Risk of Teenage Pregnancy among Adolescents with Borderline Personality Disorder: A Nationwide Longitudinal Study

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Abstract

Background: Evidence suggested that borderline personality disorder (BPD) is related to the increased likelihood of risky sexual behaviors and that BPD is one of the most important risk factors of teenage pregnancy among adolescents. But whether adolescent BPD is independently associated with teenage pregnancy remains uncertain. **Methods:** We enrolled 809 adolescent girls with BPD and 8,090 without BPD between 2001 and 2009 and followed them up to the end of 2011 for the identifying any teenage pregnancy and repeated teenage pregnancy. Comorbidities of depressive disorder, bipolar disorder, as well as alcohol and substance use disorder were assessed. Psychotropic medications including antidepressants, mood stabilizers, and second-generation (atypical) antipsychotics were also identified. **Results:** Using Cox regression analyses with an adjustment of demographic characteristics, psychiatric comorbidities, and psychotropic medications showed that adolescents with BPD had significant increased risks of any teenage pregnancy (hazard ratio [HR] = 14.53, 95% confidence interval [CI] = 9.89–21.37, $p < 0.05$), and repeated teenage pregnancy (HR = 30.43, 95% CI = 17.32–53.45, $p < 0.05$) during the follow-up compared with non-BPD controls. Psychotropic medications were not significantly associated with the risks of any teenage pregnancy and repeated teenage pregnancy. **Discussion:** Adolescent BPD was an independent risk factor of any teenage pregnancy and repeated teenage pregnancy, regardless of the comorbidities of alcohol and substance use disorders. Whether the prompt intervention toward adolescent BPD may reduce the risks of any teenage pregnancy and repeated teenage pregnancy would need further investigation.

Key words: adolescents, borderline personality disorder, early pregnancy, teenage pregnancy

Introduction

Borderline personality disorder (BPD) is a severe form of psychopathology and manifests a characteristic pervasive pattern of instability in emotional regulation, interpersonal relationships, self-esteem, and impulse control [1-3]. Major clinical symptoms of BPD include affective instability, unstable interpersonal relationships, identity disturbance, impulsive aggression, suicidal and self-mutilating behaviors, chronic feelings of emptiness, as well as chronic suicidal tendencies [1-3]. The prevalence of BPD in the general population of adolescents is about 3%, but the clinical prevalence of BPD ranges from around 10% in adolescents consulting at an outpatient clinic to over 70% in suicidal adolescents attending an emergency department [4]. BPD is more common in girls than boys (about 70% and 30%, respectively) and carries an increased risk of psychiatric comorbidities including major depressive disorder, bipolar disorder, and substance use disorder, as well as a high mortality rate due to suicide [1-3].

Evidence reported that the association exists between adolescent BPD and the risky sexual behaviors such as not using a condom during sex, more sexual partners, and more frequent casual sex [5, 6]. The Pittsburgh Girls Study of 1,620 Black and White teenage girls showed that girls with more BPD symptoms at

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age 14 years have showed steeper growth over time in risky sexual behaviors from ages 14 to 18 years, and that adolescents who showed steeper increases in BPD symptoms over time also have steeper increases in risky sexual behaviors across adolescence [6]. Penner et al. enrolled 123 female adolescent inpatients for the comprehensive interview to assess BPD diagnosis (40.6% BPD) and measures of risky sexual behaviors, attitudes, and perceived norms related to risky sexual behaviors and sexual self-efficacy and revealed that girls in the BPD group have riskier attitudes and perceive peer norms about sexual behavior and lower self-efficacy to refuse sex than inpatient controls [5]. Jardin et al. have found the relationship of BPD trait with number of sexual partners among young college females [7].

Risky sexual behaviors tend to be related to the early pregnancy, which typically was defined as pregnancy before the age of 20 years, among teenage girls [8]. Incidence of early pregnancy or teenage pregnancy is about 20% worldwide, and unexpected pregnancy accounts for up to 80% of early pregnancy [9, 10]. Early pregnancy causes individual distress as well as socioeconomic and public health burden because adolescents with early pregnancy are more likely to either terminate the pregnancy or drop out of school and eventually become young parents [11]. Increasing evidence showed that adolescents with bipolar disorder and with alcohol and substance abuse are associated with early pregnancy, and that high comorbidity exists between those mental disorders and adolescent BPD [1-3, 12]. But whether adolescent BPD is an independent predictor of early pregnancy remains uncertain.

With the Taiwan National Health Insurance Research Database (NHIRD) with a large sample size and a longitudinal follow-up study design, we examined the temporal association of adolescent BPD with subsequent teenage pregnancy. We hypothesized that adolescent girls with BPD would be more likely to develop any teenage pregnancy and even repeated teenage pregnancies than those without BPD.

Methods

Data source

The Taiwan National Health Research Institute (NHRI) is in charge of the entire insurance claims database, namely, the Taiwan NHIRD, which consists of health-care data more than 99% of the entire Taiwan population. The NHIRD is audited and released by the NHRI for scientific and study purposes. Individual medical records included in the NHIRD are de-linked data to protect patients' privacy. Comprehensive information on insured individuals is included in the database including demographic characteristics, dates of clinical visits, disease diagnoses, and surgical interventions. The diagnostic codes used were based on *the International Classification of Diseases, 9th Revision, Clinical Modification* (*ICD-9-CM*). The NHIRD has been used extensively in many epidemiologic studies in Taiwan [13-16]. Institutional review board at Taipei Veterans General Hospital approved this study (IRB protocol number = 2018-07-016AC and date of approval = July 17, 2018) without stipulation of obtaining informed consents from any study participant.

Inclusion criteria for adolescents with BPD and the control group

Adolescents aged between 10 and 19 years who were identified as having a diagnosis BPD (*ICD-9-CM* codes: 301.83) by board-certified psychiatrists between January 1, 2001, and December 31, 2009, and who had no history of any pregnancy before enrollment (BPD diagnosis date) were included as the BPD cohort. The time of BPD diagnosis was defined as the time of enrollment. The age-, sex-, residence-, and time of enrollment-matched (1: 10) control cohort was randomly identified after eliminating the study cases, those who had been given a diagnosis of BPD at any time, and those who had any pregnancy before enrollment. Early pregnancy (< 20 years) was identified during the follow-up (from enrollment to December 31, 2011, to age of 19 years, or to the death). Pregnancy was identified based on the pregnancy-related diagnostic codes (*ICD-9-CM* codes: 63, 64, 65, 66, 67x [x = 0–7], 779.6, V22, V23, V24, V27) or pregnancy-related procedure codes including obstetric ultrasound assessment, virginal delivery, cesarean section, and abortion procedure. We assessed psychiatric comorbidities (including depressive disorder, bipolar disorder, alcohol use disorders, and substance use disorders) as the confounding factors in our study. The use of psychotropic medications (antidepressants, mood stabilizers, and second-generation (atypical) antipsychotics) during the follow-up was examined and was divided into three subgroups based on the cumulative defined daily dose [cDDD] during the follow-up period: nonusers (cDDD < 30), short-term users (cDDD = 30–364), and long-term users (cDDD ≥ 365). Antidepressants included selective serotonin reuptake inhibitors (fluoxetine, sertraline, paroxetine, fluvoxamine, citalopram, and escitalopram), serotonin-norepinephrine reuptake inhibitor (venlafaxine, duloxetine, and milnacipran), and norepinephrine-dopamine reuptake inhibitor (bupropion). Mood stabilizers included lithium and anticonvulsants (carbamazepine, oxcarbazepine, valproate, lamotrigine, topiramate, and gabapentin), and second-generation antipsychotics included aripiprazole, risperidone, paliperidone, olanzapine, amisulpride, ziprasidone, clozapine, and quetiapine. We also assessed levels of urbanization (level 1 to level 5; level 1, most urbanized region; level 5, least urbanized region) in our study [17].

Statistical analysis

For between-group comparisons, the *F* test was used for continuous variables and Pearson's Chi-square test for nominal variables, where appropriate. We used the Cox proportional hazard models with the adjustment of demographic characteristics (age, sex, and residence), psychiatric comorbidities (depressive disorder, bipolar disorder, as well as alcohol and substance use disorders), and psychotropic medications to calculate a hazard ratio (HR) with a 95% confidence interval (CI) of any early pregnancy and repeated early pregnancy (≥ 2 times early pregnancy) among adolescents with BPD and the controls. In addition, we used Cox proportional hazard analyses were used to investigate the

psychotropic medications (non-users vs. short-term users vs. long-term users) with the likelihood of any early pregnancy and repeated early pregnancy (≥ 2 times early pregnancy) among adolescents with BPD.

The differences between groups were considered significant if two-tailed *p*-values were less than 0.05. All data processing and statistical analyses were done using the Statistical Package for the Social Sciences version 17 software (SPSS Inc., Chicago, Illinois, USA) and Statistical Analysis Software version 9.1 (SAS Institute, Cary, North Carolina, USA).

Results

In all, 809 girls with BPD and 8,090 without BPD were enrolled in our study, with an average of 17 years (Table 1). Adolescents with BPD had higher prevalence of depressive disorder (55.3% vs. 2.1%, $p < 0.001$), bipolar disorder (21.8% vs. 0.5%, $p < 0.001$), alcohol use disorder (9.5% vs. 0.5%, $p < 0.001$), and substance use disorder (16.3% vs. 0.5%, $p < 0.001$) compared with those without BPD (Table 1). Adolescents with BPD had a significantly lower income ($p < 0.001$) than those without BPD (Table 1). Furthermore, girls with BPD significantly develop any early pregnancy (18.3% vs. 1.7%, $p < 0.001$) and repeated early pregnancy (8.0% vs. 0.5%, $p < 0.001$) and have an earlier age (18.48 ± 1.22 vs. 19.17 ± 0.93 years, $p < 0.001$) of developing any early pregnancy during the follow-up period than those without BPD did (Table 1).

Kaplan–Meier survival analyses with log-rank tests (Figure 1) revealed the significant association between adolescent BPD and subsequent risk of any early pregnancy ($p < 0.001$). Cox regression analyses with an adjustment of demographic characteristics, psychiatric comorbidities, and psychotropic medications showed that adolescents with BPD had increased risks of any early pregnancy (HR [95% CI] = 14.53 [9.89 – 21.37]) and repeated early pregnancy (30.43 [17.32 – 53.45]) during the follow-up compared with non-BPD controls (Table 2). Alcohol use disorder (1.81 [1.16 – 2.81]) was only related to the increased likelihood of any early pregnancy, but substance use disorder was related to the increased likelihoods of any early pregnancy (2.67 [1.84 – 3.96]) and repeated early pregnancy (2.21 [1.17 – 4.17]) (Table 2). Finally, psychotropic medications, including antidepressants, mood stabilizers, and atypical antipsychotics, were not associated with the risks of any early pregnancy and repeated early pregnancy (Table 3).

Discussion

Our study findings supported the study hypothesis that adolescents with BPD were more likely to develop any early pregnancy and repeated early pregnancy later in life compared with the non-BPD controls after adjusting for comorbid psychiatric disorders. Comorbidities of alcohol use disorder and substance use disorder were also related to the elevated risks of any early pregnancy. But psychotropic medications, including antidepressants, mood stabilizers, and atypical
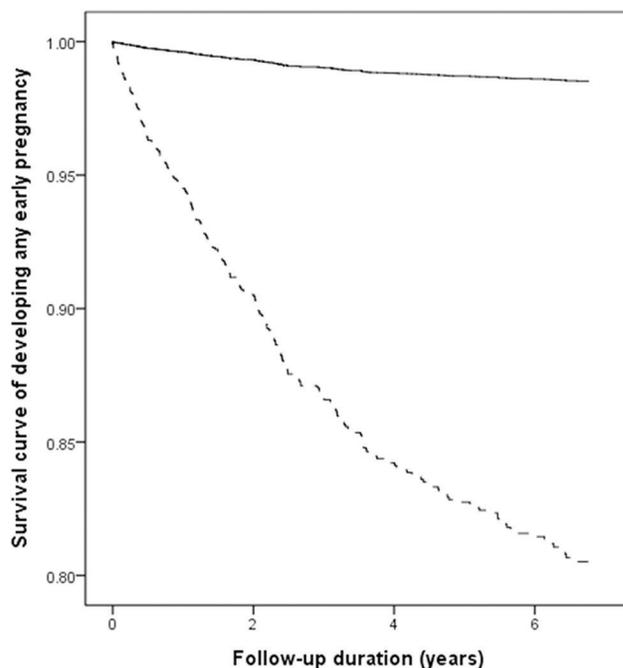

Figure 1. Survival curve of developing any early pregnancy among adolescents with BPD and controls. Broken line represents adolescents with BPD. Solid line represents those in control group ($p < 0.001$). BPD, borderline personality disorder

antipsychotics, were not beneficial for the risks of any early pregnancy and repeated early pregnancy.

As mentioned previously, adolescent BPD is related to the increased likelihood of risky sexual behaviors, one of the most significant risk factors of early pregnancy [5, 6]. Choukas-Bradley et al. reported the unidirectional relationship of BPD psychopathology with subsequent risky sexual behaviors and found that adolescents who showed more rapid increases in BPD symptoms exhibit greater increases in risky sexual behaviors across middle and late adolescence [6]. A retrospective study of 379 women aged between 18 and 40 years who completed the Structured Interview for *Diagnostic and Statistical Manual of Mental Disorders*, *4th Edition*, Personality for Axis II diagnoses demonstrated that BPD symptom is associated with any teenage pregnancy and repeated teenage pregnancy [18]. Our study with a larger sample size and a longitudinal follow-up study design supported De Genna et al.'s finings that adolescents with BPD are more likely to develop any early pregnancy and repeated early pregnancy compared with those without BPD [18]. In addition, De Genna et al. further suggested that BPD symptom severity scores predict teenage pregnancies, even after controlling for substance use disorder [18].

To interpret those results, we propose several hypotheses to explain the temporal association between adolescent BPD and teenage pregnancy. First, evidence supported that the comorbidities of alcohol use disorder and substance use with BPD increase the risks of risky sexual behaviors such as unprotected sex, more sexual partners and casual sex, and

Table 1. Demographic data and incidence of early pregnancy among adolescents with borderline personality disorder and controls

	Adolescents with BPD (*n* = 809), *n* (%)	Controls (*n* = 8,090), *n* (%)
Age at enrollment (years), mean ± SD	17.30 ± 1.58	17.38 ± 2.00
Female	809 (100.0)	8,090 (100.0)
Psychiatric comorbidities		
Depressive disorder***	447 (55.3)	170 (2.1)
Bipolar disorder***	176 (21.8)	37 (0.5)
Alcohol use disorders***	77 (9.5)	37 (0.5)
Substance use disorders***	132 (16.3)	43 (0.5)
Psychotropic medications		
Antidepressants***		
< 30 cDDD	207 (25.6)	7,901 (97.7)
30-364 cDDD	364 (45.0)	142 (1.8)
≥ 365 cDDD	238 (29.4)	47 (0.6)
Mood stabilizers***		
< 30 cDDD	594 (73.4)	8,013 (99.1)
30-364 cDDD	148 (18.3)	44 (0.5)
≥ 365 cDDD	67 (8.3)	33 (0.4)
Atypical antipsychotics***		
< 30 cDDD	608 (75.2)	8,049 (99.5)
30-364 cDDD	120 (14.8)	25 (0.3)
≥ 365 cDDD	81 (10.0)	16 (0.2)
Incidence of any early pregnancy***	148 (18.3)	134 (1.7)
Incidence of repeated early pregnancy***	65 (8.0)	43 (0.5)
Age of first pregnancy (years), mean ± SD***	18.48 ± 1.22	19.17 ± 0.93
Duration between enrollment and first pregnancy (years), mean ± SD***	1.53 ± 1.33	2.27 ± 2.08
Level of urbanization		
1 (most urbanized)	194 (24.0)	1,940 (24.0)
2	290 (35.8)	2,900 (35.8)
3	95 (11.7)	950 (11.7)
4	80 (9.9)	800 (9.9)
5 (most rural)	150 (15.8)	1,500 (15.8)
Income-related insured amount***		
≤ 15,840 NTD/month	542 (67.0)	4,308 (53.3)
15,841-25,000 NTD/month	208 (25.7)	2,658 (36.9)
≥ 25,001 NTD/month	59 (7.3)	1,124 (13.9)

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$, using Chi-square test or *F* test if appropriate.
BPD, borderline personality disorder; ADHD, attention-deficit hyperactivity disorder; NTD, new Taiwan dollar; SD, standard deviation; cDDD, cumulative defined daily dose

alcohol and substance use during sex, further resulting in any early pregnancy and repeated early pregnancy [8, 12]. But our findings suggested adolescent BPD as an independent risk factor of any early pregnancy and repeated early pregnancy, regardless of the presence of alcohol use disorder and substance use. Second, the core psychopathology of BPD, such as mood instability, unstable interpersonal relationships, identity disturbance, and chronic feelings of emptiness, may play an important role in the association between adolescent BPD and teenage pregnancy [4, 5, 7]. But no study exists to investigate the core psychopathology of BPD with the risk of teenage pregnancy. In the current study, we found no beneficial effect of psychotropic medications in the risks of any early pregnancy and repeated early pregnancy among

adolescents with BPD, which may indirectly infer to the crucial role of the core psychopathology of BPD but not the comorbidities of psychiatric disorders, in the relationship between adolescent BPD and teen pregnancy. Whether the optimal and prompt intervention toward adolescent BPD may reduce the likelihoods of any early pregnancy and repeated early pregnancy would need further investigation.

Study limitations

The readers are cautioned not to over-interpret the study results because this study has four major limitations:
• The incidence of any early pregnancy may have been underestimated because pregnancy may have been terminated in private in some cases. Nevertheless, pregnancy diagnosis in the NHIRD has a strong validity.

Table 2. Cox regression analyses of the risk of early pregnancy and repeated early pregnancy among adolescents with borderline personality disorder and controls[§]

	HR (95% CI)	
	Any early pregnancy	Repeated early pregnancy
BPD (presence versus absence)	14.53 (9.89-21.37)***	30.43 (17.32-53.45)***
Psychiatric comorbidities (presence versus absence)		
Depressive disorder	0.72 (0.47-1.10)	0.54 (0.30-0.97)*
Bipolar disorder	0.63 (0.34-1.20)	0.53 (0.21-1.34)
Alcohol use disorders	1.81 (1.16-2.81)**	1.87 (0.95-3.70)
Substance use disorders	2.67 (1.84-3.96)***	2.21 (1.17-4.17)*

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; [§]Adjusted for demographic data, psychiatric comorbidities, and psychotropic medications.
BPD, borderline personality disorder; HR, hazard ratio; CI, confidence interval; ADHD, attention-deficit hyperactivity disorder

Table 3. Antidepressants and the risk of early pregnancy and repeated early pregnancy among adolescexnts with borderline personality disorder[#]

	HR (95% CI)	
	Any early pregnancy	Repeated early pregnancy
Antidepressants		
< 30 cDDD	1 (reference)	1 (reference)
30-364 cDDD	1.10 (0.72-1.69)	1.07 (0.59-1.97)
≥ 365 cDDD	1.03 (0.57-1.83)	0.55 (0.22-1.42)
Mood stabilizers		
< 30 cDDD	1 (reference)	1 (reference)
30-364 cDDD	1.00 (0.60-1.69)	1.68 (0.81-3.48)
≥ 365 cDDD	0.64 (0.23-1.78)	0.32 (0.03-3.06)
Second-generational antipsychotics		
< 30 cDDD	1 (reference)	1 (reference)
30-364 cDDD	0.87 (0.50-1.52)	0.70 (0.27-1.81)
≥ 365 cDDD	0.57 (0.24-1.35)	0.72 (0.19-2.77)

[#]Adjusted for demographic data and psychiatric comorbidities. Not showing significant differences between all compared groups.
HR, hazard ratio; CI, confidence interval; ADHD, attention-deficit hyperactivity disorder; cDDD, cumulative defined daily dose

- BPD prevalence may be underestimated because only those adolescents who seek medical consultation are identified in the database. Nevertheless, BPD diagnosis in the NHIRD is provided by board-certified psychiatrists, which improves the diagnostic validity.
- Psychotherapy was usually a self-paid treatment option in the real-world clinical practice in Taiwan, which was not included in the NHIRD. Therefore, we could not assess the potential efficacy.
- The NHIRD lacks information regarding the adolescents' psychosocial stresses, family history, personal lifestyles, and environmental factors. Therefore, we could not investigate their potential influence.

Summary

Adolescent BPD was an independent risk factor of any early pregnancy and repeated early pregnancy, regardless of the comorbidities of alcohol and substance use disorders. Unfortunately, psychotropic medications, including antidepressants mood stabilizers, and atypical antipsychotics, cannot reduce the likelihood of any early pregnancy among girls with BPD. Whether the prompt intervention toward adolescent BPD may reduce the risks of any early pregnancy and repeated early pregnancy needs further investigation.

Conflicts of Interest

The authors declare that they have no conflict of interest in writing this paper.

Dr. Shih-Jen Tsai, a member of domestic advisory board at *Taiwanese Journal of Psychiatry*, had no rôle in the peer review process of or decision to publish this article.

References

1. Kernberg OF, Michels R: Borderline personality disorder. *Am J Psychiatry* 2009; 166: 505-8.
2. Leichsenring F, Leibing E, Kruse J, et al.: Borderline personality disorder. *Lancet* 2011; 377: 74-84.
3. Lieb K, Zanarini MC, Schmahl C, et al.: Borderline personality disorder. *Lancet* 2004; 364: 453-61.
4. Guilé JM, Boissel L, Alaux-Cantin S, et al.: Borderline personality disorder in adolescents: prevalence, diagnosis, and treatment strategies. *Adolesc Health Med Ther* 2018; 9: 199-210.
5. Penner F, Wall K, Jardin C, et al.: A study of risky sexual behavior, beliefs about sexual behavior, and sexual self-efficacy in adolescent inpatients with and without borderline personality disorder. *Personal Disord* 2019; 10: 524-35.
6. Choukas-Bradley S, Hipwell AE, Roberts SR, et al.: Developmental trajectories of adolescent girls' borderline personality symptoms and sexual risk behaviors. *J Abnorm Child Psychol* 2020; 48: 1649-58.
7. Jardin C, Sharp C, Garey L, et al.: Compelled to risk: does sexual compulsivity explain the connection between borderline personality disorder features and number of sexual partners? *J Pers Disord* 2017; 31: 738-52.
8. Jonas K, Crutzen R, van den Borne B, et al.: Teenage pregnancy rates and associations with other health risk behaviours: a three-wave cross-sectional study among South African school-going adolescents. *Reprod Health* 2016; 13: 50.
9. Chandra PC, Schiavello HJ, Ravi B, et al.: Pregnancy outcomes in urban teenagers. *Int J Gynaecol Obstet* 2002; 79: 117-22.
10. Finer LB, Zolna MR: Unintended pregnancy in the United States: incidence and disparities, 2006. *Contraception* 2011; 84: 478-85.
11. Leftwich HK, Alves MV: Adolescent pregnancy. *Pediatr Clin North Am* 2017; 64: 381-8.
12. Siegel RS, Brandon AR: Adolescents, pregnancy, and mental health. *J Pediatr Adolesc Gynecol* 2014; 27: 138-50.
13. Chen MH, Lan WH, Hsu JW, et al.: Risk of developing type 2 diabetes in adolescents and young adults with autism spectrum disorder: a nationwide longitudinal study. *Diabetes Care* 2016; 39: 788-93.
14. Chen MH, Pan TL, Li CT, et al.: Risk of stroke among patients with post-traumatic stress disorder: nationwide longitudinal study. *Br J Pychiatry* 2015; 206: 302-7.
15. Wang YP, Chen YT, Tsai CF, et al.: Short-term use of serotonin reuptake inhibitors and risk of upper gastrointestinal bleeding. *Am J Psychiatry* 2014; 171: 54-61.
16. Cheng CM, Chang WH, Chen MH, et al.: Co-aggregation of major psychiatric disorders in individuals with first-degree relatives with schizophrenia: a nationwide population-based study. *Mol Psychiatry* 2018; 23: 1756-63.
17. Liu CY, Hung YT, Chuang YL, et al.: Incorporating development stratification of Taiwan townships into sampling design of large scale health interview survey. *J Health Management* (Chin) 2006; 4: 1-22.
18. De Genna NM, Feske U, Larkby C, et al.: Pregnancies, abortions, and births among women with and without borderline personality disorder. *Womens Health Issues* 2012; 22: e371-7.