mapping, Web-surfing and gender-bending. How well, we might ask, is Freud's famous dictum holding up? When it comes to gender research, science has discovered gray areas where Freud saw black and white.

Psychology professor Sheri Berenbaum has an unusual window on the issue of genetics and sex roles. As director of the longest-running behavioral study on children with congenital adrenal hyperplasia (CAH), Berenbaum does research that gives her an understanding of gender -- with all its subtleties and complexities -- that is sometimes missed by the majority.

CAH is a relatively rare enzyme deficiency (affecting one in 15,000 newborns) that begins in gestation and causes the adrenal glands to overproduce masculinizing sex hormones, androgens. The typically virilized genitals -- enlarged clitoris and fused labia -- of female infants with CAH can even create confusion about their sex at delivery.

This unusual anatomy is not their destiny for long: Nearly all girls with CAH have corrective surgery in infancy, along with daily (and lifelong) hydrocortisone medication that regulates androgen levels. Since most grow up with a normal female appearance, can we assume that they will make typically "feminine" choices throughout their lives? More broadly, is there evidence that any human behaviors are "male-typical" or "female-typical?"

Decades of studies have generally answered that question in the affirmative, explained Berenbaum. From a young age, girls and boys are apt to choose different kinds of toys, splitting stereotypically into the "truck" and "Barbie doll" camps. Boys tend toward more active and aggressive play than girls, and fare better than girls in tests of spatial, navigational and mathematical abilities.

Female strengths usually include better verbal skills, precision manual dexterity, emotion decoding and "landmark memory," defined as the ability to recall objects and their locations within a confined space. (Yes, there's research backing up the cliche about men staring into the fridge, asking "Honey, where's the ketchup?")

If you believe that socialization -- the molding power of our environment -- is the main cause of gender differences, consider this: Berenbaum's data on girls with CAH point to the power of sex hormones, particularly those we're exposed to prenatally, in shaping our choices and aptitudes as children.

As a group, the girls in Berenbaum's study tend to prefer toys more typical for boys, show more interests in sports, have better spatial ability, and show less interest in infants and dolls than girls without CAH. Despite the hormone-balancing medication they've received since birth, exposure to high androgen levels during brain development in-utero seems to have a lasting masculinizing effect.

"The question is 'How does that happen?'" asked Berenbaum. "It's very complex. Despite some of my own data, I certainly wouldn't make a direct equation that hormones cause you to like trucks." And, she added, laughing, there's no dishwashing gene.

"Yes, there's evidence that biology does influence behavior that shows sex differences," said Berenbaum. "It's also true that, for all behaviors

studied, the distributions for males and females overlap on a continuum. Nevertheless, the differences are observed consistently."

Don't rule out the impact of socialization on gender though, cautioned Berenbaum. "What happens to most people is that we start out with small biological differences which send us off on different environmental trajectories. Socialization then magnifies the differences until they become bigger over time."

"Let's take interest in babies, for instance," she added. "Say as a girl you have a slightly increased predisposition to be interested in babies. So you hang around babies. You get comfortable with babies. You get lots of rewards for hanging around babies -- getting paid and praised for babysitting -- so after a while, a slight preference becomes a strong interest because it's magnified by the experiences you have."

That close dance between nature and nurture may be what "makes it hard to answer this question" as Berenbaum put it. A self-described feminist who believed, as a grad student in the 1970s, that gender differences would be leveled by changing social norms, Berenbaum is quick to point out that genes -- like anatomy -- are not necessarily destiny.

"I think that some people are afraid to think that genes influence behavior because it therefore means we can't change it, but that's not correct. I would argue that if we know the genes that influence a certain behavior, it might be easier to change them with an environmental intervention because we would know what we'd be targeting."

With training and support, we can strengthen cognitive and behavioral skills across the gender divide, said Berenbaum. "No matter what the cause of the difference, you can change it by the right intervention. You can teach men to be more emotionally sensitive. You can teach women to have better spatial abilities."

Conversely, negative social messages have an undermining effect. "If, before giving a math test to women, you tell them, 'Women don't do as well on this test as men do,' they don't do as well compared to when you don't give them that message. So it seems that when you set up negative expectations, it lowers their performance."

Why are people so fascinated by gender differences in the first place? "Part of the reason we care about whether women are in math and science careers," hypothesized Berenbaum, "is because those careers pay more money and have more prestige than typically female careers. If we valued women's careers more maybe this would not be such an issue."

"While I think the differences are real," she concluded, "what we should work on is saying it's OK to be whatever you are. Differences still matter because we still value males and females differently."

Source: Penn State (By Melissa Beattie-Moss)

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