

Are male and female brains hardwired differently? ^[1]

Dear Alice,

Are guys and girls psychologically hardwired to think differently?

Answer

Dear Reader,

You bring up a question that many brains have puzzled over, and it remains a bit of a head scratcher. Research has uncovered a number of differences between men's and women's brains, yet the origins and implications of those differences are tougher to pinpoint (more on this in a bit). It's also key to mention that the research isn't consistent in the way they talk about gender and sex ^[2], which can make this topic even more difficult to parse out. It can be helpful to note that brains generally aren't hardwired physiologically or psychologically for people of any gender; the brain is constantly evolving and creating new neural pathways. However, there are some noted differences in the brain that may affect people's experiences. Further, people of different genders may be inclined to think in certain ways due to experiences related to their gender, and, in turn, their social environment contributes to the ways in which they think.

One of the areas of research on gender differences has been on brain size. On average, men's brains are bigger, with around 16 percent more neurons than in women's brains. However, it's not totally clear what that might mean. Bigger brains could just be a result of bigger bodies, since men tend to be bigger than women, on average. Some researchers have suggested that a bigger brain helps with forms of cognition related to visualizing items in a given space, in which some men have been found to perform better. Studies have found more neural connections *within* the hemispheres for men, and more neural connections *between* the hemispheres for women. The corpus callosum, which is a structure that connects the two hemispheres of the brain, has more connective tissue in the male brain than the female brain. Scientists have also discovered some other variations between men and women's brains. For example, while the amygdala and the hippocampus both grow as boys and girls age, the amygdala tends to grow more for boys, and the hippocampus tends to grow more for girls. Some research indicates that this may result in differences in how men and women may experience emotions and memory recall.

There's evidence that also suggests that certain diseases affect the brain, such as Huntington's

disease, Alzheimer's disease, Parkinson's disease, and multiple sclerosis show gender differences in prevalence and severity. It's also thought that sex hormones might act upon the brain, with testosterone and estrogen having some effects on socializing patterns, emotion, and excitability. Ultimately, while there's evidence of some overall differences in size, connectivity, development, and disease of male and female brains, the origins of those differences are tricky to parse out.

Research has indicated that many of the methods historically used in gender or sex difference research was biased and often misinterpreted, often in efforts to prove that women were inferior. Further, it also indicates that that ways that much of the sex-difference research ignores the many similarities between male and female brains. For example, a study conducted on mathematics learning in boys and girls sought to determine whether young boys and girls used the same parts of their brain while doing math. While there has long been evidence that boys and girls at young ages had similar outcomes, it was unclear whether or not they were using the same parts of their brain to do math. The results indicated that not only are there similar results between boys and girls, but they use the same parts of the brain as well. Despite this, there are still major gender disparities, with women being underrepresented in science and math careers.

Even with similarities in functioning, there are still differences in society that result in these disparities. Brains are extremely malleable, meaning they change and shift based on cues from their environment, and the environments that people grow up in are dictated, in part, by the gender binary. People raised as boys have different expectations, opportunities, and experiences than people raised as girls, so it's unsurprising that men and women's brains would develop differently. Due to this, it can be hard for researchers to determine what is due to biology and what is due to the environment, as they can affect each other. Further, the research doesn't use consistent terminology, which can make it hard to parse through it all. Much of the research also isn't consistent with how gender and sex are generally defined and discussed, making it challenging to understand. In some cases, the studies also didn't indicate whether participants self-reported their gender or if it was identified by the researchers. All of this adds to the context of what brain research looks like and how those similarities or differences may be recorded, along with how meaningful they may be. Regardless of your gender, all this complex info is enough to make anyone's head spin. Further research may illuminate the differences between various genders or the role that the environment may play, but until then, it may be helpful to be thoughtful about the research that's available.

Alice!

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