

# Current Psychotic-Like Experiences Among Chinese College Students: Prevalence, Correlates, and Its Relationship with Suicidal Ideation

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**Background:** Current psychotic-like experiences (PLEs) are prevalent among adolescents. However, epidemiological data on the prevalence rate of current PLEs among college students and its clinical correlates are scarce and limited. To address this study gap, this study aimed to investigate the prevalence and correlates of current PLEs among Chinese college students.

**Methods:** A cross-sectional study was designed with a sample of 18,578 college students in China. Each participant completed a survey on social-demographic characteristics variables, PLEs, sleep disturbance, depression, anxiety, and suicidal ideation. Logistic regression analyses were conducted to explore the influential factors for PLEs among all participants and suicidal ideation among those with PLEs.

**Results:** Among Chinese college students, 40.3% of the participants reported having at least one PLE in the past month, while 7.5% had frequent PLEs. Males, age, residence location in town, left-behind experiences, poor family economic status, chronic physical illness, family history of mental disorder, BMI  $\geq 28$  [obesity], sleep disturbance, depression, anxiety, and suicidal ideation were independent correlates for frequent PLEs. Furthermore, the prevalence of suicidal ideation among participants with frequent PLEs was 32.1%. Lower grades, sleep disturbance, depression, and anxiety were independent predictors of suicidal ideation among college students who experience PLEs frequently.

**Conclusion:** Current PLEs are widespread among Chinese college students. Suicidal ideation is largely prevalent among individuals who suffer frequent PLEs, suggesting that special measures and attention should be provided to these students based on relevant factors to prevent their suicidal ideation and behavior.

**Keywords:** psychotic-like experiences, suicidal ideation, correlates, college students

## Introduction

The prevalence of mental disorders among children and adolescents has significantly increased in recent decades.<sup>1</sup> The investigation of the underlying factors contributing to mental disorders has garnered considerable attention. Psychotic-like experiences (PLEs), for instance, delusions and hallucinations, are universally defined as the resemblance of positive symptoms of psychosis in the absence of a full-blown psychotic disorder.<sup>2</sup> Numerous literature empirically revealed that PLEs in early age are robustly associated with later psychotic disorders<sup>3,4</sup> and non-psychotic disorders.<sup>5,6</sup> In addition to being an early signal of psychopathology, PLEs have been considered as a sign of broader psychological vulnerability and a transdiagnostic clinical marker of clinically significant mental disorders.<sup>7,8</sup> Given that PLEs are a psychosis risk marker, it is essential to take PLEs into great consideration and adopt a targeted approach to clinical screening, early detection, and the targeting of interventions.

PLEs are prevalent among the general population, especially adolescents. However, in previous studies, the prevalence of PLEs varies due to samples, instruments, and screening criteria. For example, Mamah et al explored the 12-month prevalence of PLEs among 9564 Kenyan youth (46.7% females, mean age 21.2 years) with the Washington Early Recognition Center Affectivity and Psychosis (WERCAP) Screen and found that 72% reported at least one PLE over the past year.<sup>9</sup> A study using the Positive Subscale of Community Assessment of Psychic Experiences (CAPE-P) recruited a community sample of 1489 Tunisian college students (64.3% females, mean age 22.0 years), among which 51.4% had at least one PLE “nearly always” in their lifetime.<sup>10</sup> Utilizing the same measure to assess lifetime PLEs with a sample of 5427 Chinese middle school students (48.8% girls, mean age 12.6 years), another study surprisingly found that 95.7% of participants reported having more than one episode of PLEs, while 17.2% had “nearly always” PLEs.<sup>11</sup> It shall be noted that despite the prevalence, nearly 75–90% of PLEs gradually disappear over time, with only a small percentage persisting and eventually developing into clinically significant outcomes.<sup>12</sup> Consequently, the assessment of PLEs over a long time frame (eg, lifetime) is limited in utility in interpreting relationships with current distress or of use in longitudinal or interventional studies.<sup>13</sup> In fact, most psychiatric diagnoses, as well as attenuated psychotic symptoms (APS), are assessed according to the patient’s status in the past month. Therefore, assessing current PLEs within the past month can better and accurately reflect their recent mental health status, making it possible to better track individual mental health in the future. Building on this, our team used the 8-item Positive Subscale of the Community Assessment of Psychic Experiences (CAPE-P8) to examine the current PLEs among 67,538 junior and senior high school students (46.3% girls, mean age 14.56 years) in urban China.<sup>14</sup> Specifically speaking, the study demonstrated that nearly half of the students (49.8%) experienced at least one PLE in the past month, while 15.4% “often” or “nearly always” had PLEs. However, few previous studies have evaluated one-month PLEs among college students with a small sample.<sup>15,16</sup> Undoubtedly, studies regarding PLEs among college students are insufficient and limited. Therefore, there is an urgent need to use larger epidemiological data to explore current PLEs among college students as a population of late adolescence and provide data-driven insights for clinical intervention in the future.

Prior studies have identified numerous influential factors of PLEs, such as sex,<sup>17,18</sup> socioeconomic status,<sup>9,15</sup> residency status,<sup>11</sup> sleep disturbance,<sup>19</sup> depression,<sup>20,21</sup> and anxiety.<sup>20,22</sup> Among the above factors, sleep disturbance, depression, and anxiety have received special attention because they are more likely to contribute to catastrophic consequences, such as suicide behaviors.<sup>23–25</sup> Alarming, suicide is the second leading cause of death among adolescents and young adults worldwide.<sup>26</sup> In China, suicide is the leading cause of death among the population aged 15 to 34,<sup>27</sup> accounting for 19% of all deaths.<sup>28</sup> Although the overall suicide rate in China has significantly decreased over the past decades, the suicide rate among young people has remained unchanged.<sup>29,30</sup> Therefore, identifying the risk factors for suicide among adolescents and young adults is of crucial significance.

In recent years, prior studies extensively documented the strong association between PLEs and suicidality.<sup>31,32</sup> Considering the congenerous risk factors between PLEs and suicidality, particularly sleep disturbance and emotional symptoms, it is crucial to delve deeper into the independent association between PLEs and suicidal behavior, while accounting for these factors through appropriate adjustments. This will enable us to elucidate the mechanism of how PLEs can contribute to suicidal behavior. To our knowledge, few studies have considered the effect of confounding factors on the relationship between PLEs and suicidality. Interestingly, in some studies, the significant relationship between PLEs and suicidal behavior persisted even after controlling for depression.<sup>33</sup> However, this result was not replicated in other studies.<sup>34</sup> Accordingly, using a large sample of representative college students, the current study intended to examine the relationship between PLEs and suicidal ideation, which was considered to be a precursor to suicide.<sup>35</sup> Additionally, this study explored the independent predictors of suicidal ideation among adolescents with PLEs, while accounting for the effects of confounding factors.

## Methods

### Subjects

A large-scale online survey was conducted, utilizing a convenience sampling method to recruit college students from four colleges/universities in three provinces (Shanxi, Hunan, and Guangdong) in China. The web-based survey was

distributed through the “Survey Star” online platform and the Quick Response (QR) code of the questionnaire was forwarded to participants via WeChat. All Participants were required to complete the questionnaire by scanning a QR code from their cell phones. The platform automatically recognizes the completeness of the questionnaire filling, and the submission can only be completed if the participant completes all the questions. The recruitment period ran from October 17 to 29, 2023.

A total of 19,236 college students participated in our survey and submitted responses during the recruitment period. To improve the quality of the data, certain exclusion criteria were applied for participation, including: (i) completion time less than 5 minutes, (ii) incorrect identity information (ie, incomplete student number), and (iii) inconsistent survey contents. According to the criteria above, 585 participants were excluded. One question-“Have you ever suffered from any kind of mental health problems?” was used to investigate participants’ history of mental disorders. Given that PLEs are a precursor to the onset of mental disorders, 73 participants with a history of psychiatric conditions were excluded from the subsequent analyses. Accordingly, our study obtained results from a final sample of 18,578 participants with valid data.

This study employed an anonymous survey methodology, where participants were identified through a unique student number. Prior to the survey, all participants were required to submit an electronic informed consent form that explicitly stated their right to discontinue or withdraw from the survey at any time without penalty. During the survey, a toll-free psychological hotline was established to offer assistance to participants in need. Furthermore, a comprehensive written report about the overall status of participants was provided to the respective schools. The current study was approved by the Ethics Committee of the School of Psychology, South China Normal University (SCNU-PSY-2023-345).

## Measures

### Social-Demographic Characteristics

The socio-demographic characteristics of the participants included sex, age, grade, ethnicity, parental marital status, residence location, left-behind experiences (eg, living separately from one or both parents for more than 6 months before 16 years old),<sup>36</sup> single child status, parents’ education, family economic status, chronic physical illness (e.g, having at least one of arthritis, angina, asthma, diabetes, visual impairment, or hearing problems),<sup>37</sup> family history of mental disorder, and body mass index (BMI, calculated as weight (kg)/height (m)<sup>2</sup>).

### PLEs

The CAPE-P8 was employed to assess participants’ PLEs over the past month.<sup>38,39</sup> Each item was rated on a 4-point scale (1 = never; 2 = sometimes; 3 = often; and 4 = nearly always). Participants were regarded to have frequent PLEs when they selected “often” or “nearly always” on one or more items of CAPE-P8.<sup>40,41</sup> In this study, its Cronbach’s alpha was 0.93.

### Sleep Disturbance

Sleep disturbance over the past month was assessed through four questions: (1) “Have you had trouble falling asleep?”, (2) “Have you woken up frequently during the night?”, (3) “Have you woken up very early and can’t get back to sleep?”, and (4) “How would you rate your overall sleep quality”.<sup>19</sup> The first three questions examined insomnia symptoms, and responses to questions range from 1 to 5 (1 = never, 2 = < 1 night/week, 3 = 1–2 nights/week, 4 = 3–5 nights/week, 5 = 5–7 nights/week). The last question evaluated subjective sleep quality, and the options were rated on a 5-point Likert scale, from 1(very good) to 5 (very poor). The higher the score, the poorer the quality of sleep. Participants were classified as having sleep disturbance if they reported any of three insomnia symptoms occurring more than three times per week (rated as a response option of 4 or 5), subjectively reported poor (option 4) or very poor (option 5) sleep quality.<sup>25,42</sup> In this study, the Cronbach’s alpha for 4 items was 0.80.

### Depression

The 2-item Patient Health Questionnaire (PHQ-2) was used to measure depressive symptoms over the past two weeks.<sup>43</sup> Each item was rated on a 4-point scale from 0 (not at all) to 3 (almost every day), with a total score from 0 to 6. The cut-off total score of 3 and above refers to probable depression.<sup>44</sup> In this study, its Cronbach’s alpha was 0.82

## Anxiety

The 2-item Generalized Anxiety Disorder (GAD-2) was utilized to assess anxiety symptoms over the past two weeks.<sup>45</sup> Each item was rated on a 4-point scale from 0 = not at all, 1 = several days, 2 = more than half the days, to 3 = almost every day, with a total score from 0 to 6. A cut-off total score of 3 and above represented the clinical level of anxiety.<sup>46</sup> In this study, Cronbach's alpha was 0.87.

## Suicidal Ideation

Suicidal ideation was evaluated through three dichotomous questions based on the three-step theory of suicide.<sup>47,48</sup> The first question was "Are you in pain and hopeless?". Participants are considered to have suicidal ideation if they answered "yes". Participants with suicidal ideation went on to answer the second question - "Does your pain exceed your connectedness?". If participants answered "yes", they had a strong suicidal desire. These participants with strong suicidal ideation were required to answer the third question - "Do you have the capacity to commit suicide?" Participants are considered to have suicide attempts when they answered "yes". The prevalence of suicidal ideation was 9.5% (N = 1773) among the current sample. Of those with suicidal ideation, 620 college students reported strong suicidal ideation, with 391 of them having suicide attempts. Due to the low rate of suicide attempts (2.1%), this study used overall suicidal ideation (9.5%) for logistic regression analysis.

## Statistical Analyses

In this study, continuous variables were reported as mean (standard deviation, SD), and categorical variables were described as frequencies (percentage, %). No evidence of multicollinearity was found among all variables, as indicated by variance inflation factor (VIF) values of 1.800 or below.<sup>49</sup> Due to the non-normal distribution of age, as confirmed by the Kolmogorov–Smirnov one-sample test conducted on the sample, the Mann–Whitney *U*-test was employed to assess age differences among groups. Moreover, the Chi-square test was used to examine differences among groups for other categorical variables. Multivariate logistic regression analyses were conducted to identify factors that were independently correlated with frequent PLEs and suicidal ideation. Only statistically significant factors ( $p < 0.05$ ) from the univariate analyses were included in the regression models.<sup>50</sup> All statistical analyses were performed through SPSS 23.0, and the significance level was set at 0.05.

## Results

### Description of the Sample

Among 18,578 participants, 5931 (31.9%) were male and 12,647 (68.1%) were female. The mean (SD) age was 20.07 (1.63) years. 488 participants (2.6%) had a chronic physical illness, while 226 (1.2%) reported a family history of mental disorder. [Table 1](#) summarized the detailed social-demographic characteristics of the participants.

### Prevalence of PLEs and Suicidal Ideation

Results indicated that two-fifths of participants (40.3%, N = 7485) endured at least one PLE in the past month. 7.5% (N = 1398) of students "often" or "nearly always" experienced PLEs over the past month. The frequency of each item of CAPE-P8 was depicted in [Table 2](#). In addition, the prevalence of suicidal ideation was 9.5% (N=1773).

### Correlates of PLEs

As shown in [Table 3](#), there were statistically significant differences between participants with and without frequent PLEs in the social-demographic characteristics variables, namely sex, age, grade, ethnicity, parental marital status, residence location, left-behind experiences, single child status, father's education, mother's education, family economic status, chronic physical illness, family history of mental disorder, and body mass index (all  $p < 0.01$ ). Participants with frequent PLEs were found to have a higher likelihood of sustaining sleep disturbance, depression, and anxiety and having suicidal ideation (all  $p < 0.001$ ), compared with participants without frequent PLEs.

After controlling for confounding factors in the binary logistic regression analysis, the following variables were still significant (see [Table 4](#)): males (OR = 1.44, 95% CI = 1.27 ~ 1.64), age (OR = 0.88, 95% CI = 0.84 ~ 0.93), residence location in town (OR = 0.83, 95% CI = 0.71 ~ 0.98), left-behind experiences (OR = 1.37, 95% CI = 1.17 ~ 1.60), poor family economic

**Table 1** Social-Demographic Characteristics of the Participants (N =18,578)

Characteristics		N	%
Sex	Female	12,647	68.1
	Male	5931	31.9
Age [year, Mean (SD)]	20.07(1.63)		
Grade	Freshman	6448	34.7
	Sophomore	4653	25.0
	Junior	3911	21.1
	Senior	3566	19.2
Ethnicity	Han <sup>a</sup>	18,257	98.3
	Others	321	1.7
Parental marital status	Married	16,979	91.4
	Not current married <sup>b</sup>	1599	8.6
Residence location	Rural	9332	50.2
	Town	4790	25.8
	Urban	4456	24.0
Left-behind experiences <sup>c</sup>	Yes	2664	14.3
Single child status	Yes	4018	21.6
Father's education	Primary school or below	3427	18.4
	Junior high school	8690	46.8
	Senior high school	4120	22.2
	College or above	2341	12.6
Mother's education	Primary school or below	4022	21.6
	Junior high school	8904	47.9
	Senior high school	3652	19.7
	College or above	2000	10.8
Family economic status	Good	839	4.5
	Fair	13,605	73.2
	Poor	4134	22.3
Chronic physical illness <sup>d</sup>	Yes	488	2.6
Family history of mental disorder	Yes	226	1.2
Body mass index (kg/m <sup>2</sup> ) <sup>e</sup>	<18.5[underweight]	3384	18.2
	18.5~23.9[normal weight]	10,378	55.9
	24~27.9[overweight]	2552	13.7
	≥28[obesity]	2264	12.2

**Notes:** <sup>a</sup>Han is the major ethnic group in China. <sup>b</sup>Not current married included separated, divorced, and widowed. <sup>c</sup>Live separately from one or both parents for more than 6 months before 16 years old. <sup>d</sup>Chronic physical conditions referred to having at least one of arthritis, angina, asthma, diabetes, visual impairment, or hearing problems. <sup>e</sup>Body mass index categories were defined refer to the Chinese criteria for adults.

status (OR = 1.42, 95% CI = 1.03 ~ 1.94), chronic physical illness (OR = 1.41, 95% CI = 1.06 ~ 1.88), family history of mental disorder (OR = 1.53, 95% CI = 1.03 ~ 2.27), BMI ≥ 28 [obesity] (OR = 1.25, 95% CI = 1.04 ~ 1.49), sleep disturbance (OR = 1.90, 95% CI = 1.64 ~ 2.21), depression (OR = 2.48, 95% CI = 2.09 ~ 2.94), anxiety (OR = 4.28, 95% CI = 3.59 ~ 5.09), and suicidal ideation (OR = 2.05, 95% CI = 1.76 ~ 2.39). The adjusted R square for this model is 26.4%.

## Suicidal Ideation in Participants with PLEs

Table 5 presented a comparison of the socio-demographics and clinical characteristics between participants with frequent PLEs who exhibited suicidal behaviors and those who did not. The prevalence of suicidal ideation among frequent PLEs participants was 32.1% (449/1398). Compared with frequent PLEs participants without suicidal ideation, those with suicidal ideation were found to be younger, be in lower grades, have left-behind experiences and chronic physical illness, and suffer from sleep disturbance, depression, and/or anxiety (all  $p < 0.01$ ).

**Table 2** The Prevalence of Current PLEs Among the Current Sample

	Prevalence (%)			≥ Often (%)		
	Overall	Male	Female	Overall	Male	Female
<b>DEs</b>						
Delusion of reference	31.5	33.2	30.9	4.2	5.7	3.5
Delusion of persecution	10.8	15.0	8.9	2.4	3.6	1.8
Thought withdraw	15.5	19.3	13.7	3.2	4.7	2.4
Thought insertion	14.7	18.7	12.8	2.8	4.2	2.2
Thought broadcasting	21.2	25.9	19.0	3.6	5.5	2.7
Feeling of being control	11.4	15.9	9.3	2.4	3.8	1.7
Any	39.5	41.6	38.5	7.1	9.7	5.9
<b>HEs</b>						
Verbal auditory hallucinations	12.1	16.3	10.2	2.4	4.0	1.7
Visual hallucinations	7.0	11.1	5.1	1.8	3.0	1.2
Any	12.6	17.0	10.6	2.8	4.7	1.9
<b>PLEs</b>						
Any	40.3	42.4	39.3	7.5	10.3	6.2

**Abbreviations:** Des, delusional experiences; HEs, hallucinatory experiences; PLEs, psychotic-like experiences.

**Table 3** Demographics and Clinical Characteristics Between Participants with and without PLEs [N(%)]

Characteristics		Frequent PLEs (N=1398, 7.5%)	Control (N=17180, 92.5%)	P value	Cramer's V/ Cohen's d
Sex	Females	786(56.2)	11,861(69.0)	<0.001	0.073
	Males	612(43.8)	5319(31.0)		
Age [year, Mean (SD)]		19.70(1.67)	20.10(1.62)	<0.001	0.243
Grade	Freshman	578(41.3)	5870(34.2)	<0.001	0.056
	Sophomore	391(28.0)	4262(24.8)		
	Junior	231(16.5)	3680(21.4)		
	Senior	198(14.2)	3368(19.6)		
Ethnicity	Han <sup>a</sup>	1353(96.8)	16,904(98.4)	<0.001	0.033
	Others	45(3.2)	276(1.6)		
Parental marital status	Married	1232(88.1)	15,747(91.7)	<0.001	0.033
	Not current married	166(11.9)	1433(8.3)		
Residence location	Rural	722(51.6)	8610(50.1)	0.002	0.026
	Town	307(22.0)	4483(26.1)		
	Urban	369(26.4)	4087(23.8)		
Left-behind experiences	Yes	357(25.5)	2307(13.4)	<0.001	0.091
Single child status	Yes	353(25.3)	3665(21.3)	0.001	0.025
Father's education	Primary school or below	275(19.7)	3152(18.3)	<0.001	0.036
	Junior high school	574(41.1)	8116(47.2)		
	Senior high school	332(23.7)	3788(22.0)		
	College or above	217(15.5)	2124(12.4)		
Mother's education	Primary school or below	330(23.6)	3692(21.5)	<0.001	0.038
	Junior high school	592(42.3)	8312(48.4)		
	Senior high school	282(20.2)	3370(19.6)		
	College or above	194(13.9)	1806(10.5)		
Family economic status	Good	67(4.8)	772(4.5)	<0.001	0.088
	Fair	842(60.2)	12,763(74.3)		
	Poor	489(35.0)	3645(21.2)		

(Continued)

**Table 3** (Continued).

Characteristics		Frequent PLEs (N=1398, 7.5%)	Control (N=17180, 92.5%)	P value	Cramer's V/ Cohen's d
Chronic physical illness	Yes	82(5.9)	406(2.4)	<0.001	0.058
Family history of mental disorder	Yes	46(3.3)	180(1.0)	<0.001	0.054
Body mass index (kg/m <sup>2</sup> )	<18.5[underweight]	237(17.0)	3147(18.3)	0.003	0.027
	18.5~23.9[normal weight]	748(53.5)	9630(56.1)		
	24~27.9[overweight]	202(14.4)	2350(13.7)		
	≥28[obesity]	211(15.1)	2053(11.9)		
Sleep disturbance	Yes	445(31.8)	1547(9.0)	<0.001	0.195
Depression	Yes	703(50.3)	1581(9.2)	<0.001	0.330
Anxiety	Yes	668(49.2)	1207(7.0)	<0.001	0.368
Suicidal ideation	Yes	449(32.1)	1324(7.7)	<0.001	0.219

**Table 4** Multivariate Analysis for Variables Associated with Frequent PLEs

Characteristics		OR	95% CI	P value
Sex	Female	1.00		
	Male	<b>1.44</b>	<b>1.27~1.64</b>	<b>&lt;0.001</b>
Age [year, Mean (SD)]		<b>0.88</b>	<b>0.84~0.93</b>	<b>&lt;0.001</b>
Grade	Freshman	1.00		
	Sophomore	1.09	0.93~1.28	0.294
	Junior	0.92	0.75~1.12	0.411
	Senior	0.97	0.77~1.22	0.791
Ethnicity	Han	1.00		
	Others	1.45	1.00~2.11	0.050
Parental marital status	Married	1.00		
	Not current married	1.00	0.82~1.23	0.990
Residence location	Rural	1.00		
	Town	<b>0.83</b>	<b>0.71~0.98</b>	<b>0.025</b>
	Urban	1.07	0.90~1.27	0.433
Left-behind experiences	Yes	<b>1.37</b>	<b>1.17~1.60</b>	<b>&lt;0.001</b>
Single child status	Yes	1.02	0.87~1.19	0.756
Father's education	Primary school or less	1.00		
	Junior high school	0.89	0.74~1.06	0.192
	Senior high school	1.13	0.91~1.39	0.268
	College or more	1.14	0.88~1.48	0.316
Mother's education	Primary school or less	1.00		
	Junior high school	0.95	0.80~1.12	0.535
	Senior high school	1.03	0.83~1.27	0.792
	College or more	1.14	0.86~1.47	0.381
Family economic status	Good	1.00		
	Fair	1.01	0.75~1.37	0.951
	Poor	<b>1.42</b>	<b>1.03~1.94</b>	<b>0.034</b>
Chronic physical illness	Yes	<b>1.41</b>	<b>1.06~1.88</b>	<b>0.020</b>
Family history of mental disorder	Yes	<b>1.53</b>	<b>1.03~2.27</b>	<b>0.034</b>
Body mass index (kg/m <sup>2</sup> )	18.5~23.9[normal weight]	1.00		
	<18.5[underweight]	1.05	0.88~1.24	0.610
	24~27.9[overweight]	1.02	0.85~1.22	0.850
	≥28[obesity]	<b>1.25</b>	<b>1.04~1.49</b>	<b>0.018</b>

(Continued)

**Table 4** (Continued).

Characteristics		OR	95% CI	P value
Sleep disturbance	Yes	<b>1.90</b>	<b>1.64~2.21</b>	<b>&lt;0.001</b>
Depression	Yes	<b>2.48</b>	<b>2.09~2.94</b>	<b>&lt;0.001</b>
Anxiety	Yes	<b>4.28</b>	<b>3.59~5.09</b>	<b>&lt;0.001</b>
Suicidal ideation	Yes	<b>2.05</b>	<b>1.76~2.39</b>	<b>&lt;0.001</b>

**Note:** Bold type indicates a significant odds ratio.

**Abbreviations:** OR, odds ratio; CI, confidence interval.

A binary logistic regression analysis further illustrated that sleep disturbance (OR = 1.80, 95% CI = 1.40 ~ 2.32), depression (OR = 1.63, 95% CI = 1.21 ~ 2.21), and anxiety (OR = 2.26, 95% CI = 1.21 ~ 2.21) remained significant after controlling for confounding factors (see Table 6). Grade was also negatively associated with suicidal ideation (OR = 0.43~0.65). The adjusted R square for this model is 15.9%.

**Table 5** Demographics and Clinical Characteristics Between Frequent PLEs Participants with and without Suicidal Ideation

Characteristics		With SI (N=449, 32.1%)	Without SI (N=949, 67.9%)	P value	Cramer's V/ Cohen's d
Sex	Female	264(58.8)	522(55.0)	0.185	-
	Male	185(41.2)	427(45.0)		
Age [year, Mean (SD)]		19.52(1.65)	19.79(1.68)	0.005	0.162
Grade	Freshman	217(48.3)	361(38.0)	0.001	0.109
	Sophomore	119(26.5)	272(28.7)		
	Junior	67(14.9)	164(17.3)		
	Senior	46(10.2)	152(16.0)		
Ethnicity	Han	434(96.7)	919(96.8)	0.872	-
	Others	15(3.3)	30(3.2)		
Parental marital status	Married	389(86.6)	843(88.8)	0.250	-
	Not current married	60(13.4)	106(11.2)		
Residence location	Rural	233(51.9)	489(51.5)	0.992	-
	Town	98(21.8)	209(22.0)		
	Urban	118(26.3)	251(26.4)		
Left-behind experiences	Yes	139(31.0)	218(23.0)	0.002	0.086
Single child status	Yes	113(25.2)	240(25.3)	1.000	-
Father's education	Primary school or below	99(22.0)	176(18.5)	0.210	-
	Junior high school	186(41.4)	388(40.9)		
	Senior high school	93(20.7)	239(25.2)		
	College or above	71(15.8)	146(15.4)		
Mother's education	Primary school or below	105(23.4)	225(23.7)	0.999	-
	Junior high school	190(42.3)	402(42.4)		
	Senior high school	91(20.3)	191(20.1)		
	College or above	63(14.0)	131(13.8)		
Family economic status	Good	22(4.9)	45(4.7)	0.396	-
	Fair	259(57.7)	583(61.4)		
	Poor	168(37.4)	321(33.8)		
Chronic physical illness	Yes	39(8.7)	43(4.5)	0.003	0.083
Family history of mental disorder	Yes	20(4.5)	26(2.7)	0.108	-
Body mass index (kg/m <sup>2</sup> )	<18.5[underweight]	74(16.5)	163(17.2)	0.585	-
	18.5~23.9[normal weight]	251(55.9)	497(52.4)		
	24~27.9[overweight]	58(12.9)	144(15.2)		
	≥28[obesity]	66(14.7)	145(15.3)		
Sleep disturbance	Yes	203(45.2)	242(25.5)	<0.001	0.198
Depression	Yes	302(67.3)	401(42.3)	<0.001	0.234
Anxiety	Yes	307(68.4)	381(40.1)	<0.001	0.264



**Table 6** Multivariate Analysis for Variables Associated with Suicidal Ideation Among Participants with Frequent PLEs

Characteristics		OR	95% CI	P value
<b>Age</b>		<b>0.99</b>	<b>0.90~1.08</b>	<b>0.751</b>
Grade	Freshman	1.00		
	Sophomore	<b>0.65</b>	<b>0.48~0.89</b>	<b>0.007</b>
	Junior	<b>0.61</b>	<b>0.41~0.91</b>	<b>0.015</b>
	Senior	<b>0.43</b>	<b>0.27~0.70</b>	<b>0.001</b>
Left-behind experiences	Yes	1.28	0.98~1.68	0.074
Chronic physical illness	Yes	1.59	0.99~2.58	0.057
Sleep disturbance	Yes	<b>1.80</b>	<b>1.40~2.32</b>	<b>&lt;0.001</b>
Depression	Yes	<b>1.63</b>	<b>1.21~2.21</b>	<b>0.001</b>
Anxiety	Yes	<b>2.26</b>	<b>1.67~3.07</b>	<b>&lt;0.001</b>

**Note:** Bold type indicates a significant odds ratio.

**Abbreviations:** OR, odds ratio; CI, confidence interval.

## Discussion

This study intended to examine the prevalence of PLEs and suicidal ideation among Chinese college students, as well as to investigate the demographic and clinical factors associated with these experiences. Our study indicated that 40.3% of college students had PLEs over the past month, and 7.5% experienced frequent current PLEs. The prevalence rates observed in our study are higher compared to the findings of a previous survey conducted with a small sample of college students (N=2231, 36.3% and 3.3%).<sup>16</sup> Nevertheless, the rates are lower than the results from a large-scale survey of junior and senior high school students (N=67538, 49.3% and 15.4%)<sup>14</sup> with the same scale and screening criteria. The variation in prevalence rates can be attributed to the difference in the sampled populations. In our study, 9.5% of participants reported suicidal ideation in the preceding month. However, the prevalence rate of suicidal ideation also varies greatly in different measures, samples, and sampling time. For instance, one study using the Epidemiological version of the Kiddie Schedule for Affective Disorders and Schizophrenia (Kiddie-SADS-E) investigated 9510 Taiwanese adolescents (48.3% boys, mean age 14.69 years) and displayed that 18.03% of participants have suicidal ideation over the past month.<sup>51</sup> Zarrouq et al employed the Mini International Neuropsychiatric Interview (MINI) to assess one-month suicidal behaviors among 3020 Moroccan school students (53.0% boys, mean age 16 years) and found that the prevalence rate of suicidal ideation during the last month was 15.7%.<sup>52</sup>

In this study, male students are more likely to suffer frequent PLEs, which is consistent with prior findings.<sup>53</sup> However, the finding is opposed to some studies that argue female adolescents had a higher prevalence of PLEs.<sup>17,54</sup> One possible reason for the results of this study is that male college students are more prone to adopting unhealthy lifestyles, such as Internet addiction<sup>55</sup> and smoking,<sup>56</sup> which may contribute to PLEs.<sup>57,58</sup> Meanwhile, age served as a protective factor against frequent PLEs. In fact, PLEs are transient in nature, and the majority of PLEs (75 ~ 90%) during early adolescence gradually diminish with age.<sup>12</sup> Our observation of students who have experienced being left-behind revealed a significant increase in current PLEs, in line with previous research findings.<sup>14,41</sup> Left-behind adolescents, as a consequence of their parents' migration and inadequate care, experience greater exposure to traumatic events (eg, emotional neglect and exploitation, school bullying),<sup>59</sup> and heightened feelings of loneliness.<sup>60</sup> These factors make them more vulnerable to mental health issues. Moreover, extensive existing studies have adequately proven that familial poverty is a vital risk factor for increased mental health issues among adolescents,<sup>61</sup> including PLEs.<sup>9</sup> This argument coincides with our finding that poor family economic status was significantly associated with a higher occurrence of frequent PLEs. This result may provide a partial explanation for the lower prevalence of PLEs reported by participants residing in urban areas, as they tend to have better family economic status compared to those from rural areas in this study. According to our findings, participants residing in towns and urban areas reported a higher risk of frequent PLEs compared to those residing in rural areas. Though it is true that families in urban are generally better off economically, it should be acknowledged that urbanization may also have detrimental effects on the psychological development of

individuals, including limited access to green spaces, residential segregation, social disorganization, and other concentrated disadvantages (ie, unemployment).<sup>62,63</sup> Furthermore, our finding further illustrated that students with obesity are more likely to have frequent current PLEs. Obesity might involve hypothalamic-pituitary-adrenal axis (HPA axis) dysregulation,<sup>64,65</sup> which is well known to be involved in psychosis.<sup>66</sup> We also speculated that obese individuals are less inclined to engage in physical exercise, which may result in an increased risk of PLEs.<sup>14,42</sup> Coinciding with previous work,<sup>14</sup> it has been validated that chronic physical illness and family history of mental disorder are independently related to frequent PLEs. Thus, these factors should also be taken into consideration for implementing psychosocial interventions among college students.

We demonstrated that college students with frequent PLEs had a higher risk of sleep disturbance, depression, and anxiety than those without frequent PLEs. Lee et al investigated the relationship between PLEs and sleep disturbance among adolescents and found that sleep disturbance was independently correlated with the increased likelihood of PLEs.<sup>67</sup> Other studies conducted among adolescents also affirmed the association between PLEs and depressive and anxiety.<sup>20,22</sup> This association could be explained by their congenious risk factors, such as negative life events.<sup>68–70</sup> Controlled for other confounding factors, our results revealed that participants with frequent PLEs were more than twice as likely to have suicidal ideation (OR=2.05). The strong relationship between PLEs and suicidal ideation was consistent with previous studies.<sup>16,71</sup> This relationship could be attributed to increased affective reactivity and inadequate coping skills to negative stressors in individuals with PLEs,<sup>72,73</sup> which in turn contribute to an increase risk of suicidal ideation.

To our knowledge, scant attention has been paid to independent predictors of suicidal ideation among adolescents with PLEs. In this study, we found that students with frequent PLEs were at risk for sleep disturbance, depression, and anxiety, with proportions of 31.8%, 50.3%, and 49.2%, respectively. This prevalence rate increased significantly among frequent PLEs participants who had suicidal ideation (sleep disturbance, 45.2%; depression, 67.3%; anxiety, 68.4%). Several literatures, including this study, have identified that PLEs are independently associated with suicidal ideation.<sup>16,33,71</sup> Therefore, sleep disturbance and emotional symptoms should be directly related to both PLEs and suicide behavior. Additionally, higher grades were associated with a lower risk of suicidal ideation among participants who reported PLEs frequently. This finding contradicts the general findings on suicidal ideation among college students.<sup>74</sup> One possible explanation for this is that among college students with frequent PLEs, students in higher grades may have greater access to social support and are easier to seek help when they are in trouble.

The present study makes notable contributions in terms of methodology, such as a large sample size and comprehensive measurement of clinical characteristics. This study also has several limitations that may be reflection points for future research. Firstly, PLEs and other clinical characteristics in this study were assessed through self-report. Especially suicidal ideation was measured with only a single item, which may lead to certain reporting biases. Also, to minimize participant burden, we opted to measure depressive and anxiety symptoms with the PHQ-2 and GAD-2. However, it should be noted that PHQ-2 and GAD-2 may not be as comprehensive or accurate as the PHQ-9 and GAD-7 in accessing the symptoms.<sup>75</sup> Secondly, this study employed a cross-sectional design and no further follow-up was conducted with the high-risk group, which may limit our ability to infer causality. Therefore, it is necessary to further conduct longitudinal research to explore the relationship between PLEs and other clinical symptoms. Finally, there are several factors related to the mental health of college students that have not been taken into account, such as the study field<sup>76</sup> and life events.<sup>68</sup> Future studies can attempt to unearth these influential factors.

## Conclusion

This study demonstrated that PLEs was prevalent among Chinese college students. The independent relationship between PLEs and suicidal ideation were also proven. Our findings highlighted the importance of screening college students with PLEs. We also identified several factors associated with frequent PLEs, which broadened the theoretical and empirical basis concerning PLEs and provided new insights into the pathomechanisms underlying PLEs. This study also provided valuable data for healthcare professionals and school administrators to refer to when assessing the risks of suicide among individuals with frequent PLEs. Further longitudinal studies in the future are necessary to gain a deeper understanding of the relationship between these factors and PLEs.

## Data Sharing Statement

The data presented in this study are available on request from the corresponding authors (Dr. Dongfang Wang).

## Ethics Statement

The investigation was carried out in accordance with the Helsinki Declaration as revised 1989 and approved by the Ethics Committee of the School of Psychology, South China Normal University. Informed consent was obtained from all participants involved in the study.

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## Disclosure

The authors declare that they have no conflicts of interest in this work.

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