

ORIGINAL ARTICLE

Differential contributions between objective and subjective psychosis-like experiences to suicidal ideation in college students

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Abstract

Aim: The present study aimed to investigate the prevalence rate of objective and subjective psychosis-like experiences (PLEs) in non-help-seeking college students and to explore their differential contributions to suicidal ideation.

Methods: First-year college students were recruited and surveyed with the Chinese version of the 16-item Prodromal Questionnaire (CPQ-16), Childhood Trauma Questionnaire (CTQ-SF), Patient Health Questionnaire-9 (PHQ-9), General Anxiety Disorder-7 (GAD-7) and Beck Scale for Suicide Ideation (BSI). The Structured Interview of Psychosis-Risk Syndromes (SIPS) was conducted in individuals with a CPQ-16 score of 9 or higher.

Results: Data were available for 8367 students. Three hundred and seventy of them scored 9 or higher on the CPQ-16, suggesting potential PLEs (4.42%). Among them, 194 agreed to the SIPS screening. The PLEs were confirmed in 103 individuals who scored 1–5 on any positive symptom scales of the SIPS (objective PLEs, oPLEs). For the remaining 91 individuals, their PLEs were not confirmed by the SIPS and thus were categorized as individuals with subjective PLEs (sPLEs). In univariate logistic regression, oPLEs was associated with a two times risk of suicidal ideation compared to sPLEs (OR = 1.971, $p = .029$). In multivariate logistic regression when non-PLE status was set as a reference, oPLEs significantly predicted suicidal ideation (OR = 3.441, $p = .011$), while the sPLEs (OR = 2.277, $p = .091$) was no longer a significant predictor after controlling for PHQ-9, GAD-7 and CPQ-SF scores.

Conclusions: OPLEs and sPLEs have differential contributions to suicidal ideation. OPLEs seems to be associated with a higher risk of suicidal ideation and is independent of other psychopathology.

KEYWORDS

attenuated psychotic syndrome, college students, psychosis-like experiences, suicidal ideation

Hong-Xia Ma and Jie Zhao contributed equally to the article.

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1 | INTRODUCTION

Psychosis-like experiences (PLEs) refer to unusual experiences (such as hearing voices or being suspicious) that are below the threshold for the diagnosis of psychotic disorders in terms of their intensity or duration (Shevlin et al., 2007). Although some PLEs are transient and self-limiting, others are considered to be associated with an ultrahigh risk (UHR) of developing psychosis (Dominguez et al., 2011). PLEs were also found to increase the risk of future suicidal behaviour, including suicidal ideation, suicide attempts, and suicide death (Yates et al., 2019). As suicide is the leading cause of death among young adults (Yang et al., 2015), the contribution of PLEs to suicide risk warrants more attention.

Structured interviews, such as the Structured Interview of Psychosis-Risk Syndromes (SIPS) (Miller et al., 2003) and Comprehensive Assessment of At-Risk Mental States (CAARMS) (Yung et al., 2005), are often used to identify individuals with potential UHR or PLEs. However, these face-to-face diagnostic interviews are often time consuming and require extensive training, which would be inefficient in screening for potential PLEs in the general population. Therefore, a stepwise process would be practical and efficient and could initially utilize brief self-reported screening instruments followed by clinical interviews (Savill et al., 2018). Moreover, as many people with mental health problems do not actively seek help (Addington et al., 2002), broader screening programs using self-report questionnaires may be a preferable strategy to identify individuals with potential PLEs who might otherwise delay seeking help.

As mentioned in previous studies, subjective reports tend to overestimate the prevalence of PLEs (Fusar-Poli, 2017), and this tendency would be even higher in non-help seekers than in the clinical population. Kim et al. (2018) and colleagues found that the probability of having a psychosis risk syndrome (validated by the CAARMS) was only 18.1% in non-help-seeking college students by using a positive test cutoff score of 7 on the Korean version of the 16-item Prodromal Questionnaire (Kim et al., 2018). To extend this investigation to the field of PLEs, Moriyama et al. (2019) screened 2241 children and adolescents for PLEs with self-ratings as well as structured interviews. They found 1040 children (46%) reported at least one PLE in the study, but only 364 children had clinically validated PLEs (17%) by CAARMS interviews (Moriyama et al., 2019).

In these studies, there is a group of individuals who report positive PLEs on prodromal questionnaires that are later rejected in the context of clinical interviews (individuals who reported subjective PLEs [sPLEs]). To our knowledge, there is a lack of data characterizing the clinical features of this group of individuals in terms of their suicidal risk compared with those with interview-validated PLEs (those with objectively assessed PLEs [oPLEs]). Other factors, such as childhood trauma, anxiety and depression, have also been identified as risk factors for suicidal ideation (Farabaugh et al., 2012; Kwok & Gu, 2019). These factors should also be taken into consideration when exploring the association between PLEs and suicide.

The present study aimed to investigate the clinical characteristics of sPLEs and oPLEs in non-help-seeking college students and to explore their differential contributions to suicidal ideation.

2 | METHODS

2.1 | Participants and procedure

The data were collected from a convenience sample of undergraduate freshmen at North China University of Science and Technology in November 2018. The study consisted of two stages. In the first stage, all of the first-year students were informed that the purpose of the survey was to understand the general mental health status of college students. Students who voluntarily took part in the anonymous survey completed a battery of online questionnaires by scanning QR codes using the WeChat program during their elective courses. The first stage of the study was approved by the Ethics Committee of North China University of Science and Technology. As personal data (i.e., names) were not collected, informed consent for this part of the study was waived.

The participants received an automatic message via the WeChat program if they scored 9 or higher on the Chinese version of the 16-item Prodromal questionnaire (CPQ-16) and were invited to enter the next stage of the study. In the second stage, the SIPS was administered by psychiatrists from Beijing Anding Hospital. This part of the study was approved by the Clinical Research Ethics Committee of Beijing Anding Hospital. Written informed consent was obtained from all participants for this part.

2.2 | Measures

2.2.1 | The Chinese version of the 16-item Prodromal Questionnaire

The PQ-16 is a self-report scale to screen for participants at high risk of developing psychosis. It originated from the Prodromal Questionnaire (PQ) (Loewy et al., 2005) and was proposed as a shorter version of PQ by Ising in 2012 (Ising et al., 2012).

The reliability and validity of the CPQ-16 was examined by Chen and colleagues in Chinese college students in 2016. The cutoff score of 9 (distress scores) yielded 85% sensitivity and 87% specificity, indicating potential psychosis risk (Chen et al., 2016).

2.2.2 | The Chinese version of the Childhood Trauma Questionnaire-Short Form (CTQ-SF)

The CTQ-SF is a 28-item retrospective self-report questionnaire developed by Bernstein in 2003 (Bernstein et al., 2003) that is widely used to assess childhood trauma occurring before 16 years of age. The questionnaire consists of five subscales, namely, emotional abuse,

physical abuse, sexual abuse, emotional neglect and physical neglect, and the minimization/denial validity scale.

The Chinese version of the CTQ-SF was developed in 2005 and has shown good psychometric properties in different Chinese populations (Fu et al., 2005; Jiang et al., 2018).

2.2.3 | The Generalized Anxiety Disorder Scale-7 (GAD-7)

The GAD-7 is a 7-item anxiety scale developed by Spitzer and colleagues in 2006 (Spitzer et al., 2006). Participants are asked to rate how often they felt bothered by each symptom during the previous half month. The Chinese version of the GAD-7 has been validated in college students, patients and adolescents (He et al., 2010).

2.2.4 | The Patient Health Questionnaire-9 (PHQ-9)

The PHQ-9 is a self-administered scale to assess the severity of depression symptoms in the previous two weeks (Kroenke et al., 2001). All nine items are based on DSM-IV criteria, and for each item, responses range from '0' (not at all) to '3' (nearly every day). The PHQ-9 has been proven to be reliable and valid in both the general population and college students in China (Zhang et al., 2013).

2.2.5 | The Beck Scale for Suicide Ideation (BSI)

BSI is a self-rating inventory based on the Scale for Suicide Ideation (SSI) (Beck et al., 1979). This 19-item scale is used to measure suicidal thoughts in the previous week. The first five items are screening items to identify people with suicidal ideation. The Chinese version of the BSI has shown good reliability and validity in Chinese populations (Li et al., 2010). In this study, the dichotomous variable 'BSI_ideation' was used to mark the presence of suicidal ideation. If participants scored 0 on the first five items, then the BSI_ideation was rated as negative; if participants scored 1 or 2 on any of the five items, then the BSI_ideation was rated as positive.

2.2.6 | Structured Interview of Psychosis-Risk Syndromes

The SIPS is a semi-structured interview that probes the risk of developing psychosis (Miller et al., 2003). In the SIPS, the severity of positive, negative, disorganized and general symptoms is rated with the Scale of Psychosis-risk Symptoms (SOPS). A score of 1-5 on one or more of the P1-P5 scales indicates positive symptoms that are at a nonpsychotic level and thus could be used for the confirmation of self-reported PLEs (Ered & Ellman, 2019). A score ranging from 3 to 5 on these positive symptom scales represents a potential psychosis-

risk syndrome (e.g., attenuated positive symptoms syndrome, APS). The Chinese version of the SIPS has exhibited good reliability and validity in clinical applications, with a Cronbach coefficient of 0.71 (Zhang et al., 2014).

In the present study, the SIPS were administered to confirm the presence of self-reported PLEs, as well as a diagnostic tool to identify ultrahigh-risk individuals (Fusar-Poli et al., 2016). The interrater reliability was good among all raters, with a 0.95 of intra-class correlations of SOPS items averaged by scales.

2.3 | Statistical analyses

The statistical analyses were conducted using the Statistical Package for the Social Sciences (SPSS 23.0). All continuous variables were assessed for normality with one-sample Kolmogorov-Smirnov tests. Comparisons between groups with regard to socio-demographic, personal history and clinical variables were performed using independent sample t-tests, Mann-Whitney U tests, Kruskal-Wallis H tests, Fisher's exact tests and chi-square tests, where appropriate. If the results were significant, post hoc tests were performed, and the Bonferroni adjustment was applied for the critical α .

To investigate the contributions of various PLEs status (oPLEs or sPLEs versus controls) to suicidal ideation, and whether these contributions were independent of depression, anxiety and childhood trauma, univariate and multivariate logistic regression analyses were conducted (Model 1). Suicidal ideation was entered as a binary dependent variable. The status of PLEs was dummy coded as two dummy variables, representing oPLEs and sPLEs, and the control group was set as a reference. In the multivariate logistic regression with the backward LR method, the two dummy variables, PHQ-9, GAD-7 and all four dimensions of the CTQ were entered as independent variables. To directly compare the risks of suicidal ideation between individuals with oPLEs and sPLEs, another univariate logistic regression was conducted (Model 2). In the regression model, suicidal ideation was entered as a binary dependent variable, and PLEs status (oPLEs vs. sPLEs) was entered as the independent variable (sPLEs was set as reference).

A receiver operating characteristic (ROC) curve was generated to calculate the sensitivity and specificity and show the predicted probabilities in the multivariate logistic regression.

A p value $<.05$ was set to be statistically significant, and all tests were two tailed.

3 | RESULTS

3.1 | Prevalence of PLEs and UHR in first-year students

After excluding students with missing data on the CPQ-16 ($N = 35$), data for 8367 students were available for analyses. There were

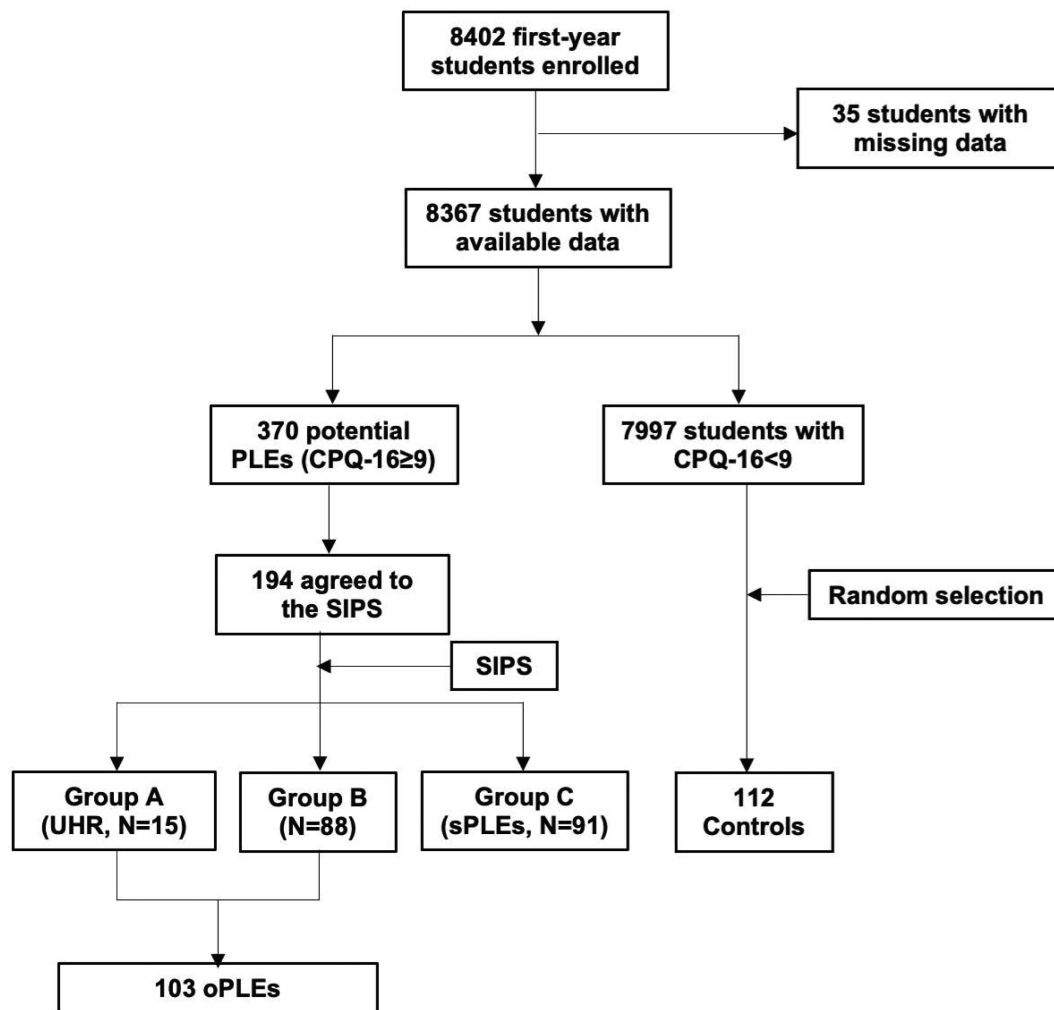


FIGURE 1 Flow of participants' inclusion. CPQ-16, The Chinese version of 16-item Prodromal Questionnaire; oPLEs, Objective psychosis-like experiences; PLEs, psychosis-like experiences; sPLEs, subjective psychosis-like experiences; UHR, ultrahigh-risk for psychosis. Group B includes students who scored 1–5 on any positive symptom scale of the SOPS but did not fulfil the UHR criteria due to either intensity or frequency below the threshold

370 students who scored at 9 or higher on the CPQ-16 (4.42%) and were categorized as individuals with potential PLEs. Among these individuals with potential PLEs, 194 (52.43%) voluntarily took part in the SIPS. The socio-demographic and clinical characteristics were not significantly different between the individuals who did and did not take part in the SIPS (Supplementary Table 1). They were divided into three groups based on SIPS scores (Figure 1): group A included 15 students who met the criteria of UHR; group B included 88 students who scored 1–5 on any positive symptom scale of the SOPS but did not fulfil the UHR criteria due to either intensity or frequency below the threshold; and group C, in which 91 students scored 0 on all positive symptom scales (categorized as individuals with sPLEs). Considering that the sample size of group A was too small for further analyses and that group A and group B both had objectively assessed PLEs, we combined group A and group B into a single group (categorized as individuals with oPLEs).

To provide more insight into the differences between the subjective and objective assessments, we compared the individual items on

the CPQ-16 and the most likely corresponding questions in the SIPS/SOPS (Supplementary Table 2). Every item was endorsed by a certain number of students in both groups. The percentages of endorsements on each item of the PQ-16 were compared between those with oPLEs and sPLEs, but no difference was found on any of these items (Supplementary Table 3).

3.2 | Comparisons between groups

One hundred and twelve students with a CPQ-16 score lower than 9 were randomly selected and formed the control group (non-PLEs). Pairwise comparisons with Bonferroni adjustment revealed that scores were higher on the BSI ideation, BSI tendency, PHQ-9, GAD-7, CTQ emotional abuse, CTQ physical abuse, CTQ emotional neglect and CTQ physical neglect subscales in those with oPLEs than those in the control group. Compared to individuals reporting sPLEs, those with oPLEs were more likely to have suicidal ideation

and higher scores on the emotional abuse and emotional neglect subscales (Table 1).

emotional abuse, emotional neglect and physical neglect subscales of the CTQ-SF (Table 2).

3.3 | Correlation analyses between suicidal ideation, clinical characteristics and childhood trauma

In the whole sample, Spearman's correlation analyses indicated that suicidal ideation was positively correlated with suicidal tendency, scores on the PHQ-9, GAD-7 and CPQ-16, and scores on the

3.4 | Exploring independent predictors of suicidal ideation

In the univariate logistic analyses where the control group was set as reference (Model 1), the oPLEs status, sPLEs status, GAD-7 scores and PHQ-9 scores were all found to be significantly correlated with

TABLE 1 Demographic, family and personal history and clinical characteristics in oPLEs, sPLEs and the control group

	oPLEs (N = 103)	sPLEs (N = 91)	Controls (N = 112)	Comparisons between three groups		Post-hoc analyses					
						oPLEs/controls		oPLEs/sPLEs		sPLEs/controls	
						x ² /F/Z	p value	x ² /F/Z	p value	x ² /F/Z	p value
Age ^a	18.32 (0.79)	18.35 (0.95)	18.32 (0.60)	0.32	.85	-	-	-	-	-	-
Female (%)	46.00 (44.70)	44.00 (48.40)	52.00 (46.40)	0.27	.88	-	-	-	-	-	-
Family history (%)	3.00 (2.90)	3.00 (3.30)	0.00 (0.00)	3.93	.12	-	-	-	-	-	-
BSI_ideation (%)	43.00 (41.70)	24.00 (26.70)	8.00 (7.10)	34.95	<.001	35.51	<.001	4.82	.03	14.27	<.001
BSI_tendency ^a	6.77 (7.81)	5.78 (6.58)	1.99 (4.73)	33.94	<.001	-5.54	<.001	-1.05	.88	-4.72	<.001
CPQ-16	13.44 (5.26)	12.44 (4.22)	1.13 (1.68)	216.32	<.001	-12.82	<.001	-1.57	.35	-12.44	<.001
PHQ-9 ^a	10.52 (4.18)	9.38 (3.88)	3.48 (3.36)	140.45	<.001	-10.56	<.001	-2.10	.11	-9.49	<.001
GAD-7 ^a	8.86 (4.65)	8.11 (3.82)	2.25 (2.98)	138.54	<.001	-10.32	<.001	-1.03	.92	-9.82	<.001
CTQea ^a	7.79 (2.72)	6.43 (1.95)	6.31 (2.00)	26.98	<.001	-4.79	<.001	-3.97	<.001	-0.93	1.00
CTQpa ^a	6.18 (2.26)	5.48 (1.06)	5.49 (1.82)	18.13	<.001	-4.17	<.001	-1.95	.15	-2.51	.04
CTQsa ^a	5.54 (1.70)	5.41 (1.08)	5.49 (1.62)	1.06	.59	-	-	-	-	-	-
CTQen ^a	11.03 (3.62)	9.67 (3.13)	9.79 (4.56)	11.78	.003	-3.03	.006	-2.86	.01	-0.63	1.000
CTQpn ^a	8.97 (2.74)	8.25 (2.53)	7.56 (2.93)	18.69	<.001	-4.20	<.001	-2.15	.09	-2.27	.07

Abbreviations: BSI_ideation, suicidal ideation; BSI_tendency, suicidal tendency; CPQ-16, The Chinese version of 16-item Prodromal Questionnaire; CTQea, Emotional Abuse Subscale; CTQen, Emotional Neglect Subscale; CTQpa, Physical Abuse Subscale; CTQpn, Physical Neglect Subscale; CTQsa, Sexual Abuse Subscale; GAD-7, Generalized Anxiety Disorder 7-item scale; oPLEs, individuals with objectively elicited psychosis-like experiences; PHQ-9, The Patient Health Questionnaire 9-item depression module; sPLEs, individuals with subjectively reported psychosis-like experiences.

^aData are presented as mean (SD).

TABLE 2 Bivariate correlation matrix of CPQ-16, clinical characteristics and childhood trauma measures (N = 306)

Measure	BSI_ideation	BSI_tendency	Age	Sex	CPQ-16	PHQ-9	GAD-7	CTQea	CTQpa	CTQsa	CTQen
BSI_tendency	0.539 ^a										
Age	0.014	-0.023									
Sex	-0.051	-0.159 ^a	0.128 ^b								
CPQ-16	0.363 ^b	0.390 ^a	-0.082	-0.040							
PHQ-9	0.371 ^a	0.435 ^a	-0.046	-0.087	0.707 ^a						
GAD-7	0.328 ^a	0.366 ^a	-0.060	-0.085	0.721	0.793 ^a					
CTQea	0.136 ^b	0.149 ^a	-0.005	-0.100	0.252 ^a	0.245 ^a	0.199 ^a				
CTQpa	0.088	0.168 ^a	-0.074	0.001	0.244 ^a	0.217 ^a	0.164 ^a	0.525 ^a			
CTQsa	-0.027	-0.038	0.047	0.032	0.059	0.079	0.021	0.358 ^a	0.424 ^a		
CTQen	0.125 ^b	0.148 ^a	0.007	0.000	0.141 ^b	0.170 ^a	0.144 ^b	0.303 ^a	0.352 ^a	0.117 ^b	
CTQpn	0.120 ^b	0.099	-0.001	0.082	0.203 ^a	0.211 ^a	0.185 ^a	0.393 ^a	0.379 ^a	0.255 ^a	0.545 ^a

Abbreviations: BSI_ideation, suicidal ideation; BSI_tendency, suicidal tendency; CPQ-16, The Chinese version of 16-item Prodromal Questionnaire; CTQea, Emotional Abuse Subscale; CTQen, Emotional Neglect Subscale; CTQpa, Physical Abuse Subscale; CTQpn, Physical Neglect Subscale; CTQsa, Sexual Abuse Subscale; GAD-7, Generalized Anxiety Disorder 7-item scale; PHQ-9, The Patient Health Questionnaire 9-item depression module.

^aCorrelation is significant at the 0.01 level (2-tailed).

^bCorrelation is significant at the 0.05 level (2-tailed).

TABLE 3 Univariate and multivariate logistic regression models to predict suicidal ideation (N = 306)

Variable	Reference	Odds ratio	Univariate		Odds ratio	Multivariate	
			95% CI	p value		95% CI	p value
Model 1							
Age		0.998	0.712–1.398	.989			
Sex		0.790	0.469–1.331	.375			
oPLEs (dummy #1)	Controls	9.317	4.108–21.129	.000	3.441	1.332–8.890	.011
sPLEs (dummy #2)	Controls	4.727	2.005–11.144	.000	2.277	0.878–5.907	.091
GAD-7		1.189	1.121–1.261	.000			
PHQ-9		1.212	1.138–1.290	.000	1.146	1.064–1.235	<.001
CTQea		1.103	0.995–1.223	.063			
CTQpa		1.057	0.926–1.208	.412			
CTQsa		1.059	0.900–1.245	.491			
CTQen		1.066	0.999–1.137	.052			
CTQpn		1.081	0.986–1.185	.099			
Model 2							
oPLEs	sPLEs	1.971	1.071–3.626	.029			

Abbreviations: BSI_ideation, suicidal ideation; BSI_tendency, suicidal tendency; CTQea, Emotional Abuse Subscale; CTQen, Emotional Neglect Subscale; CTQpa, Physical Abuse Subscale; CTQpn, Physical Neglect Subscale; CTQsa, Sexual Abuse Subscale; GAD-7, Generalized Anxiety Disorder 7-item scale; oPLEs, individuals with objectively elicited psychosis-like experiences; PHQ-9, The Patient Health Questionnaire 9-item depression module; sPLEs, individuals with subjectively reported psychosis-like experiences.

suicidal ideation. In the univariate logistic regression where the sPLEs status was set as reference (Model 2), the oPLEs status was found to be associated with a two times risk of suicidal ideation compared to sPLEs status (OR = 1.971, $p = .029$, 95% CI: 1.071–3.626). The results of the multivariate logistic regression revealed that PHQ-9 scores (OR = 1.146, $p < .001$, 95% CI: 1.064–1.235) and oPLE status (OR = 3.441, $p = .011$, 95% CI: 1.332–8.890) independently predicted suicidal ideation, while sPLE status (OR = 2.277, $p = .091$, 95% CI: 0.878–5.907) was no longer a statistically significant predictor of suicidal ideation after depression, anxiety and childhood trauma were controlled for (Table 3). For those reporting sPLEs, PHQ-9 scores became the only predictor for suicidal ideation.

Figure 2 presents the ROC curve for the predicted probabilities from the final model of the regression analysis. The area under the ROC curve was estimated to be 0.766 ($p < .001$, 95% CI: 0.707–0.825), with a sensitivity of 74.7% and a specificity of 67.0%, indicating that the overall accuracy of the final model to predict suicidal ideation was acceptable.

4 | DISCUSSION

The present study demonstrated that PLEs were prevalent in 4.42% of first-year college students based on a subjective prodromal questionnaire (CPQ-16 scores of 9 or higher). However, the rate of interview-invalid PLEs (sPLEs) was high (46.9%). Our findings have confirmed the hypothesis that oPLEs and sPLEs differentially contribute to suicidal ideation. Individuals with oPLEs were two times more likely to have suicidal ideation than those with sPLEs. Furthermore,

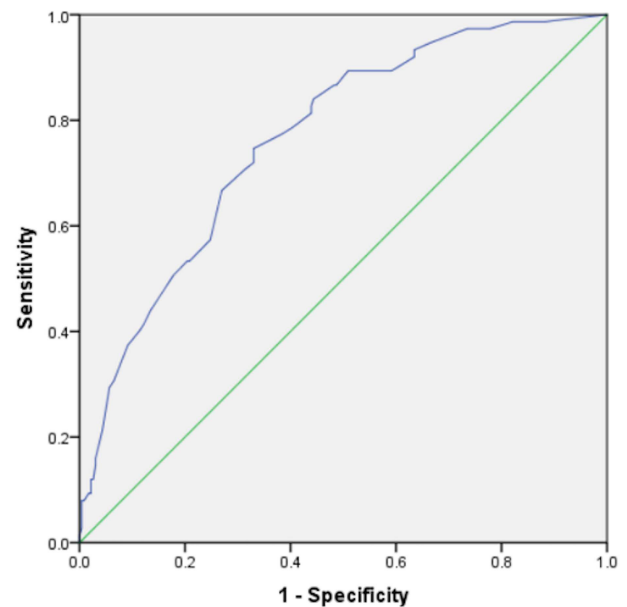


FIGURE 2 Receiver operating characteristic (ROC) curves for the model of final model predicting suicidal ideation. The area under the ROC curve was estimated to be 0.766 ($p < .001$, 95% CI 0.707–0.825)

oPLEs was independent of depression, anxiety, and the influence of childhood adversities.

PLEs have been reported in approximately 5% of the general population (van Os et al., 2009). As the conversion rate to psychosis is very low in the non-help-seeking population compared with the clinical population (Fusar-Poli, 2017; Fusar-Poli et al., 2015; Fusar-Poli &

Schultze-Lutter, 2016), it would then be more useful to change the primary goal of early intervention in this population to prevent adverse consequences caused by subclinical psychotic symptoms (e.g., suicide). In the present study, univariate analyses indicated that there was a dose–response difference in the severity of suicidal ideation across three categories, such that those with oPLEs (41.7%) > those with sPLEs (26.7%) > controls (7.1%). However, sPLEs status was no longer significantly associated with higher suicidal ideation after depression, anxiety and childhood trauma were controlled for in the multivariate logistic regression. As Levey et al. (2018) pointed out, some of the items on the PQ-16 may also reflect a feeling of depression rather than psychotic experience for some individuals. For instance, Item #1 (I feel uninterested in the things I used to enjoy.) describes the feeling of anhedonia, which could be either a manifestation of depression or a negative symptom. Therefore, the contribution of sPLEs to suicidal ideation could possibly be attributed to the effects of comorbid depression.

A growing body of evidence has shown that childhood trauma is related to higher suicidal ideation (Clements-Nolle et al., 2018; Jeon et al., 2009). Additionally, different studies, including cross-sectional surveys and meta-analyses, have suggested that childhood adversities were associated with the severity of PLEs (Fisher et al., 2013; Gibson et al., 2016; Schreier et al., 2009). In our study, emotional abuse, emotional neglect and physical neglect scores were positively correlated with suicidal ideation in the correlation analyses. However, multivariate analyses indicated that childhood trauma was not an independent risk factor for suicidal ideation when depression and PLEs status were controlled for. One possible explanation is that the association between childhood trauma and suicidal ideation is mediated by the presence of depression and/or PLEs.

The strengths of the study include a relatively large sample size that comprised individuals with various PLEs statuses, such as those with oPLEs (including individuals with UHR), those reporting sPLEs, and controls. However, the results should be interpreted with caution due to potential methodological limitations. First, 370 individuals scored above the threshold on the CPQ-16, but only approximately half of them (N = 194) completed the diagnostic interview associated with the SIPS, which may have introduced potential bias. Nevertheless, the socio-demographic characteristics and CPQ-16 total scores were comparable between the two groups of individuals, suggesting that the representativeness of those who completed the SIPS was acceptable. Second, the participants were all first-year college students who had relatively high cognitive and functioning levels, which limits the generalizability of the findings to other populations. Third, the cross-sectional design could not explore the longitudinal trajectory of PLEs or the dynamic interaction between the severity of PLEs, depression, anxiety and suicidal ideation. Fourth, although oPLEs survived the multivariate logistic regression as a statistically significant predictor, the wide confidence interval indicated a less precise estimate of the odd ratios. Studies with larger sample sizes are required to enable more precise population estimates in the future.

In conclusion, the major finding of this study is that oPLEs and sPLEs have differential contributions to suicidal ideation. OPLEs seems to be associated with a higher risk of suicidal ideation compared to sPLEs and is independent of depression, anxiety, and the influence of childhood adversities. The finding has potential clinical implications. By providing a more detailed clinical characterization of PLEs, the study shed light on the different characteristics between sPLEs and oPLEs and their differential roles in increasing suicidal risks, which would lend support to the future development of individualized suicidal prevention strategies for college students with PLEs.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

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