Applied & Educational Psychology (2025)
Clausius Scientific Press, Canada

DOI: 10.23977/appep.2025.060119
ISSN 2523-5842 Vol. 6 Num. 1

Anxiety disorder burden trends in Chinese children and adolescents (0-19 years), 1990-2021

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Keywords: Children and adolescents; Anxiety disorder; Disease burden; ARIMA model; Joinpoint Regression.

Abstract: The sickness burden of anxiety among persons aged 0-19 was investigated in China between 1990 and 2021 in order to provide a scientific basis for the prevention and treatment of anxiety in Chinese children and adolescents. Furthermore, a shift in anxiety was predicted for 2022–2030. Data from the Global Burden of Disease (GBD) database for 2021 were used to analyze the prevalence of anxiety and disability-adjusted life years (DALYs) among Chinese children and adolescents. The Joinpoint regression approach was used to calculate the annual percentage change (APC) and the average annual percentage change (AAPC). The ARIMA model was used to scientifically forecast the disease load over the next nine years. In 2021, China's child and adolescent anxiety prevalence was lower than the world average. The incidence rate of 15-19-year-olds increased rapidly in 2019-2021. It is predicted that the incidence of anxiety and DALYs rate of children and adolescents in China will increase from 2022 to 2030. The anxiety burden of children and adolescents in China will still be heavy in the future. Outdoor rest time, pregnant mothers' mood, and school environment are the factors that affect children and adolescents' anxiety, so it is urgent to strengthen the attention and intervention on children and women's anxiety.

1. Introduction

A billion people, or more than one in eight adults and adolescents worldwide, suffer from a mental disorder, according to the World Health Organization's most recent World Mental Health Report[1]. Their anxiety is typified by frequent panic episodes or extensive, ongoing anxiety, which can have a significant negative impact on the sufferer's bodily and emotional well-being as well as their family's and their socioeconomic advancement [2]. Because of its complicated and long-lasting effects, the condition is now a serious public health concern that requires immediate attention. During adolescence, a kid develops into an adult. He frequently experiences inconsistencies as a result of the imbalanced growth of his mental and physical activity, which leads to a number of psychological crises [3].According to both domestic and international surveys, school-age children and adolescents have a comparatively high prevalence of mental illness. We ought to focus more on children's and adolescents' anxiety[4].

The Outline of "Healthy China 2030" states that strengthening interventions for common mental disorders like depression and anxiety is important for the future of our country and nation. In order

to promote the mental health of children and adolescents in the process of building a healthy China, there are currently few papers on the burden of anxiety diseases in children and adolescents. Therefore, this paper will analyze the burden of anxiety diseases in children and adolescents aged 0-19 in China from 1990 to 2021 using the 2021GBD (Global Burden of Disease) database in order to serve as a resource for research on anxiety diseases in China.

2. Materials and Methods

2.1 Data Sources

The relevant data of the research comes from GBD2021 database [5].Among them, the data in China mainly come from official channels such as national census, population sampling survey and death registration report system, which provides high-quality data support for the research [6, 7].

2.2 Method

Based on GBD2021, this study separated the age group into four layers: "< 5 years old, 5 to 9 years old, 10 to 14 years old, 15 to 19 years old." The burden of anxiety disorders among children and adolescents under 20 years old in China was analyzed using incidence, DALYs, and DALYs rates; since anxiety disorder is not fatal, only DALYs were used in this analysis. The average annual change percentage (APC) and average annual change percentage (AAPC) were then calculated to examine the trend of anxiety disorders in children and adolescents.

2.3 The Statistical Analysis

Using Excel2019, the age, number of patients, incidence, and prevalence of gender dysphoria, as well as the percentage of DALYs in children and adolescents aged 0–19 during 1990–2021, were sorted. The prevalence of anxiety disorders in Chinese children and adolescents aged 0–19 years was examined between 1990 and 2021 using Joinpoint. The Autoregressive Global Moving Average Model (ARIMA) was built using the R language function of R software to predict[8]the illness burden of anxiety disorders in Chinese children and adolescents between 2022 and 2030[9].The ARIMA model is capable of processing non-stationary time series data efficiently and making precise predictions about future trends by using past observations[10].Using the following formula, the rate of change of each indicator was determined in order to quantify the evolution of the burden of mental illness among children and adolescents: Change rate = [(Value in 2021 - Value in 1990) / Value in 1990] ×100%

3. Results

3.1 Incidence of anxiety disorder and DALYs rate of children and adolescents in China and the world

Between 1990 and 2021, there was a small increase in the rate of DALYs and in the incidence of anxiety disorders among children and adolescents aged 0–19 years. Fig.1 shows that the incidence [617.11/100,000(95%UI:472.23/100,000~801.91/100,000)] and DALYs [336.78/100,000 (95%UI: 211.72/100,000~495.02/100,000)] of anxiety disorders in children and adolescents under the age of 20 in China were lower than the global average in 2021, and that the trend had reversed by 2019. The incidence rate was 0.2091%(95% CI: 0.0902%~0.3281%, P<0.01), and the mean percentage change rate indicated that it was not statistically significant -0.0517%(95%CI: −0.3631%~0.2607%, P>0.05).

According to Tab. 1 the prevalence of anxiety disorders and DALYs among Chinese children and adolescents in 2021 was lower than the global average.

Table 1 Distribution of incidence of anxiety and disability-adjusted life years in children and adolescents aged <20 years in China and the world in 2021 [OR(95%UI)]

Categries	Incidence (/ 100,000)		Disability adjusted life annual rate (per 100,000)	
	China	Global average	China	Global average
Age				
< 5	137.87(96.64~189.99)	117.56(78.19~170.08)	16.65(6.98~25.22)	14.10(8.03~22.15)
5~9	729.10(514.80~999.80)	683.41(458.66~978.23)	216.77(133.40~322.17)	202.70(118.00~310.27)
10~14	904.01(681.09~1184.29)	925.07(704.08~1213.41)	531.04(320.82~786.22)	503.74(302.03~760.86)
15~19	640.79(421.60~883.88)	870.27(553.66~1221.54)	599.42(382.08~891.37)	649.72(407.89~962.34)
Gender				
Male	494.42(374.90~641.70)	524.64(404.08~690.02)	262.92(165.70~389.98)	260.87(159.50~392.52)
Female	757.92(757.92~987.22)	778.10(605.70~1015.37)	421.54(265.68~618.50)	419.13(260.46~615.18)
Total	617.11(472.23~801.91)	647.47(502.13~842.66)	336.78(211.72~495.02)	337.56(208.54~498.60)

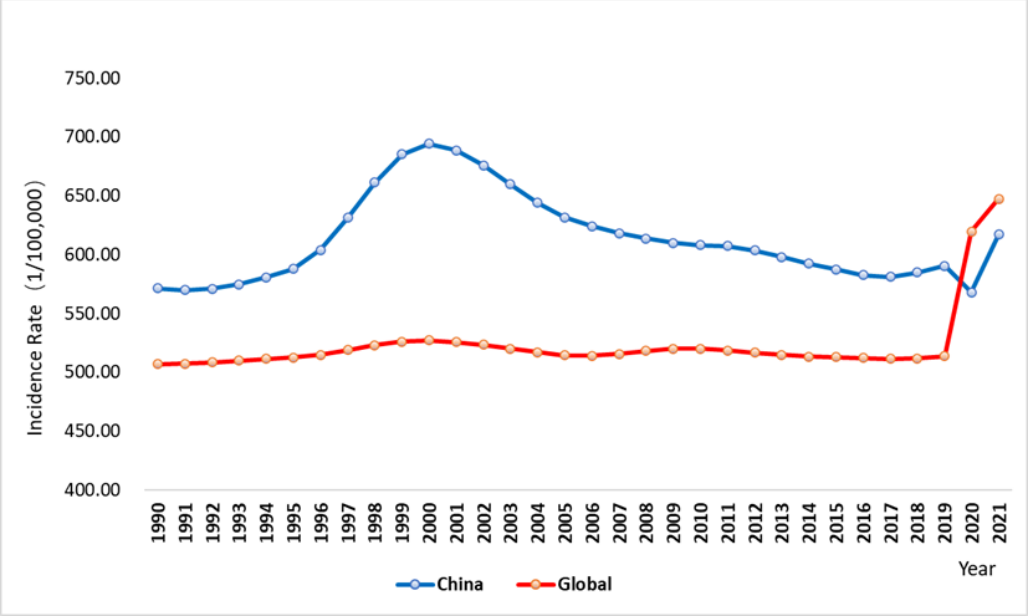

Figure 1 Trend of Anxiety Disorder Incidence of Children and Adolescents < 20 Years Old in China and the World from 1990 to 2021

3.2 Gender differences in the burden of anxiety disorders

According to studies, China's illness burden of anxiety disorders in people under 20 years old exhibits two distinct features. In 2021, there were 2.063 million anxiety disorders, 8.9851 million prevalences, and 1.12593 million DALYs among 20-year-olds in China, which is a drop of 18.85%, 24.79%, and 24.43%, respectively, from 1990. Reverse increase in relative indicators: Contrary to a decline in absolute burden, there was a 7.43% increase in the standardized incidence rate during the same time period. Gender differences persisted throughout the process, and in most age groups, girls had higher incidence and DALYs than boys of the same age (Tab. 2)Women outperformed men in terms of improved DALYs rate (+3.8% compared to men) and decreased incidence (+5.2% compared to men). Figure 2 displays trends in gender-specific changes.

Tab. 2 Average annual percentage of disease burden of anxiety disorders among children and adolescents in China from 1990 to 2019 [%,(95%CI)]

Group	Incidence rate				Disability-adjusted life rate			
	< 5	5~9	10~14	15~19	< 5	5~9	10~14	15~19
Male	0.19a	0.14a	-0.19a	-1.00a	0.19a	0.15a	-0.13	-0.75a
	(0.07~0.03)	(0.07~0.21)	(-0.35~-0.02)	(-1.38~-0.61)	(0.07~0.30)	(0.09~0.22)	(-0.26~0.00)	(-0.92~-0.58)
Female	0.31a	0.36a	-0.18a	-1.57a	0.30a	0.39a	-0.07	-1.17a
	(0.19~0.43)	(0.26~0.45)	(-0.29~0.06)	(-1.94~-1.20)	(0.18~0.42)	(0.27~0.52)	(-0.14~0.01)	(-1.54~-0.80)
Total	0.25a	0.23a	-0.28	-1.44a	0.24a	0.26a	-1.81	-1.10a
	(0.11~0.39)	(0.16~0.31)	(-0.57~0.01)	(-1.66~-1.21)	(0.11~0.37)	(0.16~0.35)	(-0.40`0.04)	(-1.33~-0.88)

Note: a is P<0.05

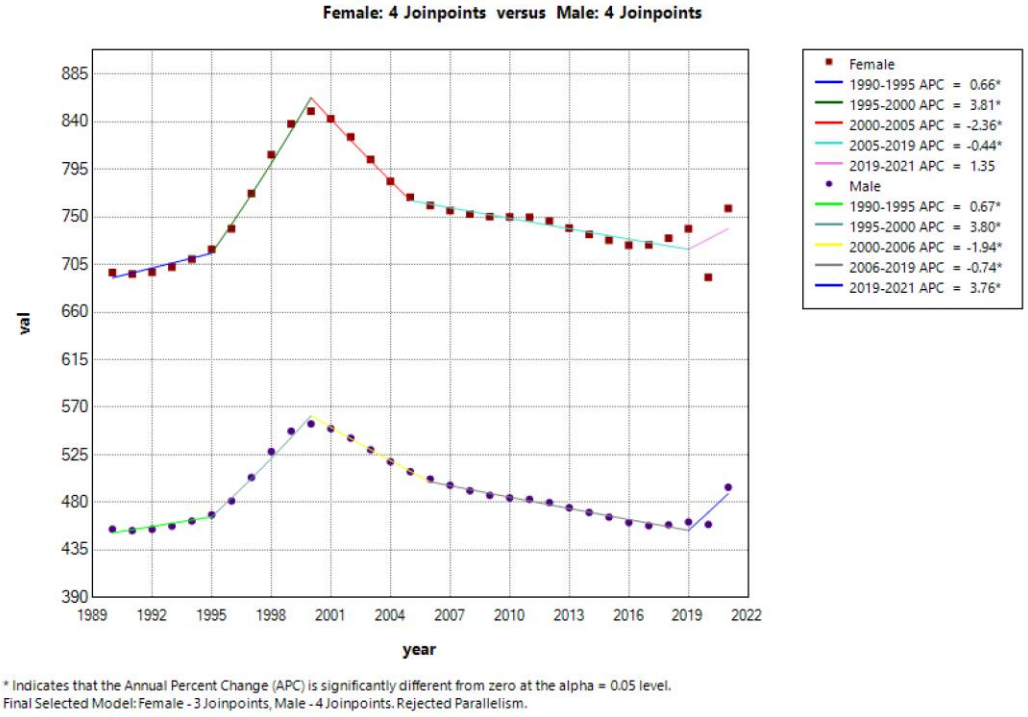

Fig. 2 Incidence of gender dysphoria among children and adolescents in China from 1990 to 2021

3.3 Age-specific turning point in the epidemic trend of anxiety disorder

Significant age stratification characteristics were found in the epidemiology of anxiety disorders in the Chinese population aged <20 years: the AAPC of the <5-year-old group reached 0.56% (P>0.05), indicating a continuous increase, while the AAPC of the 15-19-year-old group was -0.0172% (P>0.05), indicating a slowdown overall. The incidence rate of the 5-9 and 10-14 age groups has been declining since 1999 at the turn of the century (AAPC=-0.32%, P<0.05); specifically, from 2019 to 2021, the APC of the 15-19 age group increased sharply to 8.92% (P<0.01), while the 5-14 year-old group maintained a downward trend (APC=-1.15%, P<0.05) fluctuated abnormally during the epidemic period.

3.4 Changing structure of China's child and adolescent DALY rates and anxiety incidence

The findings of statistical analysis indicate that there is a contradictory temporal trend in the epidemiology of anxiety disorders in China's children and adolescents. First, the incidence increased

steadily, with an average annual growth rate of more than 0.2% from 1990 to 2021, when AAPC reached 0.2091% (95% CI: 0.0902-0.3281, P < 0.01). The rate of DALYs varied over time, and the AAPC was -0.0517% (95% CI:-0.3631-0.2607, P > 0.05) for the same time period. However, an N-shaped curve of "decline-platform-recovery" was formed in 1995, 2000, 2005, and 2016. Ultimately, the research revealed that the trend had departed from the mechanism, showing a little upward trend (+1.62%) in the DALYs rate and a cumulative increase of 7.43% in the incidence rate. It shows that the effect of disease prevention and control affects the change of population structure.

3.5 A study on the prevalence of anxiety disorders in Chinese children and adolescents ages 0~19 in 2030

Based on the model used in the study, China's children and adolescents will have a higher illness burden of anxiety between 2022 and 2030, and the country's DALY rate will continue to rise annually (for more information, see Fig. 3). Second, even though the overall incidence rate is increasing, there will be varying fluctuations in it (for more information, see Fig. 4. Additional examination of the future trend indicates that the study population's DALYs rate of anxiety disorder is predicted to rise by 20.97% (from 336.78/100,000 to 407.41/100,000), significantly surpassing the 0.82% increase in the incidence rate (617.11→622.17/100,000), creating a "low incidence growth-high burden accumulation" scissors difference phenomenon and hastening the disease burden.

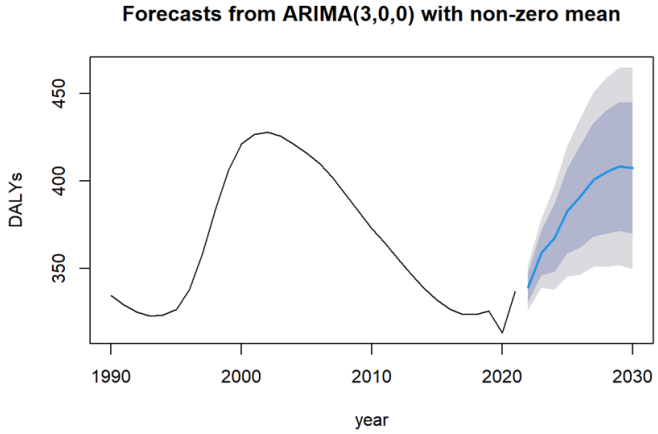

Fig. 3 Prediction results of DALY rate of anxiety disorders among children and adolescents in China from 2022 to 2030

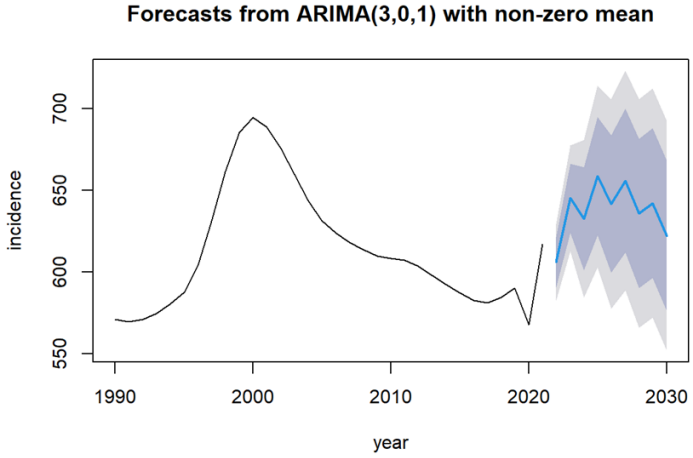

Fig. 4 The prediction results of the incidence of anxiety disorders in children and adolescents in China from 2022 to 2030

4. Discuss

4.1 Status and Prediction of Anxiety Disorder among Children and Adolescents in China

According to this study, China's prevalence of anxiety in children and adolescents was lower than the global average between 2019 and 2021 and higher than the global average before 2019. This shift may be due to China's mental health system's steady progress and the effective management of anxiety problems in children and teenagers; for example, the "Healthy China 2030" initiative encourages early detection and prompt treatment of important populations with mental illnesses, which has reduced negative feelings and increased awareness of mental health issues, which has reduced the prevalence of anxiety disorders and DALYs. A further demographic shift that has a direct impact on the prevalence and illness of anxiety disorders in children and adolescents is the fact that, according to the nation's seventh national census[11], people between the ages of 0 and 19 made up 23.13 percent of the total population, up 1.49 percent from the sixth census.

The DALY rate and the incidence of anxiety among the target population are expected to rise over the next nine years, rising in an arc and rising and falling in twists and turns, respectively, but they are still at a high level, despite the fact that the incidence of anxiety among children and adolescents in China is lower than the global average in 2019–2021. This represents the growing severity of the problem of anxiety among children and adolescents, which not only affects them but also increases the burden on the medical system, and their psychological issues may also translate into long-term socio-economic costs.

4.2 The impact of stigma on children's and teenagers' anxiety disorders and recommendations

The ARIMA model predicts that the incidence and DALYs rate will rise slightly between 2022 and 2030, despite the fact that the prevalence of anxiety disorders in China among children and adolescents aged 0 to 19 years is 2,687.70 per 100,000 in 2021. This suggests that the disease burden of anxiety disorders in children and adolescents remains high. Many children and adolescents with anxiety disorders are reluctant to seek help because of the stigma [12], and in order to safeguard their privacy, they are now choosing to receive their medical care online [13]. This implies that in order to lessen the negative effects of anxiety on kids and teenagers, we should lower the stigma associated with mental illness, provide social support, install counseling centers in schools, and promote mental health education [14].

4.3 Issues and recommendations about anxiety disorders in Chinese girls and teenagers

Additionally, the study discovered that between 1990 and 2021, the prevalence of anxiety disorders in Chinese female children and adolescents was almost twice as high as that of men, and the decline in the incidence was greater for women than for men. This could be attributed to the fact that girls receive more family attention and resources, both of which have a positive effect on mental health [15]. According to other research, women are more susceptible to anxiety problems at times of significant hormonal change, such adolescence and menstruation, as a result of changes in estrogen levels[16]. Therefore, addressing teenage girls' physical health and assisting them in developing healthy coping strategies are essential to lowering the prevalence of anxiety disorders.

4.4 Disparities and recommendations about risk factors for anxiety disorders in kids and teenagers of various ages

Furthermore, the study noted that the prevalence of anxiety disorders among Chinese children

under the age of five rose dramatically between 1990 and 2021, suggesting that anxiety disorders are becoming more prevalent at younger ages. The emotional development of children is significantly influenced by the mother's emotional state and the family environment during pregnancy [17, 18]. Chinese women are facing increasing strain as modern society develops. Pregnant women's anxiety and low mood may have an impact on young children's anxiety prevalence . Pregnant women's psychological needs should receive more consideration. Children and adolescents between the ages of 10 and 14 have the highest prevalence of anxiety, which may be linked to social and academic pressure. During this alternating period, their minds are immature, their emotional regulation skills are weak, and they are psychologically susceptible to pressure. Research also indicates that there is a higher [19, 20]risk of bullying and violence during this time. Schools and families should make more efforts to support these kids and teens in managing their stress through sports and other activities. It is important to note that, in China, the prevalence of anxiety disorders among those aged 15 to 19 will rise sharply between 2019 and 2021, while the prevalence of anxiety disorders among those aged 5 to 9 and 10 to 14 will fall during this time. This is thought to be related to online learning and the pressure placed on high-age students to perform academically during the lockdown. Anxiety risk among adolescents in this age group is further increased [21] by a number of factors, including the fear of the pandemic and the isolation brought on by the isolation. Teenagers should therefore take extra care to rest outside in order to prevent spending too much time in a closed or stressful environment.

In conclusion, this study examined the disease burden of anxiety disorders in children and adolescents in China over the previous 32 years using the GBD 2021 database and forecasted future trends. Notwithstanding drawbacks like data sources and regional differences, the results emphasize the significance of interventions aimed at important groups like women, children, and adolescents. Future research should concentrate on the disease burden of anxiety subtypes to better direct prevention and treatment initiatives.

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