

Increased first clinic visits in adolescent patients with mood, anxiety, or childhood affective disorders during the COVID-19 pandemic

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KEYWORDS

unimodal cognition, vision, tactile, tactile experience enrichment, chronic restraint stress

ABSTRACT

Background: To explore changes in the first clinic visits in adolescents diagnosed with mood disorders, anxiety disorders, or childhood mood disorders from January 2019 to May 2022 based on outpatient records from a large psychiatric hospital in China.

Methods: The medical records of adolescents aged 12–17 years at their first clinic visits from January 2019 to May 2022 were collected at Ningbo Kangning Hospital. Adolescents primarily diagnosed with mood disorders, anxiety disorders, or childhood affective disorders were included in the present study.

Results: The results showed that the number of adolescents at their first clinic visits diagnosed with mood disorders, anxiety disorders, and childhood affective disorders according to the International Classification of Diseases-10 (ICD-10) increased each year, with an increase from 2019 to 2020 being greater than that from 2020 to 2021. The mean age at first diagnosis showed a significant trend towards younger age ($P < 0.001$). The mean age when boys did their first clinic visits in 2021 was significantly younger than that in 2019 ($P < 0.05$) and the mean age of girls in 2021 was significantly younger than that in 2019 ($P < 0.001$) and in 2020 ($P < 0.001$). No difference was found in terms of sex (Chi-square = 7.538, $P > 0.05$).

Conclusion: The number of first clinic visits by adolescent patients with mood, anxiety, or childhood affective disorders increased during the COVID-19 pandemic. The use of universal, selective, and indicated prevention and treatment strategies to buffer children and adolescents from negative mental health outcomes is imperative in the context of the COVID-19 pandemic.

1 Introduction

The World Health Organization (WHO) announced that coronavirus disease 2019 (COVID-19) was a spreading global public health emergency in January 2020. During the COVID-19 pandemic,

home confinement, fear of infection, and worries about economic recessions can easily cause depression, anxiety, posttraumatic stress disorder, substance dependence, and other psychiatric problems [1]. Children and adolescents may be more likely to experience mental health

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crises than adults due to their specific stage of development, conflicts with their parents, the suspension of outings, and monotonous online classes.

During the particular time of a pandemic, multiple risk factors and missing protective factors can be detrimental to mental health and vulnerability to mental illness may increase. As a result, new mental illnesses may develop in children at high risk, and people with existing mental illnesses may experience worsening symptoms. A review revealed a worsening trend in general mental health as well as an increased number of symptoms of depression and anxiety among children and adolescents during the first year of the COVID-19 pandemic [13]. Some studies showed an increased prevalence of suicidal ideation, suicide, and nonsuicidal self-harm in children and adolescents during the COVID-19 pandemic [4, 12]. Urgent population-level monitoring of mental health is therefore particularly important to optimize the prevention and mitigation of the pandemic's negative impact on mental health.

Few current studies have longitudinally compared trends describing the visits of children and adolescents for psychiatric problems from the prepandemic period to the present. This study explored first clinic visits in adolescents diagnosed with mood disorders, anxiety disorders or childhood mood disorders from January 2019 to May 2022 based on the outpatient records of a large psychiatric hospital in China.

2 Methods

2.1 Study design

The outpatient electronic medical records of adolescents aged 12–17 years from January 2019 to May 2022 were collected at Ningbo Kangning Hospital. In the present study, participants with

diagnoses of mood disorders (International Classification of Diseases-10 (ICD-10) code [10]: F31, F32, F34, F38, F39, and F39), anxiety disorders (ICD-10 code: F40, F41, and F42) and childhood affective disorders (ICD-10 code: F93) were included. A valid first visit was defined as the first visit to the clinic, and the outpatient diagnosis code met the requirements of the study.

We examined the number of adolescent patients who were first diagnosed with mood disorders, anxiety disorders, or childhood affective disorders during the COVID-19 pandemic. We then analysed the temporal characteristics of sex and age.

2.2 Statistical analysis

One-way analysis of variance and the chi-square test were used to estimate the temporal characteristics of sex and age along with year. All tests were two-tailed, and $P < 0.05$ was considered statistically significant.

3 Results

Grand waveforms of changes in adolescent first visits from January 2019 to May 2022 are shown in Fig. 1(a). There were 384 adolescent patients with first visits in 2019, 1,170 with first visits in 2020, 1,715 with first visits in 2021, and 826 with first visits from January 2022 to May 2022. Figure 1(b) shows that the number of first clinic visits by adolescents for mood disorders, anxiety disorders, and childhood affective disorders increased each year, with an increase from 2019 to 2020 being greater than that from 2020 to 2021.

The mean age at the first clinic visit was 16.05 (standard deviation (SD) = 1.14) years in 2019, 15.59 (SD = 1.30) years in 2020, and 15.31 (SD = 1.40) years in 2021. After analysis, there was a significant time effect ($F = 53.25$, $P < 0.001$). The mean age in 2021 was significantly younger

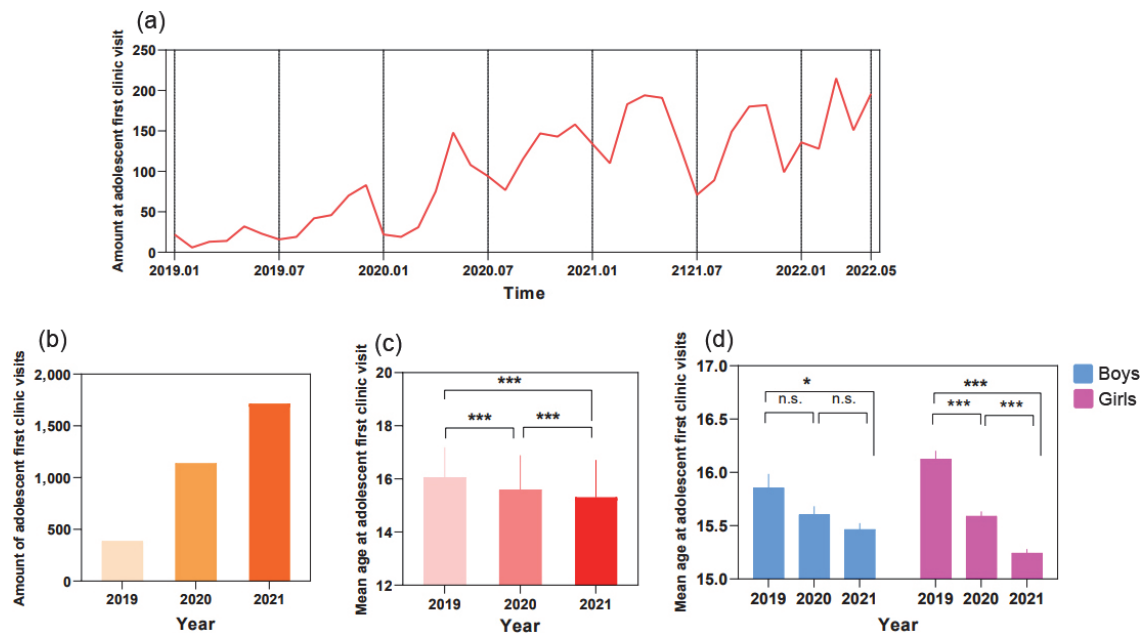


Figure 1 (a) Grand waveforms of changes in the first visits by adolescents from January 2019 to May 2022. (b) The number of first visits by adolescents for mood disorders, anxiety disorders, and childhood affective disorders increased each year. (c) The age difference over the three years. (d) The change of the age of boys and girls. n.s., no significance; *, $P < 0.05$; ***, $P < 0.01$.

than that in 2019 ($P < 0.001$) and 2020 ($P < 0.001$) (Fig. 1(c)). The adolescents with first clinic visits included 103 boys (26.89%) and 283 girls (73.11%) in 2019, 302 boys (25.81%) and 868 girls (74.19%) in 2020, 505 boys (29.45%) and 1,210 girls (70.55%) in 2021, and 252 boys (30.51%) and 574 girls (69.49%) from January 2022 to May 2022. Although no difference was found in sex (Chi-square = 7.538, $P > 0.05$), the prevalence in females was higher than that in males each year.

Then we analysed the change of the age of boys and girls separately (Fig. 1(d)). Then the mean age of boys' first clinic visit was 15.854 (SD = 0.132) years in 2019, 15.606 (SD = 0.077) years in 2020 and 15.465 (SD = 0.059) in 2021. Then mean age of girls' first clinic visit was 16.124 (SD = 0.079) in 2019, 15.590 (SD = 0.045) in 2020 and 15.243 (SD = 0.038) in 2021. After analysis, there was a significant time effect ($F = 3.517$, $P < 0.05$). The mean age at boys' adolescent first clinic visits in 2021 was significantly younger than that in 2019 ($P < 0.05$) and the mean age of girls in 2021 was significantly younger than that in 2019 ($P < 0.001$) and in 2020 ($P < 0.001$).

4 Discussion

Based on an analysis of outpatient electronic medical records, we found an increasing trend in the number of visits from January 2019 to May 2022 for adolescents aged 12–17 years with a diagnosis of mood disorders, anxiety disorders, or childhood affective disorders, especially in 2020 compared to 2019, indicating that mental health problems are becoming more prominent in adolescents. The mean age at first diagnosis showed a significant trend towards younger age. This may be because during the pandemic, social isolation measures have destroyed supportive environments for adolescent development, including a stable social environment, peer support and social services. Moreover, offline teaching, irregular sleep, reduced social interaction and the excessive use of smartphones have increased the psychological pressure experienced by adolescents. It is recommended that more forms of health education should be developed, and mental health services should be provided through various channels; for adolescents who develop

psychological problems, caregivers should pay attention to the mental, emotional, and behavioural changes of adolescents and seek psychological treatment when necessary.

Although no difference was found in terms of sex, the proportion of girls was higher than that of boys each year. However, it was found that clear sex differences were exhibited in the incidence rate of various psychiatric disorders in adolescents. Biological factors, including the level of gene expression, hormone levels, anatomy, etc., play an important role in girls' vulnerability to mood disorders [6, 15], and psychosocial explanations for the higher incidence rate in girls than boys involve stress coping, mother-child relationships, sex-specific expectations, and social cognitive function [9, 14]. We also found the proportion of boys has also increased (from 26.89% in 2019 to 30.51% in 2022), which may result from the reduced time that boys spend on social and outdoor activities, which led to more domestic conflicts during restriction management, increased susceptibility to negative emotions, and reduced sensitivity to pleasure stimulus.

Our study provided evidence of an increase in mental health problems among adolescents during the pandemic. There are many risk factors for psychological problems. A retrospective study showed that feelings of loneliness are associated with anxiety and depression [7]. Increased loneliness may result from school closures and maintaining physical distances during the COVID-2019 pandemic. With the increased time spent at home during lockdowns, adult family members may experience increased financial and psychological stress, which directly or indirectly have negative impacts on adolescent mental health [2, 5]. Restrictive measures such as limited recreational space and restricted physical activity and time spent outside the home also have an impact. Although more psychological support may be needed during blockades,

restrictive measures may discourage and reduce support-seeking behaviour [11, 16]. Finally, excessive use of the internet and social media is associated with mental stress in children and adolescents [3, 8]. All these stressors increase the risk of mental illness in adolescents.

In the context of the COVID-19 pandemic, the number of young people diagnosed with mental illnesses is increasing. Universal, selective, and indicative prevention and treatment strategies to buffer children and adolescents from negative mental health outcomes, not only in the context of the COVID-19 pandemic but also during future crises are needed.

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Declaration of conflicting interests

The authors declare no conflicting interests regarding the content of this article.

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References

- [1] Alamrawy, R. G., Fadl, N., Khaled, A. Psychiatric morbidity and dietary habits during COVID-19 pandemic: A cross-sectional study among Egyptian Youth (14-24 years). *Middle East Current Psychiatry*, **2021**, 28(1): 6.
- [2] Brown, S. M., Doom, J. R., Lechuga-Peña, S., Watamura, S. E., Koppels, T. Stress and parenting

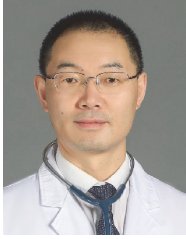
- during the global COVID-19 pandemic. *Child Abuse & Neglect*, **2020**, 110(pt 2): 104699.
- [3] Chen, I. H., Chen, C. Y., Pakpour, A. H., Griffiths, M. D., Lin, C. Y. Internet-related behaviors and psychological distress among schoolchildren during COVID-19 school suspension. *Journal of the American Academy of Child & Adolescent Psychiatry*, **2020**, 59(10): 1099–1102.e1.
- [4] Ellis, W. E., Dumas, T. M., Forbes, L. M. Physically isolated but socially connected: Psychological adjustment and stress among adolescents during the initial COVID-19 crisis. *Revue Canadienne Des Sciences Du Comportement*, **2020**, 52(3): 177–187.
- [5] Evans, G. W., Li, D., Whipple, S. S. Cumulative risk and child development. *Psychological Bulletin*, **2013**, 139(6): 1342–1396.
- [6] Frackiewicz, E. J., Sramek, J. J., Cutler, N. R. Gender differences in depression and antidepressant pharmacokinetics and adverse events. *The Annals of Pharmacotherapy*, **2000**, 34(1): 80–88.
- [7] Loades, M. E., Chatburn, E., Higson-Sweeney, N., Reynolds, S., Shafran, R., Brigden, A., Linney, C., McManus, M. N., Borwick, C., Crawley, E. Rapid systematic review: The impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. *Journal of the American Academy of Child and Adolescent Psychiatry*, **2020**, 59(11): 1218–1239.e3.
- [8] Moore, S. A., Faulkner, G., Rhodes, R. E., Brussoni, M., Chulak-Bozzer, T., Ferguson, L. J., Mitra, R., O'Reilly, N., Spence, J. C., Vanderloo, L. M. et al. Impact of the Covid-19 virus outbreak on movement and play behaviours of Canadian children and youth: a national survey. *International Journal of Behavioral Nutrition and Physical Activity*, **2020**, 17(1): 85.
- [9] Naninck, E.F.G., Lucassen, P. J., Bakker, J. Sex differences in adolescent depression: Do sex hormones determine vulnerability? *Journal of Neuroendocrinology*, **2011**, 23(5): 383–392.
- [10] World Health Organization. The ICD-10 classification of mental and behavioural disorders: diagnostic criteria for research. 1993.
- [11] Phillips, D., Paul, G., Fahy, M., Dowling-Hetherington, L., Kroll, T., Moloney, B., Duffy, C., Fealy, G., Lafferty, A. The invisible workforce during the COVID-19 pandemic: Family carers at the frontline. *HRB Open Research*, **2020**, 3: 24.
- [12] Murata, S., Rezeppa, T., Thoma, B., Marengo, L., Krancevich, K., Chiyka, E., Hayes, B., Goodfriend, E., Deal, M., Zhong, Y. Q. et al. The psychiatric sequelae of the COVID-19 pandemic in adolescents, adults, and health care workers. *Depression and Anxiety*, **2021**, 38(2): 233–246.
- [13] Samji, H., Wu, J., Ladak, A., Vossen, C., Stewart, E., Dove, N., Long, D., Snell, G. Review: Mental health impacts of the COVID-19 pandemic on children and youth - a systematic review. *Child and Adolescent Mental Health*, **2022**, 27(2): 173–189.
- [14] Seeman, M. V. Psychopathology in women and men: Focus on female hormones. *American Journal of Psychiatry*, **1997**, 154(12): 1641–1647.
- [15] Slavich, G. M., Sacher, J. Stress, sex hormones, inflammation, and major depressive disorder: Extending Social Signal Transduction Theory of Depression to account for sex differences in mood disorders. *Psychopharmacology*, **2019**, 236(10): 3063–3079.
- [16] Wang, G., Zhang, Y., Zhao, J., Zhang, J., Jiang, F. Mitigate the effects of home confinement on children during the COVID-19 outbreak. *Lancet*, **2020**, 395(10228): 945–947.



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