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Review

Exploration of Homosexuality Based on Multiple Scientific Aspects

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Abstract: Homosexuality has become a heated debate in recent years, and it has prevailed nowadays around the world, causing tremendous changes in the current society. In this article, homosexuality is discussed based on multiple scientific perspectives: neuroscience, genetics, and psychology. Specifically, the passage will focus on structural differences in the brain between heterosexual and homosexual people, the role of genetics in homosexuality, and psychological principles behind the curtain. As our findings have shown, there are significant disparities in brain structures, such as different GMV (Gray matter volume). They have also provided valuable insights into the relationship between certain genetic characteristics and sexual orientation. Additionally, psychological explanations and clinical issues have been revealed. Overall, this study contributes to a holistic understanding of the biological and psychological aspects of sexual orientation, presenting many worth pondering inferences.

Keywords: homosexuality; neuroscience; genetics; psychology

1. Introduction

Homosexuality is the state of being sexually or romantically attracted to people of the same sex. ("Homosexuality" Oxford Advanced Learner's Dictionary) It has been suggested that the first recorded same-sex couple existed around 2400 BCE, which dates back thousands of years. Since then, the discussion about homosexual behaviors has become increasingly popular. People began to propose various theories to explain the existence of homosexuality. Among those explanations, genetic, biological, and evolutionary perspectives formed a great proportion. This has led to the study in this passage. Similarly, this study is about summarizing and analyzing the origin and all of the information related to homosexuality and the homosexual population from multiple perspectives. More specifically, the main task is to explore the reasons same-sex attraction occurs and certain implications of it. In this passage, data analyses and scientific inferences are more important than statements from a moral point of view. Based on those data and the insights derived from it, we will acquire some meaningful knowledge about homosexuality.

2. Neurobiological perspective

After thorough research from a neurobiological perspective, we discovered diverse disparities in brain structures between people with different sexual orientations and argued that they may reveal certain differences between two groups in their responses to stimuli in reality. Specifically, many studies have used gray matter volume known as GMV as a measure to compare levels of activity and connection between two groups of people. They have found an association between sexual orientation and GMV in sensorimotor regions: as a study has shown, heterosexual people, no matter whether men or women, all tend to reveal a relatively higher GMV in the thalamus, cerebellum, and premotor cortex than homosexual people. (Votinov 7) This is informative because places like

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the thalamus play a very significant role in perceiving external sensory stimuli and relaying information to different cortices in our brains. Also, discoveries of differences in the putamen and precentral gyrus proved the existence of a correlation between sexual orientation and GMV in motor regions. To sum up, this association may pose insights into how homosexual people process stimuli differently from heterosexual people. Particularly, it is reasonable to infer that the ability to sense and move among heterosexuals may be stronger than homosexual people. However, this statement requires a lot more validation. What's more interesting is that it has been found that homosexual people generally have a larger SCN (suprachiasmatic nucleus) than heterosexuals, as the article wrote, "The SCN was found to be larger and contained more neurons in homosexual men who had died of AIDS, compared with heterosexual men dying of other causes, and with a group of heterosexual men and women who had died of AIDS." (Harrison 2) This may present information about the potential differences in circadian rhythms between homosexuals and heterosexuals.

Moreover, researchers have found that the brain of a homosexual person usually resembles that of a heterosexual person with the opposite sex. For example, the brain of a straight man is highly likely to be structured in a form similar to a homosexual woman's. Apart from the environmental factors, this may also explain why most gay people desire to stay with people of the opposite sex--probably due to similar capabilities or ways of understanding information. To be more detailed, assuming He/Ho stands for sexual orientation, and M/W representing the sex, researchers have demonstrated similarities between the group of HeW and HoM, as well as the group of HeM and HoW from the aspect of functional connectivity. For instance, HoM and HeW displayed similar patterns of connection with the contralateral amygdala, hypothalamus, and so on. Both groups reveal distinct connections to particular areas like the amygdala, hypothalamus, or orbitofrontal cortex, where abilities like emotion-managing ability are the main focus. (Savic and Lindstrom 2) Therefore, this finding may again present some insights about similar emotional processing abilities between a straight person and a homosexual person with the opposite sex even though the scientific evidence is currently lacking. In addition, the study about the size of brain symmetry also adds evidence to the argument of similar anatomical traits between a straight person and a homosexual person who has the opposite sex. In detail, researchers have found that the brain hemispheres are not symmetric in gay women, similar to straight men--the right hemisphere is slightly larger; In contrast, both gay men and straight women in the study have symmetric hemispheres. (Coghlan)

Overall, the brain differences between homosexuals and heterosexuals can be said to be obvious. Also, the similarities between the two groups of people mentioned in the last paragraph are undeniable. However, both findings are only able to demonstrate a correlation rather than a causal relationship. People should be extremely cautious when establishing claims upon these two discoveries.

3. Biological perspective

There has always been a heated debate about the cause of homosexuality on the foundation of biology, particularly genetics. People keep questioning whether the "gay gene" exists in all homosexual people. Nevertheless, through infinite research made by those scientists, the existence is not able to be proven and many studies which claimed the existence were reported to have fatal flaws, but what is noticeable is that epigenetic factors may play a role in shaping a person's sexual orientation. Those factors which are mostly environmental influence it by altering or regulating the frequency of gene expression related to sexual behaviors and development in human beings.

Firstly, we still have to discuss some studies that suggest the existence of the "gay gene" in homosexual people. A researcher named Dean H. Hamer led a study of finding exclusive genetic marks in homosexual men. Since Hamer believed gay men had gay rel-

atives through maternal inheritance, their studies aimed at studying genes on the X chromosome. Then, what was surprising is that they had discovered a "special" marker in a specific DNA region called q28 at the X chromosome among 33 out of 40 pairs of homosexual brothers, yet Hamer didn't conclude this finding as a discovery of "gay gene" but instead claimed to have found statistical evidence of the existence of such gene. However, though seemingly groundbreaking, there are fatal defects in Hamer's study. Hamer didn't prove the markers within q28 as an exclusive symbol that is only contained in homosexual men because there was no control group for people to contrast. In other words, Hamer didn't prove that there weren't any markers in men who are heterosexual. This poses a great threat to the established claim but this study was still famous and well-achieved. (Harrub 5)

A more recent study suggests more information using a more careful and scientific method. This study conducted by Alan R. Sanders and his colleagues has proposed a potential association between certain protein families and sexual orientation, such as the SLITRK family. The researchers investigated each chromosome in order to discover as many relevant genetic markers as they could. Particularly, they have found that the SLITRK family--SLITRK1 and SLITRK5, for example--may have relevance to sexual orientation. (Sanders, 2) In addition, in other reports, it has been said that SLITRK 6 may also play a role in shaping a person's orientation.

To sum up, the genetic aspect of sexual orientation still requires a lengthy period for scientists to explore something unprecedented. However, till now, researchers have found certain genetic markers or characteristics that are possibly related to sexual orientation. Under the current knowledge and experience, most scientists are not willing to concede the existence of a specific "gay gene" since there are no studies perfectly proving its existence. In contrast, they tend to agree that genetic factors play a role but the underlying mechanisms are still unclear.

4. Psychological perspective

4.1. How can the formation be explained?

From both neurological and genetic perspectives, the biological aspect of sexual orientation is being explored. However, understanding the influence of environmental and social factors is equally important. Specifically, can solely altering the environment change a person's sexual orientation? From a social psychology standpoint, the answer is complex and not fully known, but several factors suggest potential influences.

Social circles and peer influence play a significant role in shaping an individual's sexual orientation. For instance, a person who is currently heterosexual might experience shifts in their sexual orientation due to social pressures. If they are part of a group where homosexuality is prevalent or accepted, they might suppress their heterosexual tendencies to conform. Alternatively, being around peers who are openly homosexual might encourage the exploration of one's own sexual identity, potentially leading to the development of a new self-concept. Cultural factors also contribute to this dynamic. In countries where homosexuality is embraced and supported, individuals, especially adolescents, might feel more comfortable exploring their sexual orientation. Cultural acceptance provides a safe space for individuals to understand and express their sexuality without fear of stigma. This exposure to diverse sexual orientations can motivate individuals to explore and possibly identify with same-sex attraction.

In summary, while core sexual orientation is generally stable, social and cultural environments can influence how individuals explore and express their sexuality. Conformity to social norms and exposure to supportive environments can facilitate self-discovery and identity formation, potentially impacting how people come to understand and express their sexual orientation.

Looking from the perspective of developmental psychology will also acquire similar answers. By using the proposed theory of famous psychologist Eric Erikson, during adolescence, teenagers undergo the process of "identity vs. Role confusion." This is very important because, during this stage, they will begin to explore multiple aspects of their identities: their values, beliefs, and sexual orientation. It has been said that they will fall into role confusion if they aren't able to form a stable social identity. We hypothesize that when adolescents are confused about their identities, they will become more urgent to find one. Thus, the effect of conformity and other social factors will be magnified.

4.2. Why do mental health problems prevail?

Discussing the formation of homosexuality is not enough to understand the homosexual tendency from a psychological perspective. To examine it comprehensively, knowing some of its possible consequences is very necessary, and among those the mental health problem is the most considerable one.

According to David M. Ferguson and his colleagues, "The weight of the evidence clearly favors the view that GLB (Gay+Lesbian+Bisexual) young people showed pervasive increases in risks of common psychiatric disorders, with these increases being particularly evident for measures of suicidal ideation, suicide attempt, and multiple disorders." (Fergusson 3) More specifically, in another similar study conducted to investigate psychiatric disorders in homosexuals, researchers have arrived at the table above and it is apparent that in both men's and women's cases of comparison, almost all DSM-III-R disorders are more prevalent in homosexuals than heterosexuals, demonstrating a noticeable increase when the sexual orientation has changed. (Sandfort 1)

But why is the difference so significant? Social pressure seems to be the only reasonable explanation. First and foremost, minority stress and social marginalization are inevitable. Although people will argue that some countries embrace the existence and prevalence of LGBTQ+, it is still a minority if we view it on the scale of a whole country or the entire world. For any minorities, the probability of getting "bullied" or repelled will definitely be larger than other groups of people. Because of the outgroup homogeneity bias of those heterosexual people--viewing all outsiders as having the same traits--LGBTQ+ population is easily tagged with a lot of negative and stereotypical characteristics. What's later will be infinite discriminatory actions and contempt toward those people. Eventually, depressive and anxiety disorders will destroy most of the people. Secondly, access to LGBTQ+-specific mental health care services is currently insufficient. For heterosexual people, it is relatively easier than those who are homosexual when mediating their daily stress or pressure since heterosexual people will consider less about the types of services than homosexuals. Generally, the LGBTQ+ population requires specific mental healthcare services that are done by employees who are trained and have acquired LGBTQ+-specific treatment skills, which are nowadays lacking. Therefore, the daily stress or pressure may accumulate into grueling psychiatric disorders in those homosexual people and the mental health problem will be more secure in heterosexuals, contributing to a visible disparity in the cases of mental health disorders between two groups of people. Take the United States as an example, even in such a country where homosexuality is embraced and legal, the amount of mental healthcare services for LGBTQ+ isn't adequate, and certain data has partially supported that those specific healthcare services can effectively impede the growth of mental disorders of the LGBTQ+ population. In the report conducted by the Trevor Project in 2022, the famous non-profit organization for suicide prevention of LGBTQ+, it has been claimed that about 60% of LGBTQ youth who wanted mental healthcare in 2021 were not able to get it. (Trevor Project 11) Correspondingly, in 2021, 62% of the same population reported having symptoms of depression. (Trevor Project 10) Then, in a later study, researcher Natalia Ramos and her colleagues claimed that approximately 54% of LGBTQ+ youth aged 13 to 24 years desired mental health care in 2022 but were unable to receive it. (Ramos 1) Correspondingly, in the same report by the Trevor Project,

roughly 58% of LGBTQ+ youth reported experiencing symptoms of depression, which is 4% less than last year's. (The Trevor Project 8) From the analysis, we can observe a negative correlation between the amount of services provided and the rate of depression, reflecting the significance of the specific mental healthcare services. Thus, we can reasonably suggest that mental health care services play an indispensable role in the mental health problems among the LGBTQ+ population, at least the population of youth.

5. Conclusion

In conclusion, regardless of the aspects that are examined, people with different sexual orientations will always have significant discrepancies with each other. From a neuroscience perspective, different sizes and connections of areas like sensorimotor regions have led to many insightful predictions that may be useful in future development; from a genetic or pure biological perspective, "gay gene" is still being discussed intensely while it is almost sure that genetic factors have played a role in determining whether a person will be homosexual; from a psychological perspective, social and environmental factors are very influential in shaping a person's sexual orientation. Additionally, mental health problems in homosexual people are severe and require assistance as soon as possible. To sum up, homosexuality is an extremely crucial concept and phenomenon with different insights seen from disparate fields. People are likely going to witness more groundbreaking studies related to the origin of homosexuality in the future.

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