Preplanned Studies

Change of Disease Spectrum Characteristics of Psychiatric Inpatients Before and After Lockdown Lifted During the COVID-19 Pandemic — Wuhan City, Hubei Province, China, 2021

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Summary

What is already known about this topic?

The coronavirus disease 2019 (COVID-19) pandemic poses a significant threat to mental health globally and may change the proportion of hospitalized patients.

What is added by this report?

This report analyzed and compared the disease characteristics of psychiatric inpatients one year before and after Wuhan lifted lockdown during COVID-19. About 50% of the inpatients were diagnosed with bipolar disorder; females and adolescents had a higher prevalence of mental disorders.

What are the implications for public health practice?

More attention should be paid to the mental health of children, adolescents, and females.

In recent decades, the prevalence of mental disorders has increased in China and worldwide. The coronavirus disease 2019 (COVID-19) spread worldwide in less than 2 months from late December 2019. Numerous studies have shown that COVID-19 poses a significant threat to physical and mental health among the general population (*1*). Factors such as chronic stress and social isolation may increase the risk of emotional deterioration for some people (*2*), which may increase psychosis risk and proportion of inpatients. We conducted a retrospective cohort study of analyzing and comparing the disease characteristics of psychiatric inpatients 1 year before and after Wuhan lifted lockdown during COVID-19. The data were extracted from the information management system of the mental health center of the third-level hospital in Wuhan City, Hubei Province, China, from April 8, 2019 to April 9, 2021, which included gender, age, Wuhan residential registration (*hukou*), and disease diagnosis. Taking the date of lifting lockdown in Wuhan (April 8, 2020) as the cut-off point, the disease

characteristics of psychiatric inpatients before and after one year were compared. Results showed that nearly half of inpatients were diagnosed with bipolar disorder, and most tended to be younger and female. This study suggests that more attention should be paid to the mental health of females and adolescents, and it is necessary to conduct studies that are multicenter and have more extended observation periods.

On January 23, 2020, Wuhan was under lockdown to control the pandemic, significantly reducing access to services. Renmin Hospital of Wuhan University was appointed as a designated hospital for ordinary and severe COVID-19 patients. No new inpatients were admitted to other departments except emergency and fever clinics. With the effort of the whole society, Wuhan was lifted from lockdown on April 8, 2020 into the period of normalized epidemic prevention and control. All departments only began to receive new inpatients after strict disinfection. Therefore, in this study, April 8, 2020 was taken as the time node to compare the disease spectrum characteristics of psychiatric inpatients before and after one year and provide references for mental health assessment and prevention over the coming years.

This retrospective cohort analysis was conducted on patients with mental disorders hospitalized between April 8, 2019 and April 9, 2021 in the mental health center of the third-level hospital in Wuhan, Hubei, China. This period was divided into two phases. "Phase 1" (i.e., from April 8, 2019 to April 8, 2020) represents the period before Wuhan lifted the lockdown. "Phase 2" (i.e., from April 9, 2020 to April 9, 2021) was Wuhan's normalized epidemic prevention and control stage. Data from the electronic medical record in the information management system were used, which contained information on demographic characteristics (gender, age, Wuhan *hukou*) and disease diagnosis (somatoform disorders, bipolar disorder, sleep disorders, depressive disorder,

stress-related disorder, emotional and behavioral disorders in children and adolescents, anxiety disorder, schizophrenia spectrum disorder, psychoactive substances-induced mental disorders, organic mental disorder, obsessive-compulsive disorder, and other mental disorders). Qualified psychiatrists were responsible for defining and classifying the diagnosis according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) (3).

Continuous data were expressed as mean and standard deviation, categorical data regarding the number of patients (percentage). Continuous data were analyzed using the two-sample t-test. Differences between categorical data were evaluated using the Fisher's Exact test or the Pearson chi-squared test. Statistical analysis was performed using IBM SPSS Statistics for Windows (version 21.0, IBM Corp., Armonk, NY, USA). And $P<0.05$ was considered statistically significant.

Between April 8, 2019 and April 9, 2021, 10,863 inpatients were treated in the Department of Psychiatry at Renmin Hospital of Wuhan University. The total number of inpatients in Phase 1 and Phase 2 was 6,664 (61.3%), 4,199 (38.7%), respectively, with a 36.98% reduction in Phase 2 compared to Phase 1. Comparison of demographic characteristics between both phases: the prevalence of female inpatients in Phase 2 was higher than that in Phase 1 (61.1% *vs.* 55.9%; *P*<0.01); the average age in Phase 2 was younger than that in Phase 1 (33.52±16.52 *vs.* 34.55±16.10; *P*<0.01); the prevalence of inpatients with non-Wuhan *hukou* in Phase 2 was higher than that in Phase 1 (61.5% *vs.* 59.0%; *P*<0.05) (Supplementary Table S1, available in http://weekly. chinacdc.cn/).

The top 3 disease diagnoses in both phases were bipolar disorder (44.6% *vs.* 46.7%), schizophrenia spectrum disorder (19.7% *vs.* 16.9%), and depressive disorder (17.9% *vs.* 16.6%). The distribution of disease diagnosis among inpatients in the Phase 2 was compared with the Phase 1: the proportion of inpatients with bipolar disorder increased (46.7% *vs.* 44.6%, *P*<0.05); emotional and behavioral disorders in children and adolescents increased (3.4% *vs.* 1.6%; *P*<0.01); schizophrenia spectrum disorder decreased (16.9% *vs.* 19.7%; *P*<0.01) (Table 1). The disease

TABLE 1. Inpatients' disease diagnosis distribution in Phase 1 and Phase 2.

| Variety of disease	Phase 1 (n=6,664)	Phase 2 (n=4,199)	χ^2	*P*-value
Somatoform disorders				
Yes	84 (1.3%)	53 (1.3%)	0.00	0.994
No	6,580 (98.7%)	4,146 (98.7%)		
Bipolar disorder				
Yes	2,975 (44.6%)	1,959 (46.7%)	4.20	0.040
No	3,689 (55.4%)	2,240 (53.3%)		
Sleep Disorders				
Yes	59 (0.9%)	29 (0.7%)	1.22	0.270
No	6,605 (99.1%)	4,170 (99.3%)		
Depressive disorders				
Yes	1,196 (17.9%)	696 (16.6%)	3.37	0.066
No	5,468 (82.1%)	3,503 (83.4%)		
Stress-related disorder				
Yes	36 (0.5%)	15 (0.4%)	1.85	0.174
No	6,628 (99.5%)	4,184 (99.6%)		
Emotional and behavioral disorders in children and adolescents				
Yes	107 (1.6%)	144 (3.4%)	37.96	<0.001
No	6,557 (98.4%)	4,055 (96.6%)		
Anxiety disorders				
Yes	417 (6.3%)	298 (7.1%)	2.95	0.086
No	6,247 (93.7%)	3,901 (92.9%)		
Schizophrenia spectrum disorder				
Yes	1,315 (19.7%)	711 (16.9%)	13.31	<0.001
No	5,349 (80.3%)	3,488 (83.1%)		
Psychoactive substances-induced mental disorders				
Yes	46 (0.7%)	23 (0.5%)	0.83	0.363
No	6,618 (99.3%)	4,176 (99.5%)		
Organic mental disorder				
Yes	232 (3.5%)	169 (4.0%)	2.14	0.144
No	6,432 (96.5%)	4,030 (96.0%)		
Obsessive-compulsive disorder				
Yes	65 (1.0%)	37 (0.9%)	0.25	0.620
No	6,599 (99%)	4,162 (99.1%)		
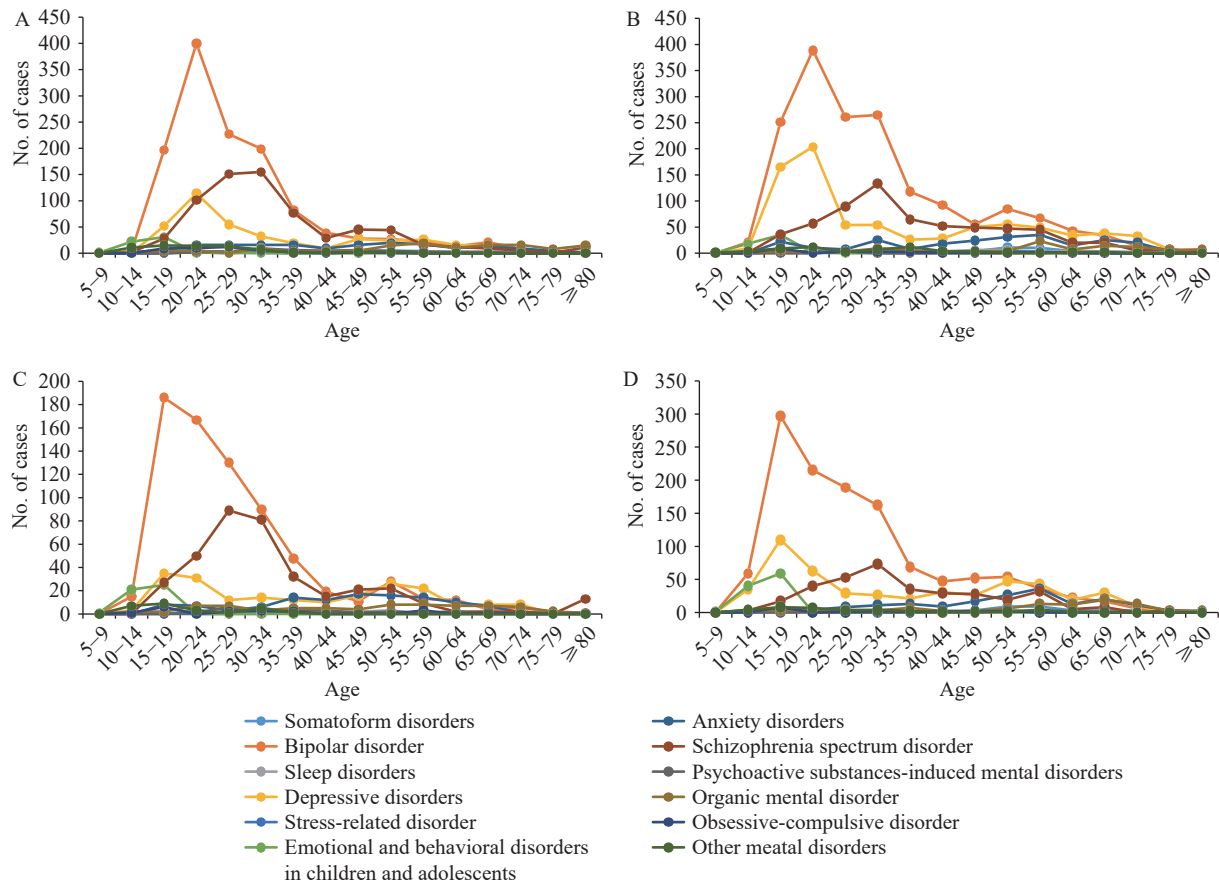
FIGURE 1. Disease distribution of inpatients by gender and age in Phase 1 and Phase 2. (A) Male in Phase 1; (B) Female in Phase 1; (C) Male in Phase 2; (D) Female in Phase 2.

diagnoses distribution by gender at different age groups in Phases 1 and 2 is shown in Figure 1. The disease distribution proportions of inpatients by gender in Phase 1 and Phase 2 are separately shown in Supplementary Figures S1–S2 (available in http://weekly.chinacdc.cn/). A detailed comparison of the two stages of disease diagnosis distribution among demographic characteristics is presented in Supplementary Table S2 (available in http://weekly.chinacdc.cn/).

DISCUSSION

The disease characteristics of psychiatric inpatients were changed after Wuhan lifted lockdown during the COVID-19 pandemic. This study showed that nearly half of the inpatients were diagnosed with bipolar disorder, and the overall average age tended to be younger.

Inpatients with mental disorders have significantly decreased since epidemic prevention and control were implemented. COVID-19 poses a tremendous challenge to healthcare systems around the world. When sporadic cases of the virus occurred in local areas, most medical procedures and related tests were highly restricted or more complex than before to reduce the risk of spreading the virus. Some patients with mental disorders in stable condition who preferred regular outpatient review or online consultation were not hospitalized for treatment until out of control (4). On the other hand, with the support of the state and government in recent decades, many local mental health institutions have been rapidly established to undertake the treatment and management of some patients with psychiatric disorders.

This study showed that the top three mental disorders were bipolar disorder, schizophrenia spectrum disorder, and depressive disorder. However, the prevalence of bipolar disorder has increased significantly, and females had a higher prevalence than males. The pathogenesis of bipolar disorder has been unknown and may be related to genetic, lifestyle, and environmental exposures (e.g., poor diet, physical

inactivity, and childhood trauma) (*5*). Most individuals with bipolar disorders are easily misdiagnosed or not accurately diagnosed until years later (*6*). Females had higher psychiatric disorders than the general population, which may be related to endocrine factors, such as polycystic ovary syndrome (*7*). More than 70% of individuals with bipolar disorders have been onset before 25-year-old (*8*). It is emphasized that early detection, timely diagnosis and treatment, and family and social support are the need for illness outcomes.

The prevalence of emotional and behavioral disorders in children and adolescents has increased significantly after the outbreak. Many schools and educational institutions changed teaching methods since the COVID-19 pandemic, and students began to study by home-based learning or online training. Peer activities and communication were hindered, and the unexpected situation changed their typical growth, learning, playing, and interacting. It impeded the growth and development of young human minds, especially the brain development of the youngest ones (*9*). Secondary school students faced more academic pressure from the entrance examination. Meanwhile, their parents also faced many challenges such as their work, family income, and children's education, increasing the risk of their stress. Parental stress was associated with children's emotional and behavioral problems (*10*). Therefore, the uncertainty of their future academics, individual relationships, inactivity, and parent-child relationship posed some severe threats to their mental health. More attention should be paid to the mental health of children and adolescents by the collaboration of parents, teachers, psychologists, and psychiatrists.

This study was subject to several limitations. First, data for this study were only obtained from one hospital, so the small sample size limited the representativeness. Second, the lack of information about patients may have influenced the analysis. Third, a relatively short period, just one year, was observed in this study. Future studies, especially multicenter and more extended observation period studies, are needed.

Conflicts of interest: No conflicts of interest.

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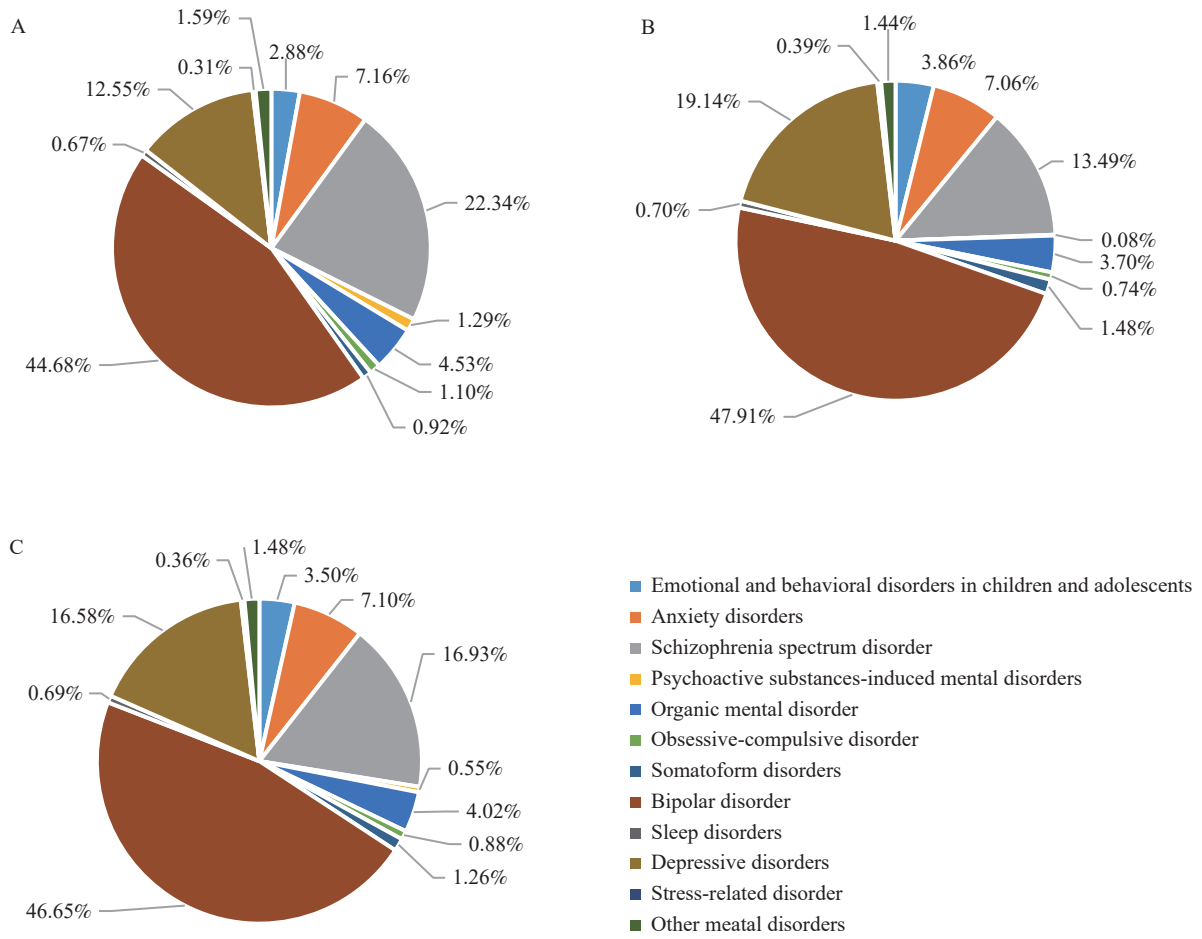
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SUPPLEMENTARY TABLE S1. Inpatients' characteristics of Phase 1 and Phase 2.

Category	Phase 1 (n=6,664)	Phase 2 (n=4,199)	χ^2/t	P-value
Gender				
Male	2,938 (44.1%)	1,634 (38.9%)	28.29	<0.001
Female	3,726 (55.9%)	2,565 (61.1%)		
Age	34.55±16.10	33.52±16.52	3.21	0.001
Wuhan *hukou*				
Yes	2,734 (41.0%)	1,618 (38.5%)	6.67	0.010
No	3,930 (59.0%)	2,581 (61.5%)		
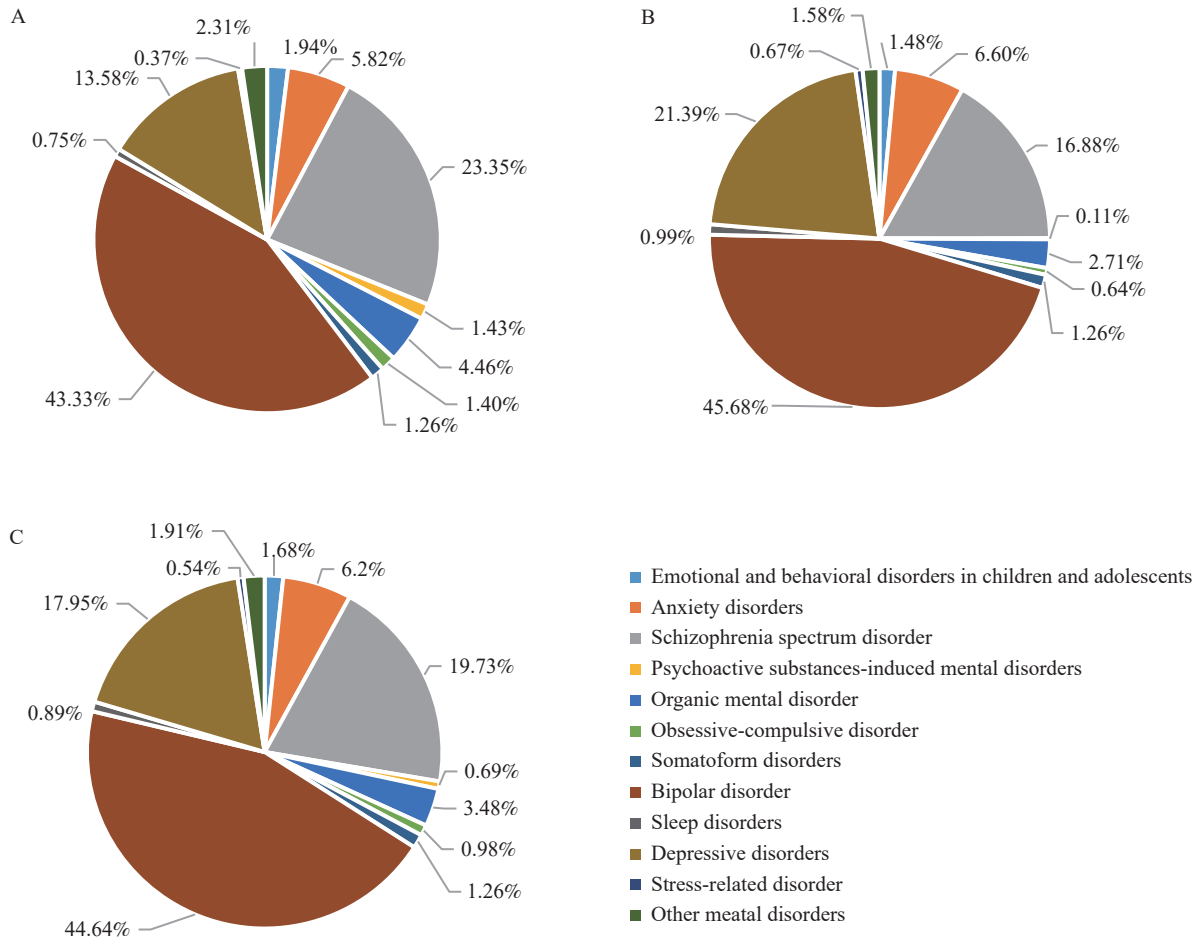
SUPPLEMENTARY FIGURE S1. Disease distribution proportion of inpatients in Phase 1 by gender, (A) male; (B) female; and (C) both.

A

B

C

- ■ Emotional and behavioral disorders in children and adolescents
- ■ Anxiety disorders
- ■ Schizophrenia spectrum disorder
- ■ Psychoactive substances-induced mental disorders
- ■ Organic mental disorder
- ■ Obsessive-compulsive disorder
- ■ Somatoform disorders
- ■ Bipolar disorder
- ■ Sleep disorders
- ■ Depressive disorders
- ■ Stress-related disorder
- ■ Other meatal disorders

SUPPLEMENTARY FIGURE S2. Disease distribution proportion of inpatients in Phase 2 by gender, (A) male; (B) female; and (C) both.

SUPPLEMENTARY TABLE S2. Inpatients' disease diagnosis distribution among demographic characteristics in Phase 1 and Phase 2.

Variety of disease		Gender		Age	Wuhan *hukou*	
		Male	Female		Yes	No
Somatoform disorders	Phase 1	37 (44.0%)	47 (56.0%)	47.81±15.08	30 (35.7%)	54 (64.3%)
	Phase 2	15 (28.3%)	38 (71.7%)	50.66±16.34	19 (35.8%)	34 (64.2%)
	χ^2/t		3.42	−1.04		0.00
	P-value		0.064	0.299		0.987
Bipolar disorder	Phase 1	1,273 (42.8%)	1,702 (57.2%)	30.50±13.14	1,156 (38.9%)	1,819 (61.1%)
	Phase 2	730 (37.3%)	1,229 (62.7%)	28.70±13.09	707 (36.1%)	1,252 (63.9%)
	χ^2/t		14.96	4.73		3.85
	P-value		<0.001	<0.001		0.050
Sleep disorders	Phase 1	22 (37.3%)	37 (62.7%)	48.88±16.15	26 (44.1%)	33 (55.9%)
	Phase 2	11 (37.9%)	18 (62.1%)	47.07±15.69	9 (31%)	20 (69%)
	χ^2/t		0.003	0.50		1.38
	P-value		0.953	0.619		0.240
Depressive disorders	Phase 1	399 (33.4%)	797 (66.6%)	34.68±17.49	503 (42.1%)	693 (57.9%)
	Phase 2	205 (29.5%)	491 (70.5%)	36.64±18.30	261 (37.5%)	435 (62.5%)
	χ^2/t		3.09	−2.28		3.79
	P-value		0.079	0.023		0.051
Stress-related disorder	Phase 1	11 (30.6%)	25 (69.4%)	40.72±15.99	17 (47.2%)	19 (52.8%)
	Phase 2	5 (33.3%)	10 (66.7%)	35.93±20.16	7 (46.7%)	8 (53.3%)
	χ^2/t		0.04	0.90		0.001
	P-value		0.846	0.372		0.971
Emotional and behavioral disorders in children and adolescents	Phase 1	53 (49.5%)	54 (50.5%)	14.71±2.30	34 (31.8%)	73 (68.2%)
	Phase 2	45 (31.3%)	99 (68.8%)	14.70±1.99	41 (28.5%)	103 (71.5%)
	χ^2/t		8.62	0.04		0.32
	P-value		0.003	0.969		0.572
Anxiety disorders	Phase 1	171 (41%)	246 (59%)	46.94±17.21	19 (46.8%)	222 (48.7%)
	Phase 2	11 (39.3%)	18 (60.7%)	48.77±15.34	14 (48.7%)	153 (51.3%)
	χ^2/t		0.22	−1.46		0.25
	P-value		0.639	0.144		0.617
Schizophrenia spectrum disorder	Phase 1	686 (52.2%)	629 (47.8%)	36.42±13.76	551 (41.9%)	764 (58.1%)
	Phase 2	365 (51.3%)	34 (48.7%)	35.61±14.04	301 (42.3%)	410 (57.7%)
	χ^2/t		0.130.721	1.25		0.04
	P-value			0.211		0.850
Psychoactive substances-induced mental disorders	Phase 1	42(91.3%)	4(8.7%)	41.54±11.93	32 (69.6%)	14 (30.4%)
	Phase 2	21(91.3%)	2(8.7%)	40.13±12.52	13 (56.5%)	10 (43.5%)
	χ^2/t			0.46		1.15
	P-value		1.000*	0.650		0.284
Organic mental disorder	Phase 1	13 (56.5%)	10 (43.5%)	57.23±18.44	11 (51.3%)	11 (48.7%)
	Phase 2	74 (43.8%)	95 (56.2%)	51.59±18.69	80 (47.3%)	89 (52.7%)
	χ^2/t		6.29	3.01		0.61
	P−value		0.012	0.003		0.434
Obsessive-compulsive disorder	Phase 1	41 (63.1%)	24 (36.9%)	27.83±11.78	26 (40%)	39 (60%)
	Phase 2	18 (48.6%)	19 (51.4%)	32.41±16.14	14 (37.8%)	23 (62.2%)
	χ^2/t		2.01	−1.64		0.05
	P-value		0.156	0.103		0.830

* Using the Fisher's Exact test.