https://ijmsphr.com

DOI: - 10.37547/ijmsphr/Volume07Issue06-02

Open Access Research Paper

INTERNATIONAL JOURNAL OF MEDICAL SCIENCE AND PUBLIC HEALTH RESEARCH

Vol. 07, No. 06, June 2026, 06-10

eISSN 2767-3774

Comparison Between Male and Female Students Based on Their Brain Measures That Do Bigger Brain Work Better in Education?

Amanboyeva Sabrina Kamoliddin kizi

Uzbekistan State World Language University, English philology faculty, Tashkent, Uzbekistan

Article Received: 25/04/2026, Article Accepted: 22/05/2026, Article Published: 10/06/2026

Abstract

The work of brain function has not been explored fully yet and many scientists are keen on discovering new concepts about it. One of the most interesting questions is whether the gender's size of the brain can influence their studies. The brain spheres (the left half and the right half structures) excel at doing various tasks. For example, boys are more interested in STEM (science, technology, engineering, mathematics) subjects while girls are good at the subjects which demand much more creativity, such as art, psychology, literature. Everyone is familiar with this information. Mainly, the key purpose of the author is to research the more unknown and hidden side of brain size between boys and girls in the educational field. Subtle differences in male and female behavior and in cognitive functions, too. Men tend to be more aggressive and outperform, women on mental tasks involving spatial skills such as mental rotation, whereas women tend to be more empathetic and perform better on verbal memory and language tasks. Moreover, the author used mixed methods, especially the qualitative research method and also the quantitative method, by using semi-structured interviews. The researcher interviewed both male and female at higher education from sophomore students based on their brain function. By asking the following research questions: Why do men and women think and act differently in the educational field? How do they behave differently in stressed situations in the learning process? Why do men and women excel at different types of tasks? (STEM & Literature) The result of this research showed that male and female students have no major difference in their brain structures. Boys' brains often process information more effectively within hemispheres (spatial tasks on the right), while girls' brains may coordinate tasks across hemispheres more effectively (intuitive thinking, language). Ultimately, the work of brain hemispheres mainly depends on people. If they want to improve their preferred brain hemisphere, they need some practice and reliable training sessions. Everyone is unique, and they have their own talent and ability. They have their own horizons and different outlooks. By the way, why we say males and females have the same brain? The reason is that autism is the type of character which cannot deal with others, for example, an etroverted person.

Keywords: Genders differences, brain size, educational performance, hemispheric dominance, hippocumpus, cognitive functions, spatial skills, mental rotation, verbal memory.

Introduction

Actually, the clear distinction between males and females brain is nothing like as clear as has been claimed. Some researchers mentioned that a boy's brain is 10% larger than girl. However, it does not affect the gender's IQ. There are some differences between male and female brain systems: grey matter and white matter, left and right spheres of the brain, neural networks, brain activity, and specific brain structures. The author clarifies them one by one. Grey matter; contains most of the brain's neuronal cell bodies. Males have nearly 6.5 times more grey matter, therefore, males tend to be very attentive and task-focused. White matter is made up of bundles, which connect various grey matter areas. Females have almost 10 times more of it; because of that, females are great at multitasking. When it comes to brain spheres, women use both sides of the brain to process information. Women tend to use more words, the reason is that women have verbal centers on both sides of the brain. Also, men use the left side for most activities, and men tend to have them on the left hemisphere, so men have a hard time expressing feelings. The work of neural networks is different among genders. Women have more connections moving left to right. It can also explain why women are more inclined to combine logic and intuition, while men have more connections moving from front to back. This makes men have greater synergy between

perception and action. The ability to directly resolve problems is significantly developed in men. Women's brains have a greater blood flow than men's through specific regions in terms of brain activity. That may partially explain why women tend to be more: empathetic, intuitive, and collaborative. And also why women are more prone to: anxiety, depression, and eating disorders. Although the hippocampus is larger in women and makes women are more better at expressing themselves emotionally, men have a bigger amygdala; thus men tend to respond to emotional stress physically. Like the above mentioned statements, boys are more interested in STEM (science, technology, engineering, and mathematics) subjects, while girls are good at the subjects which demand much more creativity, such as art, psychology, and literature. One study illustrates that girls cannot give the correct direction, which they familiar with before, if someone asks it suddenly. The opposite is true for boys. In addition, a girl is put in a room for 4 hours and when asked about what was in the room a short time later, she claims to remember 80% of the items. When the same process is tried on a boy, it is found that he almost cannot remember. Girls' memorisation process are more developed than boys. The senoir lecturer of University of Portmouth Fleischman D. (n.d.) states that "The differences of gender's is not so much more. There are little distinction and various attitude. For example, females passionate about taking care of children, stay at home, and males do agressive, dangerous things like going to war. Because the nature (world) is created like that".

Literature review

Brain Size and Intelligence in Educational Contexts

Early scientific researchers attempted to explore the connection between brain size and intelligence (J. P. Rushton and C. D. Ankney, 2009). As a result, it became widely believed that having a bigger brain may improve cognitive function and academic achievement. Does brain size really matter in students' academic performance? According to Christof Koch, the volume of the brain does not correlate more. Because it showed a considerable degree, that made 0.3 and 0.4 out of 1.0 point. There are such brain areas that are connected to knowledge, which are the parietal, temporal and frontal regions of the cortex. Learning and memory can be influenced by factors such as ageing and mental health problems. These factors may affect women and men in different ways. Therefore, it is important to study brain function by clearly separating biological sex from gender-related factors.

Brain Structure, Gender, and Cognitive Processing

Previous studies reviewed by Spets and Slotnick (2020) show that memory-related brain processes differ between women and men. On average, male brains are around 10% larger and slightly heavier than female brains. Men also tend to have slightly larger head sizes. However, these differences are mainly related to men's larger physical body size rather than intellectual ability. Because men usually have greater muscle mass and overall body size, their brains require more neurones to control bodily functions. As a result, brain weight is partly connected to body weight and tends to increase with greater height (Ho K.C. et al., 1980). in addition to size, studies indicate that the levels of white and grey matter in the brain differ noticeably (Gur R.C et al., 1999; Leonard C.M et al., 2008). Ho K.C. and Roessmann U. et al. (1980) have reported that men tend to have a higher proportion of grey matter in the brain, while women generally show a greater amount of white matter.

Hemisphericity and Learning Styles

Learning and thinking styles refer as individual preferences in how the brain's hemispheres process and store information. Hemisphericity describes the tendency of a person to rely more on one cerebral hemisphere during learning and thinking (K. Vengopal, 2012). The left side of the brain is mainly associated with language, logical reasoning, and analytical thinking, while the right side is better for creativity, visuals, spatial skills, and holistic understanding (N Kane, M Kane, 1979). Modern research suggests that efficient learning requires collaboration between both hemispheres rather than reliance on one, despite early theories highlighting hemispheric dominance.

Educational Implications and research gap

Most studies have focused on biological differences and structural differences between male and female brains. But fewer studies have examined how these differences affect actual learning. There is limited research on students' learning experiences, cognitive strengths, and strategies. This study aims to explore these aspects in real educational fields.

Methodology

Significantly, the study displayed that mixed research methods, combining qualitative and quantitative approaches, are highly productive for analysing the relationship between brain measures and academic performance among male and female students (Creswell & Sally, 1997). In particular, the author used semi-structured interviews with 60-65% of the respondents. The participants of the study consisted of 10 students (5 males and 5 females) selected from various higher education institutions. The sample included undergraduate university students, allowing for comparison across different educational levels while maintaining a balanced gender distribution. This study was guided by the following research questions: Why do men and women think and act differently in the educational field? How do they behave differently in stressed situations in the learning process? Why do men and women excel at different types of tasks? (STEM & Literature)

The data were collected through structured questionnaire records. The questionnaire focused on cognitive abilities, learning styles, and self-reported concentration and memory skills. Academic performance was assessed using cognitive tasks rather than students' grades. These tasks evaluated memory, attention, logical reasoning, and problem-solving abilities. Brain-related variables were measured through questionnaires focusing on white and grey matter–related cognitive functions, hemispheric dominance, and cognitive processing styles (Shaira Ismail,

et al., 2022). The instruments were designed to compare differences between male and female students in learning and information processing. Because this approach allows more direct and clear assessment of cognitive abilities related to brain function rather than relying only on students' academic grades (S. Dikkers, Aug 1, 2025).

The data were analysed using descriptive and comparative statistics. Results from cognitive tasks and interviews were compared between male and female students to examine differences in brain-related learning and cognitive performance. Participation was voluntary, and the identities of all participants were kept anonymous. The collected data were used solely for academic purposes.

Result & Discussion

The finding of this study was revealed by using the interview method, and it was conducted with 10 higher education students who have been studied at Uzbekistan State World Language University and Tashkent State University of Economics, including five male and five female participants. Before the interviews, the participants were briefly informed about the purpose of the study. The author said that the research focuses on students' thinking styles, learning experiences, and their approaches to academic tasks. During the interviews, students shared their opinions about how they learn different subjects and how they deal with stress during the learning process. All participants were informed that their answers would be used only for academic purposes and their identities would remain anonymous. For this reason, the participants were interviewed separately. The researcher made the 10 most important questionnaires. While the question was about gender differences in learning approaches, 60% of respondents approved that there was no huge difference in the learning style, and 40% of answers were 'yes'. The next question was about preference of academic tasks; female students tend to prefer language-based learning (5 out of 4), while male students more often choose analytical or science-related tasks (5/3). When the question was about the effect of stress on learning, participants gave three various answers with explanations based on their true stories. 60% of students reported that stress and pressure negatively influence their concentration and memory during the learning process, although 30% of students mentioned stress gave them motivation to complete their tasks much faster. Also, one of the participants remained neutral. Learning strategies and approaches are somehow similar among genders; students commonly rely on repetition, note-taking, visual learning, and practical activities to improve memory and understanding. The most interesting and key question of the article, 'Does big brain work better in education?', was asked. The vast majority of interviewees did not believe that a big brain automatically leads to better academic performance. 80% of respondents stated that academic success is more related to learning strategies and consistent practices rather than biological brain differences. In general, the interviews showed that most students believe academic success depends more on effort and study habits than on brain size or other physical factors.

Thematic and statistical analysis of male and female students' semi-structured interview responses

Question	*Theme / Pattern*	*Total Students*	*Female (5)*	*Male (5)*	*% of Total*
Q1: Learning & thinking style	Most students think actively, analyze, or take notes; some prefer creativity	10	5	5	100%
Q2: Task preference (STEM vs Language)	Females prefer reading/writing/discussion; males prefer problem-solving/calculation	10	4 females for language, 1 for STEM	3 males STEM, 2 males language	100%
Q3: Brain function by subject	Females find language easier; males feel science requires analysis	10	4	3	70%

Q4: Concentration under difficult task	Students take breaks, repeat tasks, or increase focus	10	5	5	100%
Q5: Stress effect	Mixed: some negative, some positive, few unaffected	10	4 negative /1 positive	2 negative /3 positive	60% negative, 30% positive
Q6: Learning strategies	Most use notes, repetition, practical or visual activities	10	5	5	100%
Q7: Learning style preference	Visual and verbal common; practical helpful	10	4	4	80%
Q8: Gender differences in learning	Most see no difference; some females note responsibility; some males note logical focus	10	3 see no differences, 2 females note responsibility	3 males see no differences, 2 note logical	60% no difference, 40% observe difference
Q9: "Bigger brain works better"	Almost all reject the idea; some emphasize practice	10	5 reject	4 reject /1 partially agree	90% reject
Q10: Academic success factor	Learning strategies & practice > brain size	10	5	5	100%

J. P. Rushton and C. D. Ankney (2009) emphasised that the size of the brain is one of the influential factors for people's success. However, this paper supported Christof Koch's point, which is that the measure of the brain does not affect a student's academic performance, by using the semi-structured interview method. Furthermore, this research proved that 60% of students stated there are no substantial differences in memory-related tasks among genders. Importantly, the majority of brain processes are developed by a person's own effort. In the literature review part, N. Kane and M. Kane (1979) point out roles and functions of the right brain hemisphere and the left brain hemisphere. Also, this research analysed that both hemispheres worked at the same level between men and women. Participants proved that all people can improve their preferred brain hemispheres by using valid and useful techniques, methods and practices.

Conclusion

This research explored whether there are differences among genders based on their brain structure and whether it affects male and female students' academic performance or not. The primary objective of this paper was to better understand how brain factors affect male and female students' learning. The result of the study demonstrated that almost 90% of representatives rejected the idea that "bigger brain works better", while 80% of respondents

confirmed that the long-term practices and learning strategies can lead a person toward better educational success. Although certain cognitive and learning differences exist between genders, brain measurement does not play a major role in determining academic success. Also, some differences were observed between men and women students, for example, preferences for certain types of tasks; these differences were not strong enough to define overall learning ability. Female students often emphasise more interest in language-based tasks, while male students excel more at analytical work. However, the vast majority of correspondents believed that these differences are not absolutely correct. Because the learning depends on more personal styles than gender. Besides, stress was found to influence learning performance, with most students reporting negative effects on concentration and memory. As above-mentioned points, many participants points out that consistent practice and effective learning strategies play a more essential role in academic achivement than brain differences. Taking everything into account, this paper explains that academic success is not determined by brain size but by how students learn and adapt. Every student has a unique way of thinking, and education should focus on developing these individual strengths rather than comparing biological differences.

Reference

1. CHRISTOF KOCH. (January 1, 2016). Does Brain Size Matter? Scientific American. https://www.scientificamerican.com/article/does-brain-size-matter1/

2. Creswell John W. & Sally Sieloff Magnan (1997). Research design: Qualitative, quantitative, and mixed method approaches. The Modern Language Journal. Volume81, No 2, pp. 256-257. https://doi.org/10.2307/328794

3. Do Men and Women Have Different Brains?(Sept. 17, 2019 August 27, 2015). Are Big Brains Smarter? YouTube. http://www.livescience.com/32142-are-big-brains-smarter.html

4. Dr. Seann Dikkers. (Aug 1, 2025). Assessment Without Grades: A Relational Approach to Knowing They're Learning. In Gospel. https://www.portalsedu.com/post/assessment-without-grades-a-relational-approach-to-knowing-they-re-learning

5. Gur RC, Turetsky BI, Matsui M, et al. Sex differences in brain gray and white matter in healthy young adults: correlations with cognitive performance. J Neurosci 1999; 19(10): 4065-72.

6. Ho KC, Roessmann U, Straumfjord JV, Monroe G. Analysis of brain weight. II. Adult brain weight in relation to body height, weight, and surface area. Arch Pathol Lab Med 1980; 104(12): 640-5. https://benthamopenarchives.com/contents/pdf/TOANATJ/TOANATJ-2-37.pdf

7. Ho KC, Roessmann U, Straumfjord JV, Monroe G. Analysis of brain weight. II. Adult brain weight in relation to body height, weight, and surface area. Arch Pathol Lab Med 1980; 104(12): 640-5

8. John Stossel TV (2019, October 15).Male brain vs Female brain. YouTube. https://youtu.be/tTEi2-FAEZE?si=9ozt4Eo3EcEUNJ8C

9. J. Philippe Rushton and C Davison Ankney. (May 19, 2009). Whole Brain Size and General Mental Ability: A Review. National Library of Medicine. Volume 119(5), pages 692–732. https://doi.org/10.1080/00207450802325843

10. Kane, N., & Kane, M. (1979). Comparison of right and left hemisphere functions. Gifted Child Quarterly, 23, 157–167. https://journals.sagepub.com/doi/abs/10.1177/001698627902300126

11. Leonard CM, Towler S, Welcome S, et al. Size matters: cerebral volume influences sex differences in neuroanatomy. Cereb Cortex 2008; 18(12): 2920-31.

12. Spets DS, & Slotnick SD, 2020. Are there sex differences in brain activity during long-term memory? A systematic review and fMRI activation likelihood estimation meta-analysis. Cogn Neurosci, 1–11. doi: 10.1080/17588928.2020.1806810

13. Shaira Ismail, Nani Ilyana Shafie & Nurul Hayani Abd Rahman. (June 30, 2022). Learning Styles, Brain Dominance and Teaching Techniques: A Case Study Approach. Responsible Education, Learning and Teaching in Emerging Economies. Volume 4, No 1, pp. 33-46. https://doi.org/10.26710/relate.v4i1.2405

14. Vengopal, K. (2012). Styles of Learning and Thinking: Hemisphericity Functions. In: Seel, N.M. (eds) Encyclopedia of the Sciences of Learning. Springer, Boston, MA. https://doi.org/10.1007/978-1-4419-1428-6_1728