Original Article

Mental Health of Children and Adolescents in Foster Care Residential Institutions in Northern Taiwan

Shin-Heng Shen, M.D.[1], Fu-Sung Lom, M.D.[2], Jing-Long Huang, M.D.[2], Brent Allan Kelsen, M.A.[3,4], Sophie Hsin-Yi Liang, M.D.[5]*

[1]Department of Psychiatry, Chang Gung Memorial Hospital, Linkou and Chang Gung University College of Medicine, [2]Department of Pediatrics, Chang Gung Memorial Hospital and Chang Gung University College of Medicine, [3]Language Center, National Taipei University, New Taipei City, Taiwan, [4]Department of Psychology, Auckland University of Technology, Auckland, New Zealand, [5]Section of Child and Adolescent Psychiatry, Department of Psychiatry, Chang Gung Memorial Hospital, Taoyuan and Chang Gung University College of Medicine, Taoyuan, Taiwan

Abstract

Objectives: Studies reposted that children and adolescents entering foster care systems are at risk of mental health conditions. In this study, we intended to describe the prevalence of mental illnesses as well as the characteristics of emotional and behavioral problems of children and adolescents in foster care residential institutions in Northern Taiwan. **Methods:** From July 2011 to January 2014, we recruited 97 children and adolescents from four foster care residential institutions due to child maltreatment or loss of dependency. They were assigned through the social welfare bureau (three group homes, $n = 76$) or the judiciary department due to delinquent or conduct behaviors (one youth home, $n = 21$). Psychiatric illnesses were diagnosed through semi-structured interviews using the Kiddie Schedule for Affective Disorder and Schizophrenia, Epidemiological Version. Emotional and behavioral problems were assessed by main caregivers in foster care residential institutions and the youths themselves. **Results:** We found higher rates of lifetime (54.6% in total, 44.7% in group home, and 90.5% in youth home) and current (28.9% in total, 31.6% in group home, and 19.0% in youth home) for any psychiatric disorders among the children and adolescents in the foster care residential institutions compared to those in the general population in Taiwan (31.6% in lifetime and 25% current). The rates of lifetime psychiatric diagnoses in total entire cohort, group home, and youth home were as follows: attention deficit/hyperactivity disorder (15.5%, 15.8%, and 14.3%), oppositional defiant disorder (13.4%, 2.6%, and 52.4%), conduct disorder (22.7%, 6.6%, and 81.0%), posttraumatic stress disorder (4.1%, 5.3%, and 0%), adjustment disorder (11.3%, 9.2%, and 19.0%), and nicotine use disorder (12.4%, 2.6%, and 47.6%), respectively. Self-reported depression rates were 9.0% among youths aged between 8 and 16 years, and 17.2% among those aged between 8 and 12 years. **Conclusion:** The results underscore the importance of receiving a comprehensive mental health assessment in the beginning and periodically for those children and adolescents in foster care residential institutions for them to receive appropriate mental health care.

Key words: Child Behavior Checklist, Children's Depression Inventory, the Kiddie Schedule for Affective Disorder and Schizophrenia, Epidemiological Version

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Introduction

When the safety of children cannot be assured, they are most often removed from their family and placed into foster care systems temporarily or permanently. The reasons that children and adolescents enter foster care systems are experiencing different kinds of child maltreatment, environment instability, or their own behavioral problems [1, 2]. Many children and adolescents in foster care systems come from adverse environments such as chronic poverty associated with family disruption, social problems, and stress. They might also suffer from environmental insults as well as drug and alcohol exposure in the uterus, which can predispose children to emotional and cognitive problems [3, 4]. Experiences of maltreatment and neglect have also been linked to negative emotional problems. Moreover, entering

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[5*]Corresponding author. No. 5, Fuxing Street, Guishan District, Taoyuan City 333, Taiwan.
E-mail: Sophie Hsin-Yi Liang <sophie.lhy@gmail.com>

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the foster care system itself is a big psychological challenge, including facing temporary or permanent loss of parents/family and requiring effort to adjust to new family members and new environments [5, 6].

Children who grow up in foster care often continue to struggle in all areas of life (education, employment, income, housing, health, substance abuse, and crime involvement) compared to their peers growing up in the general population [7]. Every effort should be made to make foster care a positive experience and a healing process for the child [8]. Early screening of the mental health condition of children and adolescents in foster care residential institutions is an opportunity to provide more appropriate resources and interventions to decrease functional impairment in academic and social-emotional difficulties [9]. But a lack of comprehensive mental health screening of children exists when they enter to the foster care system [10]. Therefore, the children cannot be identified for their behavioral problems and emotional disorders, causing insufficient access to high-quality mental health services [10]. Furthermore, the timing of early intervention remains an important factor in sustaining the positive trajectories of previously neglected children [11].

Children and adolescents in foster care systems have more mental health problems than those in the general population. Furthermore, foster children are more likely to have their mental health problems interfere with their daily functioning [12, 13]. Typically, these mental health conditions are chronic, underidentified, and undertreated, having an ongoing impact on all aspects of their lives, even long after those children and adolescents leave the foster care system [8, 14].

To date, mental health surveys using specific diagnostic criteria in Taiwan's residential care populations are lacking. In one of the few existing studies, Chou et al. reported a 95.5% prevalence of psychiatric diagnoses, including the definite diagnoses and those who met subsyndromal criteria, using the Kiddie Schedule for Affective Disorders and Schizophrenia, Epidemiological Version (K-SADS-E) interview in a study of 44 children and adolescents newly entering a foster care residential group home in Northern Taiwan [15]. The objective of the study was to explore the mental health condition in those children and adolescents in foster care residential institutions and compare clinical diagnosis and caregiver and self-reported ratings.

Methods

Participants and procedures

According to the Child Welfare Bureau of the Ministry of the Interior, as of December 2014, there were 124 foster care residential institutions and up to 3,501 children and adolescents (1,818 males and 1,683 females) in foster care residential institutions in Taiwan. In Taoyuan City where our study was done, 10 foster care residential institutions (225 children and adolescents in total, 124 males, and 131 females) existed. They included nine foster care residential group homes (group home) and one group home specifically for those with conduct behaviors following release from a juvenile detention center (youth home).

From July 2011 to January 2014, four foster care residential institutions in Taoyuan City accepted our invitation to participate in a Program for Promoting Child Well-being in Foster Care Residential Institutions. In this program, we gave all children and adolescents from 3 group homes and 1 youth home comprehensive medical, dental, and mental assessments and interventions. Of the 103 eligible children and adolescents aged < 18 years, 97 (94.2%) of them completed psychiatric diagnostic interviews. The reason six participants did not receive psychiatric diagnosis was that they were leaving the foster care system soon and chose not to participate in this study screening.

The institutional review board at Chang Gung Memorial Hospital approved the study project (protocol number = 201901249B0A3 and date of approval = October 3, 2019) with the waiver of obtaining informed consent from the study participants due to retrospective nature of the unidentifiable data.

Measures

Demographic data including gender, age, education, duration, and main reasons for removal were collected. Emotional and behavioral assessments were rated by their main caregivers in the foster care residential institutions.

Two board-certified child psychiatrists assessed lifetime and current psychiatric diagnoses. Each psychiatrist had more than five years' experience in child and adolescent psychiatry in a medical center, and both had received training for using K-SADS-E. Psychological assessments and developmental assessments were conducted by psychologists, occupational therapists, and speech therapists to confirm intellectual disability, learning disorder, and developmental disorder.

The Mandarin version of the Kiddie-Schedule for Affective Disorder and Schizophrenia, Epidemiological Version

The K-SADS-E is a valid and reliable semi-structured psychiatric diagnostic interview tool which is widely used in child and adolescent psychiatry for both clinical and research purposes [16]. The Mandarin K-SADS-E version was developed by Gau et al. in Taiwan [17] from the original English version, authorized by Dr. Merikanga.This schedule has been through a two-stage translation and modification of several items with psycholinguistic equivalents relevant to the Taiwanese culture. Further modification to meet the *DSM-IV* diagnostic criteria and an additional section developed for betel use disorder has also been done [18]. The tool has been found to have good internal reliability and specificity [19]. The overall sensitivity and specificity of the screening interview against the Mandarian K-SADS-E diagnostic categories have been calculated to be 78% and 98%, respectively [19]. It takes 1–1.5 h to complete a K-SADS-E interview.

Child Behavior Checklist — Parent Report Form

The Child Behavior Checklist (CBCL), Parent Report Form, which has 112 items rated on a three-point scale

(0 = not true, 1 = somewhat or sometimes true, and 2 = very true or often true), has been used to assess an individual's competencies; strengths; adaptive functioning; as well as emotional, behavioral, and social problems [20, 21]. The Chinese version of the CBCL has been standardized and validated by Chen et al. [22]. Parents or caregivers rate children's competences and behavioral/emotional problems for previous six months to complete this checklist. Problem items are rated by parents. The CBCL has three scales: ability, syndrome, and *DSM*-oriented scale. The syndrome scale includes anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems, attention problems, rule-breaking behavior, and aggressive behavior. Second-order factor analyses have yielded groupings of syndrome scales designated as internalizing and externalizing components. The *DSM*-oriented scales are designated as affective problems, anxiety problems, somatic problems, attention deficit/hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), and CD. In this study, the behavioral and emotional problems of children and adolescents of foster care residential institutions were assessed by their main caregivers using the CBCL. The CBCL/6–18 [20] parent form has been used for children and adolescents aged between 6 and 18 years and the CBCL/1.5–5 [21] for preschool children.

Children's depression inventory, Taiwan version

The children's depression inventory (CDI) is a 27-item self-reported questionnaire, which can evaluate the depressive tendency of children and adolescents effectively and efficaciously over the past two weeks, and is suitable for 8–16-year-old students [23]. Five subscales exist within the assessment to measure different components of depression including anhedonia, negative self-esteem, ineffectiveness, interpersonal problems, and negative mood. The internal reliability of the original inventory has been 0.71–0.89. CDI, Taiwan version, has good discriminant validity between youths with depression and healthy controls. The Taiwan version of the CDI was published in 2008 by Chen et al., showing good internal reliability (0.80–0.86), good test–retest reliability (0.85), and good specificity and sensitivity [24].

Statistical analysis

Sociodemographic factors considered in the analysis included sex, persons per year (< 6 years, 6–12 years, 12–15 years, and > 15 years), type of placement, as well as childhood maltreatment history based on participants self-report and information provided from the social worker (sexual abuse, physical abuse, neglect, and loss of dependency). Chi-square tests were used to examine differences in (a) the rate of lifetime and current psychiatric diagnoses with respect to participants' demographic factors (gender and age), placement type, and main reasons for removal; (b) the difference in the rate of emotional and behavioral problems (CBCL T score 65 and above); and (c) the difference in the rate of self-reported depressive symptoms (CDI score).

Data analysis was done using Statistical Package for the Social Science (SPSS Inc., Chicago, Illinois, USA), version 18.0. The differences between the groups were considered significant if two-tailed *p*-values were smaller than 0.05.

Results

Demographic data

Table 1 shows the demographic data of the 97 children and adolescents recruited from four foster care residential institutions due to child maltreatment or loss of dependency, assigned by the Social Bureau (3 group homes) or assigned by the Judiciary Department due to delinquent or conduct behaviors (1 youth home). Participants (n = 76) in the group home sample were mostly females (59.2%), aged between 12–15 years (46.1%) and 6–12 years (36.8%). The reasons for entering the group home residences were loss of dependency (60.5%), physical abuse (21.1%), sexual abuse (17.1%), and neglect (1.3%). Participants (n = 21) in the youth home were all males, aged between 12 and 18 years (61.9% aged between 12 and 15 years and 33.3% aged 15 years or above), with 90.5% of them reporting previous child maltreatment (57.1% physical abuse, 23.8% neglect, and 9.5% loss of dependency).

Table 1. Demographic data of children and adolescents in foster care residential institutions

	Group home§	Youth home§
n (%)	76 (78.4)	21 (21.6)
Age (years)***, mean ± SD	11.64 ± 3.25	15.10 ± 1.41
Duration (months), mean ± SD	19.37 ± 14.15	21.52 ± 17.97
Sex***, *n* (%)		
Male	31 (40.8)	21 (100)
Female	45 (59.2)	0
Age (years old)***, *n* (%)		
<6	7 (9.2)	0
6-12	28 (36.8)	1 (4.8)
12-15	35 (46.1)	13 (61.9)
>15	6 (7.9)	7 (33.3)
Child maltreatment history***, *n* (%)		
Sexual abuse	13 (17.1)	0
Physical abuse	16 (21.1)	12 (57.1)
Neglect	1 (1.3)	5 (23.8)
Dependency†	46 (60.5)	2 (9.5)
Previous psychiatric diagnosis‡, *n* (%)	5 (6.6)	0
Previous psychotropic medication use, *n* (%)	3 (3.9)	0

*p < 0.05; **p< 0..01; ***p < 0.001 using Chi-square test (n = 97)
§Type of placement: group home: children and adolescents from three foster group homes, assigned by social welfare system, due to child maltreatment or loss of dependency; youth home: youths from one foster group home, assigned by justice system, due to delinquent behaviors;
†Dependency: loss of parents or family unable to look after; duration: duration of entering foster care (months);
‡Previous psychiatric diagnosis which were diagnosed after entering foster care residential institutions, including 3 male participants with ADHD, 1 boy with autism-spectrum disorder, 1 boy with global developmental delay; previous psychotropic medication use were 3 male participants with ADHD using short-acting methylphenidate.
SD, standard deviation; ADHD, attention deficit/hyperactivity disorder

Table 2. Lifetime psychiatric disorder in foster care residential institutions

	≥ One psychiatric disorder	≥ Two psychiatric disorders	DBD[§]	Anxiety disorder[†]	Depressive disorder[‡]	Substance disorder[§§]	Neurodevelopmental disorder[††]	Others[‡‡]
Total, *n* (%)	53 (54.6)	28 (28.9)	35 (36.1)	8 (8.2)	16 (16.5)	15 (15.5)	8 (8.2)	1 (1.0)
Sex, *n* (%)								
Male (52)	34 (65.4)	21 (40.4)	28 (53.8)	3 (5.8)	9 (17.3)	14 (26.9)	3 (5.8)	1 (1.9)
Female (45)	19 (42.2)	7 (15.6)	7 (15.6)	5 (11.1)	7 (15.6)	1 (2.2)	5 (11.1)	0
P	0.026*	0.008**	0.000***	0.466	1.00	0.594	0.466	1.00
Placement type, *n* (%)								
Group home (76)	34 (44.7)	12 (15.8)	18 (23.7)	7 (9.2)	10 (13.2)	3 (3.9)	8 (10.5)	1 (1.3)
Youth home (21)	19 (90.5)	16 (76.2)	17 (81.0)	1 (4.8)	6 (28.6)	12 (57.1)	0	0
P	0.000***	0.000***	0.000***	1.00	0.106	0.000***	0.195	1.00
Age (years old), *n* (%)								
< 6 (7)	2 (28.6)	0	1 (14.3)	0	0	0	1 (14.3)	0
6-12 (29)	11 (37.9)	6 (20.7)	8 (27.6)	2 (6.9)	4 (13.8)	0	2 (6.9)	1 (3.4)
12-15 (48)	30 (62.5)	15 (31.3)	19 (39.6)	5 (10.4)	9 (18.8)	9 (18.8)	4 (8.3)	0
> 15 (13)	10 (76.9)	7 (53.8)	7 (53.8)	1 (7.7)	3 (23.1)	6 (46.2)	1 (7.7)	0
P	0.029*	0.049*	0.223	0.801	0.547	0.001***	0.938	0.499
Child maltreatment, *n* (%)								
Sexual abuse (13)	6 (46.2)	4 (30.8)	2 (15.4)	3 (23.1)	3 (23.1)	0	3 (23.1)	0
Nonsexual abuse (34)	25 (73.5)	14 (41.2)	19 (55.9)	3 (8.8)	4 (11.8)	10 (29.4)	4 (11.8)	0
None (50)	22 (44.0)	10 (20.0)	14 (28.0)	2 (4.0)	9 (18.0)	5 (10.0)	1 (2.0)	1 (2.0)
P	0.023*	0.108	0.008**	0.083	0.594	0.014*	0.032*	0.622

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$ using Chi-square test ($n = 97$)
[§]DBD include ADHD, CD, ODD;
[†]Anxiety disorder includes panic disorder, specific phobia, social phobia, adjustment disorder, PTSD, generalized anxiety disorder;
[‡]Depressive disorders include dysthymic disorder, major depressive disorder, adjustment disorder with depression, adjustment disorder with mixed depression and anxiety;
[§§]Substance disorders include illegal substance abuse/dependence, alcohol abuse/dependence, nicotine dependence, betel-nut abuse/dependence;
[††]Neurodevelopmental disorder includes intellectual disability, learning disorder, autism spectrum disorder, developmental disorder; [‡‡]Others include sleep disorder, tic disorder and enuresis.
DBD, disruptive behaviour disorder; PTSD, posttraumatic stress disorder; CD, conduct disorder; ODD, oppositional defiant disorder; ADHD, attention deficit/hyperactivity disorder

Overall lifetime and current psychiatric diagnosis

Table 2 shows the frequencies of lifetime psychiatric diagnoses. Over 54.6% of the entire cohort, including 44.7% for those in the group home and 90.5% for those in the youth home, had at least one lifetime psychiatric diagnosis ($p < 0.001$); moreover, 28.9% had two or more, including 15.8% in the group home and 76.2% in the youth home ($p < 0.001$). The highest rate of lifetime psychiatric diagnose in total, group home, and youth home was as follows: disruptive behavior disorder (36.1%, 23.7%, and 81.0%, $p < 0.001$), depressive disorder (16.5%, 13.2%, and 28.6%), and substance disorder (15.5%, 3.9%, and 57.1%, $p < 0.001$), respectively.

As shown in Table 2, males had a significant predominance among the participants who recorded at least one psychiatric diagnosis ($p < 0.05$), two or more psychiatric diagnoses ($p < 0.01$), and disruptive behavior disorder ($p < 0.001$). No significant differences were found in participants with anxiety, depression, and substance use disorder. Participants who had experienced nonsexual abuse reported higher rates of at least one psychiatric diagnosis (73.5%, $p < 0.05$), disruptive behavior disorder (55.9%, $p < 0.01$), and substance use disorder (29.4%, $p < 0.05$).

Table 3 shows 28.9% of the entire cohort, including 31.6% in the group home and 19.0% in the youth home had at least one current psychiatric diagnosis; moreover, 10.3% in the entire group had two or more, including 11.8% in the group home and 4.8% in the youth home. The highest rates of current psychiatric diagnose in total, group home, and youth home were as follows: disruptive behavior disorder (12.4%, 11.8%, and 14.3%), depressive disorder (9.3%, 10.5%, and 4.8%), anxiety disorder (8.2%, 9.2%, and 4.8%), and neurodevelopmental disorder (8.2%, 10.5%, and 0%), respectively.

No significant correlations existed between all current psychiatric diagnoses and sex, type of placement, age, and type of childhood maltreatment, except that participants who had experienced sexual abuse were more likely to have neurodevelopmental disorders than participants who had experienced nonsexual abuse (23.1% vs. 11.8%, $p < 0.05$).

Specific psychiatric diagnoses of lifetime and current psychiatric disorders were in Table 4 and Table 5.

Emotional and behavioral problems

According to the results of the CBCL, rated by the main caregivers, 25.8% of youths in residential institutions were rated in total problem (23.7% in group home and 33.3% in

Table 3. Current psychiatric disorder in foster care residential institutions

	≥ One psychiatric disorder	≥ Two psychiatric disorders	DBD[§]	Anxiety disorder[†]	Depressive disorder[‡]	Substance disorder[§§]	Neurodevelopmental disorder[††]	Others[‡‡]
Total, *n* (%)	28 (28.9)	10 (10.3)	12 (12.4)	8 (8.2)	9 (9.3)	2 (2.1)	8 (8.2)	1 (1.0)
Sex, *n* (%)								
Male (52)	13 (25.0)	5 (9.6)	8 (15.4)	3 (5.8)	3 (5.8)	2 (3.8)	3 (5.8)	1 (1.9)
Female (45)	15 (33.3)	5 (11.1)	4 (8.9)	5 (11.1)	6 (13.3)	0	5 (11.1)	0
P	0.384	1.00	0.373	0.466	0.295	0.497	0.466	1.00
Placement type, *n* (%)								
Group home (76)	24 (31.6)	9 (11.8)	9 (11.8)	7 (9.2)	8 (10.5)	1 (1.3)	8 (10.5)	1 (1.3)
Youth home (21)	4 (19.0)	1 (4.8)	3 (14.3)	1 (4.8)	1 (4.8)	1 (4.8)	0	0
P	0.415	0.685	0.719	1.00	0.679	0.388	0.195	1.00
Age (years old), *n* (%)								
< 6 (7)	2 (28.6)	0	1 (14.3)	0	0	0	1 (14.3)	0
6-12 (29)	8 (27.6)	3 (10.3)	5 (17.2)	2 (6.9)	2 (6.9)	0	2 (6.9)	1 (3.4)
12-15 (48)	13 (27.1)	6 (12.5)	5 (10.4)	5 (10.4)	4 (8.3)	2 (4.2)	4 (8.3)	0
> 15 (13)	5 (38.5)	1 (7.7)	1 (7.7)	1 (7.7)	3 (23.1)	0	1 (7.7)	0
P	0.878	0.765	0.780	0.801	0.272	0.555	0.938	0.499
Child maltreatment, *n* (%)								
Sexual abuse (13)	6 (46.2)	3 (23.1)	1 (7.7)	3 (23.1)	3 (23.1)	0	3 (23.1)	0
Nonsexual abuse (34)	12 (35.3)	5 (14.7)	7 (20.6)	3 (8.8)	3 (8.8)	2 (5.9)	4 (11.8)	0
None (50)	10 (20.0)	2 (4.0)	4 (8.0)	2 (4.0)	3 (6.0)	0	1 (2.0)	1 (2.0)
P	0.106	0.076	0.196	0.083	0.166	0.151	0.032*	0.632

*$p < 0.05$ using Chi-square test ($n = 97$)
[§]DBD include ADHD, CD, ODD;
[†]Anxiety disorder includes panic disorder, specific phobia, social phobia, adjustment disorder, PTSD, generalized anxiety disorder;
[‡]Depressive disorders include dysthymic disorder, major depressive disorder, adjustment disorder with depression, adjustment disorder with mixed depression and anxiety;
[§§]Substance disorders include illegal substance abuse/dependence, alcohol abuse/dependence, nicotine dependence, betel-nut abuse/dependence;
[††]Neurodevelopmental disorder includes intellectual disability, learning disorder, autism spectrum disorder, developmental disorder;
[‡‡]Others include sleep disorder, tic disorder and enuresis.
DBD, disruptive behavior disorder; PTSD, posttraumatic stress disorder; CD, conduct disorder; ODD, oppositional defiant disorder; ADHD, attention deficit/hyperactivity disorder

youth home), 14.4% in internalized problem (13.2% and 19.0%), and 24.7% in externalized problem (25.0% and 23.8%). Among syndrome-orientated subscales, subscales of rule-breaking problem (9.8% in total, 9.7% in group home, and 9.5% in youth home), social problem (9.7%, 6.9%, and 19.0%), and aggressive behavior (8.2%, 6.6%, and 14.3%) were the most common. In the DSM-orientated diagnosis, CD (12.9% in total, 12.5% in group home, and 14.3% in youth home), affective disorder (8.2%, 6.6%, and 14.3%), and anxiety disorder (5.2%, 3.9%, and 9.5%) were the most common.

No significant difference existed between group home and youth home in the problem-oriented subscale. Youth home participants had significantly higher rates of anxiety/depression than group home participants (19.0% vs. 1.3%, $p < 0.01$) (Table 6).

Depressive symptoms

Nine percent of the entire group had self-reported depression, whereas the subscale of negative mood, interpersonal problem, anhedonia, and negative self-esteem was around 10%, except for the ineffectiveness subscale which was 3.4% in the entire group. Although no significant differences existed between group home and youth home in the total score and subscales, higher percentage of participants were found scoring above cut point in total score (14.3% vs. 7.4%) and for the subscale's anhedonia (19.0% vs. 10.3%) and negative self-esteem (14.3% vs. 7.4%) in those in youth home compared to those in group home (Table 7).

Discussion

In this study, we found that a high rate of lifetime psychiatric diagnoses (54.6% in overall, 44.7% in group home, and 90.5% in youth home) and 6-month prevalence (28.9% in the entire group, 31.6% in group home, and 19.0% in youth home) existed among the children and adolescents in the foster care group homes (Tables 2 and 3). The finding is consistent with McMillen et al.'s study, which enrolled participants from all over the foster care system including residential institutions, detention centers, and substance abuse centers, revealing that 61% have at least one lifetime psychiatric disorder, and that 37% have at least one 1-year current psychiatric disorder [25]. Moreover, in our study, in the entire group, 28.9% had two or more lifetime psychiatric diagnoses, and 10.3% had two or more in the current 6-month (Tables 2 and 3). Among those, disruptive behavior disorder and depressive disorder had

the highest prevalence in both lifetime and current 6-month psychiatric diagnoses (Tables 2 and 3). These findings indicate that the youths in foster care residential homes not only suffer from more prevalent, but also more complicated psychiatric conditions.

Using the K-SADS-E interview, Chen et al. revealed that in Taiwan's general children population, 31.6% have lifetime psychiatric diagnoses, and 25% have one in the last 6 months [26]. Compared to the study by Chen et al., our participants had higher lifetime psychiatric diagnosis (54.6% vs. 31.6%), but less differences in current 6-month diagnosis (28.9% vs. 25%) (Tables 2 and 3). In another study, Chou et al. investigated 44 newly attended foster care children and adolescents in Northern Taiwan, revealing a high prevalence of 95.5% with one or more current psychiatric diagnoses, confirmed using K-SADS-E psychiatric interview by child psychiatrists, and 70.5% having two or more [15]. But the psychiatric diagnoses in the study by Chou et al. has included threshold and subthreshold level criteria, whereas our study included only those who met threshold criteria (Tables 2 and 3). We also conducted further analysis for the lifetime and current psychiatric diagnosis using threshold and subthreshold criteria and the result revealed the 74.7% had one or more lifetime psychiatric diagnosis and 51.6% had two or more (not shown in Tables 2 and 3). Over 52% of the participants had at least one current psychiatric diagnosis, and 26.1% had two or above psychiatric diagnoses. The different rates in the current psychiatric disorder may not only have arisen because of the different threshold criteria of the diagnosis but also the timing of the psychiatric assessment. The interval of the psychiatric interviews in the study by Chou et al. are 1 or 2 weeks after placement to the residential institutions compared to the mean interval of our participants who had stayed in the residential institutions for 19.84 ± 14.99 months. While maltreated children and adolescents not living in foster care are at higher risk of mental disorders because of the presence of biological and psychosocial risk factors [27], on the contrary, the severity and prevalence rate of psychiatric disorder among those in foster care system are likely to decline after longer duration of displacement related to their adjustment condition and adaptation abilities [28].

Attention deficit/hyperactivity disorder

From our study, ADHD was identified as the most common lifetime psychiatric illness among the youths in the foster care residential institutions (15.5%) (Table 4). This finding is higher than the lifetime prevalence of ADHD (10.1%) in a Taiwan community survey [26]. Among all participants, no gender difference existed in the diagnosis of ADHD (Tables 4 and 5). This result stands in contrast to the male to female ratio of 2:1 in the general population [29]. Ramtekkar et al. reported that females may have been underdiagnosed for ADHD in the community [30], while Quinn pointed out that girls with ADHD are more likely to present with internalizing and inattentive symptoms compared with boys presenting with more hyperactivity, impulsivity and behavioral problems [31], possibly leading to the differences of clinical transferal. Also, systematic bias in diagnostic practice is the cause because it is less likely parents take girls for assessment if they have less stereotypical ADHD behaviors [32]. Since our study was not referred clinically for the whole survey for all children

Table 4. Specific diagnoses of lifetime psychiatric disorders in foster care residential institutions

	ADHD	ODD	CD	PTSD	Adjustment disorder	Nicotine disorder
Total, *n* (%)	15 (15.5)	13 (13.4)	22 (22.7)	4 (4.1)	11 (11.3)	12 (12.4)
Sex, *n* (%)						
Male (52)	10 (19.2)	11 (21.2)	21 (40.4)	1 (1.9)	7 (13.5)	12 (23.1)
Female (45)	5 (11.1)	2 (4.4)	1 (2.2)	3 (6.7)	4 (8.9)	0
P	0.399	0.018	0.000***	0.334	0.537	0.000***
Placement type, *n* (%)						
Group home (76)	12 (15.8)	2 (2.6)	5 (6.6)	4 (5.3)	7 (9.2)	2 (2.6)
Youth home (21)	3 (14.3)	11 (52.4)	17 (81.0)	0	4 (19.0)	10 (47.6)
P	1.00	0.000***	0.000***	0.574	0.246	0.000***
Age (years old), *n* (%)						
< 6 (7)	1 (14.3)	0	0	0	0	0
6-12 (29)	7 (24.1)	2 (6.9)	1 (3.4)	2 (6.9)	3 (10.3)	0
12-15 (48)	6 (12.5)	7 (14.6)	14 (29.2)	1 (2.1)	8 (16.7)	7 (14.6)
> 15 (13)	1 (7.7)	4 (30.8)	7 (53.8)	1 (7.7)	0	5 (38.5)
P	0.458	0.134	0.001***	0.617	0.268	0.004**
Child maltreatment, *n* (%)						
Sexual abuse (13)	2 (15.4)	0	0	4 (30.8)	2 (15.4)	0
Nonsexual abuse (34)	7 (20.6)	10 (29.4)	15 (44.1)	0	4 (11.8)	8 (23.5)
None (50)	6 (12.0)	3 (6.0)	7 (14.0)	0	5 (10.0)	4 (8.0)
P	0.565	0.003**	0.001***	0.000***	0.858	0.036*

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$ using Chi-square test ($n = 97$)
ADHD, attention deficit/hyperactivity disorder; ODD, oppositional defiant disorder; CD, conduct disorder; PTSD, posttraumatic stress disorder

Table 5. Specific diagnoses of current psychiatric disorders in foster care residential institutions

	ADHD	ODD	CD	PTSD	Adjustment disorder	Nicotine disorder
Total, *n* (%)	10 (10.3)	3 (3.1)	0	3 (3.1)	6 (6.2)	2 (2.1)
Sex, *n* (%)						
Male (52)	7 (13.5)	1 (1.9)	0	1 (1.9)	3 (5.8)	2 (3.8)
Female (45)	3 (6.7)	2 (4.4)	0	2 (4.4)	3 (6.7)	0
P	0.331	0.595		0.595	1.00	0.000***
Placement type, *n* (%)						
Group home (76)	7 (9.2)	2 (2.6)	0	3 (3.9)	5 (6.6)	0
Youth home (21)	3 (14.3)	1 (4.8)	0	0	1 (4.8)	2 (9.5)
P	0.447	0.523		1.00	1.00	0.388
Age (years old), *n* (%)						
< 6 (7)	1 (14.3)	0	0	0	0	0
6-12 (29)	3 (10.3)	2 (6.9)	0	1 (3.4)	2 (6.9)	0
12-15 (48)	5 (10.4)	1 (2.1)	0	1 (2.1)	3 (6.3)	2 (4.2)
> 15 (13)	1 (7.7)	0	0	1 (7.7)	1 (7.7)	0
P	0.975	0.532		0.725	0.910	0.555
Child maltreatment, *n* (%)						
Sexual abuse (13)	1 (7.7)	0	0	3 (23.1)	2 (15.4)	0
Nonsexual abuse (34)	6 (17.6)	0	0	0	3 (8.8)	2 (5.9)
None (50)	3 (6.0)	3 (6.0)	0	0	1 (2.0)	0
P	0.214	0.233		0.000***	0.149	0.151

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$ using Chi-square test ($n = 97$)
ADHD, attention deficit/hyperactivity disorder; ODD, oppositional defiant disorder; CD, conduct disorder; PTSD, posttraumatic stress disorder

Table 6. Behavioral and emotional problems (Child Behavior Checklist T score ≥65) by two different groups

	Group home	Youth home
Total, *n* (%)	76 (78.4)	21 (21.6)
Problem-orientated		
Total problem	18 (23.7)	7 (33.3)
Internalized problem	10 (13.2)	4 (19.0)
Externalized problem	19 (25.0)	5 (23.8)
Syndrome-orientated		
Anxiety/depression**	1 (1.3)	4 (19.0)
Withdrawal	4 (5.3)	2 (9.5)
Somatic problem	1 (1.3)	1 (4.8)
Social problem†	5 (6.9)	4 (19.0)
Thought problem†	1 (1.4)	1 (4.8)
Attention problem	5 (6.6)	2 (9.5)
Rule-breaking problem†	7 (9.7)	2 (9.5)
Aggressive behavior	5 (6.6)	3 (14.3)
DSM-orientated diagnosis		
Affective disorder	5 (6.6)	3 (14.3)
Anxiety disorder	3 (3.9)	2 (9.5)
Somatic disorder†,*	0	2 (9.5)
ADHD	1 (1.3)	0
ODD	4 (5.3)	0
CD†	9 (12.5)	3 (14.3)

*$p < 0.05$, **$p < 0.01$ using Chi-square test ($n = 97$)
†Four participants under six-year-old in group home were excluded in this analysis due to the age limitation of CBCL.
CBCL, Child Behavior Checklist; ADHD, attention deficit/hyperactivity disorder; ODD, oppositional defiant disorder; CD, conduct disorder; DSM, diagnostic and statistical manual of mental disorders

and adolescents in foster care residential institutions, and the psychiatric diagnosis was done through K-SADS-E interview, the bias of transferal and effects of parent/caregiver report should be much lower, thus diminishing the male predominance of ADHD in previous research. Linares et al. examined the course of inattention and hyperactivity/impulsivity symptoms over time in youths with ADHD in the foster care population and have found on average a decline of hyperactivity symptoms beginning after the 2nd year of placement [28]. The finding has important implications for early case detection and treatment of ADHD.

Comparison between clinical diagnoses and emotional/behavioral symptoms reported by caregivers

In the problem-oriented scale of the CBCL, rated by the main caregivers in the residential institutions, 24.7% of the entire group had externalized problems, with 7.2% having attention problems (6.6% in group home, vs. 9.5% in youth home), 9.8% having rule-breaking problems, and 8.2% having aggressive behaviors (Table 6). *DSM*-oriented diagnosis in CBCL reported only 1% of the entire group had ADHD (1.3% in group home, vs. 0.0% in youth home) (Table 6). Compared to the K-SADS-E diagnosed current ADHD (10.3% in total, 9.2% in group home, and 14.3% in youth home) (Table 5) by child psychiatrists, the percentages of ADHD symptoms and ADHD diagnosis rated by the caregivers in the residential institutions were relatively under-estimated. The highest percentage on the *DSM*-oriented diagnosis was CD (12.9% in total, 12.5% in group home, and 14.3% in youth

Table 7. Self-reported depression†

	CDI-total	CDI-NM	CDI-I	CDI-IN	CDI-A	CDI-S
Total, *n* (%)	8 (9.0)	10 (11.2)	10 (11.2)	3 (3.4)	11 (12.4)	8 (9.0)
Sex, *n* (%)						
Male (47)	5 (10.6)	3 (6.4)	4 (8.5)	2 (4.3)	5 (10.6)	4 (8.5)
Female (42)	3 (7.1)	7 (16.7)	6 (14.3)	1 (2.4)	6 (14.3)	4 (9.5)
P	0.717	0.181	0.507	1.00	0.750	1.00
Placement type, *n* (%)						
Group home (68)	5 (7.4)	8 (11.8)	7 (10.3)	2 (2.9)	7 (10.3)	5 (7.4)
Youth home (21)	3 (14.3)	2 (9.5)	3 (14.3)	1 (4.8)	4 (19.0)	3 (14.3)
P	0.386	1.00	0.695	0.56	0.280	0.386
Age (years old), *n* (%)						
8-12 (29)	5 (17.2)	6 (20.7)	5 (17.2)	2 (6.9)	3 (10.3)	3 (10.3)
12-15 (47)	1 (2.1)	2 (4.3)	5 (10.6)	1 (2.1)	6 (12.8)	3 (6.4)
15-16 (13)	2 (15.4)	2 (15.4)	0	0	2 (15.4)	2 (15.4)
P	0.056	0.077	0.258	0.410	0.382	0.575
Child maltreatment, *n* (%)						
Sexual abuse (12)	1 (8.3)	8 (66.7)	1 (8.3)	0	2 (16.7)	1 (8.3)
Nonsexual abuse (33)	2 (6.1)	1 (3.0)	3 (9.1)	1 (3.0)	2 (6.1)	1 (3.0)
None (44)	5 (11.4)	1 (2.3)	6 (13.6)	1 (2.3)	7 (15.9)	6 (13.6)
P	0.721	0.108	0.776	0.518	0.382	0.273

No significant differences existed between group home and youth home in the total score and all subscales using Chi-square test.
†There were 89 participants aged between 8 and 16-years old were enrolled in the analysis due to the age for CDI assessment being between 8 and 16.
CDI, children's depression inventory; CDI-total, CDI total score; CDI-NM, CDI negative mood; CDI-I, CDI interpersonal problem; CDI-IN, CDI ineffectiveness; CDI-A, CDI anhedonia; CDI-S, CDI negative self-esteem; CDI percentage, numbers of participants who score equal to or above cut-off point

home) (Table 6), considerably higher than the rate of current diagnosis of CD measured by the K-SADS-E (0.0%). Based on those findings, we suggest that in the communal life in foster care residential institutions, attention and hyperactivity problems are more prone to being overlooked than conduct problems.

Depressive disorder

In this study, we grouped the major depressive disorder, dysthymic disorder and adjustment disorder with lifetime of depression into one category. We found 9.3% had a current diagnosis of depression (10.5% in group home, and 4.8% in youth home) (Table 3). But the rate of caregiver-rated depressive symptoms (5.2%, Table 6) was much lower than those rated either by clinical diagnosis (9.3%, Table 3) or by the participants themselves (9.0%, Table 7). This discovery reflects that caregivers underestimated the depression severity of the children and adolescents in the foster care residential institutions.

From surveillance of the general population of children and adolescents in the U.S., the older the age is, the higher the prevalence of depression (0.5% for age 3–5 years, 1.4% for age 6–11 years, 3.5% for age 12–17 years) [33]. In our study, a prevalence of 17.2% was self-reported in the group aged 8-12, and 5.0% in the 12–16 years. The rates of depression in both age intervals in our study were higher than those in the general population in the US [33]. Since most of these foster children and adolescents experienced early traumas in their life, it is a very critical issue that they may experience or develop depression earlier than those who did not experience such childhood traumas. Based on this observation, we suggest that more attention should be paid to early detection and intervention for children and adolescents with depression in the foster care system.

Adjustment disorder with depressive mood that occurs in response to an identifiable psychosocial stressor may develop into depressive disorders if it is determined that the patient's symptoms are sufficient in number, severity, and duration to meet diagnostic criteria for a depressive disorder. Jumper's study found that the odds ratio for lifetime history of depression is 1.8 among both men and women who reported a history of child sexual abuse versus those who did not [34]. Evidence showed that early childhood traumatic events including child maltreatment, physical abuse, sexual abuse, and neglect might affect brain development. Although neuronal development is lifelong, it is more intense during the first seven years of life with repeated neurogenesis, synaptogenesis, synaptic pruning, and changes in synaptic and neuronal density occurring [35].

Study limitations

Our study has three strengths. First, child psychiatrists conducted comprehensive interviews using well-established diagnostic tools. For children and adolescents who had traumas, professional experience is necessary to establish rapport and make diagnosis during the interview. Second, we had other specialists such as psychologists and occupational therapists, as part of multidimensional evaluation team to assure accuracy of our diagnoses. Third, our study included different kinds of group homes located in different areas of Taoyuan city. Therefore, the composition of the participants

reduces the bias which would be present if we included only one group home.

Nevertheless, the readers are cautioned against over-interpreting the study findings because three major limitations:

- Among those four foster group homes, one of them was mainly for juvenile delinquents who were all male adolescents. When combining the data together, it might lead to statistical interference. However, they were still enrolled in this study because 90.5% of them experienced child maltreatment similar to other participants (Table 1).
- Since the foster care residential institutions were located in North of Taiwan, the external validity for other youths in foster care residential homes in Taiwan needs to be further examined. Although the residential institutions were located in different areas of Taoyuan City, they were in urban or suburban areas. Since characteristics, such as the environment they are raised in, their original home situation, types of maltreatment, of the children and adolescents may differ in urban and rural areas, our participants may not be representative of all foster children and adolescents.
- Recall bias is difficult to eliminate and lack of additional information, especially regarding internalized symptoms before entering foster homes, is difficult to fully capture during diagnostic interviews. Thus, we made our greatest effort to reduce recall bias by acquiring as much information as possible from social workers and caregivers. Meanwhile, we included the behavior and emotional reports from the caregivers to identify internal and external behaviors and included teacher reports to make the best estimates of psychiatric diagnosis of ADHD, CD, and ODD.

Based on our experiences from this study, we suggest that researchers can benefit from early incorporation of methods to diagnose ADHD and adjustment disorder/depressive disorder. Advance detection could allow us to have interventions that are more immediate and precise. Furthermore, the staff of residential homes and social welfare resources could also be included to offer timely responses regarding aspects of child welfare beyond solely medical issues.

Summary

The rôle of the foster care residential institutions is not only to have the children and adolescents fostered, but also be sure the residents are physically, mentally, and socially cared for. These children and adolescents were found to have more psychiatric diagnoses and comorbidities compared to those in the general population. Therefore, periodic psychiatric assessment should be continued for their mental health and treatment. Further study of risk factors, patterns of comorbidity, and the trajectories of psychopathology during adolescence is crucial for the identification of the targets for primary prevention among different vulnerable groups.

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Conflicts of Interest

None.

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