In Adolescent Girls COVID-19 Lockdowns Accelerated Brain Aging

Researchers from the United States of America used magnetic resonance imaging (MRI) to investigate the impact of lockdowns during the coronavirus disease 2019 (COVID-19) pandemic on brain structure, focusing on gender differences. They discovered accelerated cortical thinning post-pandemic, with females showing more widespread and more significant changes than males, suggesting a greater developmental impact on female brains.

Study

Normative modeling reveals deviations from expected brain changes due to environmental factors or disorders. It has been widely used to study brain alterations in various conditions, including socioeconomic stress, autism spectrum disorder, depression, and schizophrenia.

The present study created a normative reference cohort using pre-lockdown data to model cortical thickness changes. The study recruited participants from the local community, including those aged 9, 11, 13, 15, and 17 years at the pre-pandemic time point and 12, 14, 16, 18, and 20 years at the post-pandemic time point.

Exclusion criteria included left-hand dominance, non-English primary language, history of speech, language, or hearing difficulties, prior diagnoses of developmental or psychiatric disorders, uncorrected vision problems, surgical implants or dental work affecting MRI, gender identity different from the sex assigned at birth, and current use of psychotropic medications.

MRI data were collected from adolescents at two time points (2018 and post-lockdown in 2021-2022) and analyzed using Bayesian linear regression to fit models for cortical thickness across 68 brain regions.

The participants were divided into pre-pandemic training (n = 87), validation (n = 22), and post-pandemic test groups (n = 54), with specific age and sex criteria. The model was validated with separate subsets, ensuring high-quality data.

Cortical thickness was compared between pre- and post-lockdown samples, with Z-scores calculated to assess deviations. Additionally, a model for average cortical thickness change was created to estimate brain age acceleration to reveal potential differences between the sexes. An alternative analysis was performed to explore potential gender interactions.

Study Findings and Discussion

As per the study, significant deviations were observed in cortical thickness in the post-pandemic test group, with 30 brain regions showing significant thinning in females, compared to only two regions in males. The regions with notable thinning for females were distributed across all lobes of the brain, while males showed significant thinning only in the occipital lobe.

The average Z-scores for cortical thickness were significantly different from zero for females (P = 0.00021) but not for males (P = 0.16). Effect sizes for post-COVID-19 cortical thinning were greater than 0.5 in 29 regions (43%) for females and in only four regions (6%) for males.

Additionally, the analysis revealed a mean age acceleration of 4.2 years for females and 1.4 years for males, indicating a difference of 2.8 years in brain age acceleration between sexes. This highlights the more pronounced impact of the COVID-19 lockdown on female brain development.

Overall, the study contributes to our understanding of the interplay between environmental stressors and adolescent brain development, with implications for public health and mental health interventions.

The study's design minimized demographic and technical differences among participants by using consistent criteria and MRI instrumentation, thereby strengthening its conclusions.

However, the study is limited by small sample size, lack of behavioral and socioeconomic data, uncertainty about age range applicability, and unclear effects of COVID-19 virus contraction on brain changes.

Conclusion

In conclusion, the study found that the lifestyle changes during the COVID-19 lockdowns led to deviations from typical cortical thinning patterns in adolescent development, with more pronounced effects in females than males.

Given that accelerated cortical thinning is linked to a higher risk of neuropsychiatric and behavioral disorders, the results emphasize the need for ongoing monitoring and support for adolescents who experienced the pandemic lockdowns.

Source:

https://www.news-medical.net/news/20240910/COVID-19-lockdowns-accelerated-brain-aging-in-adolescent-girls-researchers-find.aspx