RESEARCH ARTICLE

Psychometric properties of the brief self-report questionnaire for screening putative pre-psychotic states and validation of clinical utility in young adult

Shih-Kuang Chiang1*, Pei-Ti Chen2, Chen-Chung Liu3

1 Department of Counselling and Clinical Psychology, National Dong Hwa University, Hualien County, Taiwan, 2 Department of Psychiatry, Kaohsiung Municipal Kai-Syuan Psychiatric Hospital, Kaohsiung City, Taiwan, 3 Department of Psychiatry, National Taiwan University Hospital and College of Medicine, Taipei City, Taiwan

* skchiang@gms.ndhu.edu.tw

Abstract

Introduction

The Brief Self-Report Questionnaire for Screening Putative Pre-Psychotic States (BQSPS), a brief, self-reported screening tool for risk of psychosis, can detect auditory perceptual disturbances significantly associated with perceived need for psychological services among young adults. However, the relationship is largely explained by the existence of neurotic traits, anxiety and depression symptoms.

Objective

This study explores possible explanations of previous results from factor structures of the BQSPS and the clinical implications underlying each factor.

Methods

Construct validity, criterion-related validity, discriminant validity, internal consistency, and test-retest reliability of the BQSPS are determined among young adults (N = 289).

Results

We find that Social Anxiety, Positive Symptoms, and Negative Symptoms are three components in the BQSPS for young adults. Moreover, we find that each component of the BQSPS can be explained by related forms of psychopathology, self-esteem, or personality traits. Finally, the BQSPS can satisfactorily distinguish cases from non-cases using the Symptoms Check List-90-Revised.

Conclusions

We clarify the clinical implications of each component of the BQSPS and thus expand its clinical utility. The BQSPS has good psychometric properties in young adults from
Introduction

The peak onset for many mental health disorders is young adulthood [1], with the first onset by 25 years of age for 75% of those who will have a mental health disorder [2]. Mental health problems are prevalent among college students, with anxiety disorders being their most common psychiatric problem [3]. Depression is also frequently seen in this population [4], as are various psychotic symptoms [1]. These issues can be related to stressors for college students, including academic load, first-time working, being in a committed personal relationship, and living with others from different cultures and belief systems [5]. Many college students may experience the persistence, increase, or the first onset of mental health and substance use problems [1].

Therefore, developing strategies to identify individuals at high risk of clinical first-episode psychosis is a significant current goal for psychiatric services worldwide [6], especially for young adults. These strategies focus on the early detection of subjects who show only subthreshold symptoms, including positive and negative symptoms or functional difficulties appearing in the prodrome phase of psychosis [7]. Measures for the early detection of people at risk of psychosis have been created and tested during the last two decades [8]. As part of this strategy, the Brief Self-Report Questionnaire for Screening Putative Pre-Psychotic States (BQSPS) was developed [9], with confirmed reliability and validity [8, 10].

The BQSPS targets early and extensive at-risk mental states characterized by subtle symptoms and functional impairments, and it is unlike other questionnaires developed to improve the predictive validity for transition to psychosis [11]. Moreover, in addition to evaluating attenuated positive symptoms, like most screening questionnaires [12], the BQSPS also includes other subthreshold clinical manifestations. Liu et al. suggested two cutoff selections of the BQSPS: (a) respondents checking at least eight items, or (b) those checking three to seven items, including any of three specific items. These two criteria could obtain the largest sensitivity+specificity (0.784+0.705 = 1.489). It has construct validity and can reliably distinguish between clinical and non-clinical samples [9]. Psychometric properties of the BQSPS studies have been verified by two studies. Demmin et al. found moderate to large convergent validity, acceptable internal consistency for each scale, and modest test-retest reliability, recommending its usage for screening psychotic-like experience in college populations [10]. Similarly, Nunez et al. found a stable structure of three correlated factors: social anxiety (SA), negative symptoms (NS), and positive symptoms (PS) in adolescent and young adult subjects [8]. This three-factor model also had the predictive ability for suicidality as an external criterion.

An individual’s personality is increasingly recognized as affecting the possibility of psychopathological developments [13]. For example, self-esteem can substantially affect how psychotic symptoms are formed and maintained, as well as recovery from the illness [14]. In particular, low self-esteem may be both a causative factor and a result of a severe mental disorder [15]. This connection is supported by the twin study of Macare et al., which found substantial genetic overlap between schizotypy and neuroticism [16], and the finding of Goodwin et al. that early neuroticism appearing in adolescence may indicate the later development of psychotic symptoms in adulthood [17]. Longitudinal studies have shown both that
neuroticism can increase the risk of psychotic symptoms [18], and conversely that extraversion can help to avoid or mitigate depression and social anxiety [19].

The Symptom Checklist-90-R (SCL-90-R) is a self-rating-scale for assessing general psychopathology and specific symptoms [20], used to distinguish potential psychosis-like pathology as a short screening tool for pre-psychotic states [21]. It has been used as a valid indicator of prodromal episodes [22] and successfully detected a disposition to psychosis [23], by now being a standard measure for susceptibility to psychosis [24].

Since there is a recognized need for developing shorter questionnaires with robust psychometric properties [12, 25] the current study uses exploratory factor analyses to examine the internal structure of the BQSPS and compares the results with Nunez et al. [8]. We then test associations between the BQSPS and related criteria to determine their contributions to the explained variance of the BQSPS. In addition, we use receiver operating characteristic (ROC) analysis to investigate the discrimination of the BQSPS in a young adult population and compare the results with Müller et al. [21]. Finally, we also examine the internal constancy and test-retest reliability of the BQSPS and compare them with Demmin et al. [10].

Materials and methods

Procedure

The Institutional Review Board of Yuli Hospital approved this study (Approval number: YLH-IRB-10502). We had obtained permission from the original copyright holder of the BQSPS before this study began. All participants (N = 289) completed an informed consent procedure and the BQSPS. A subsample (N = 219) also completed the Rosenberg Self-Esteem Scale, Eysenck Personality Questionnaire, and the SCL-90-R at this time. A subsample of the first subsample (N = 70) completed the BQSPS again, two weeks after the first administration.

Participants

We recruited the subjects by stratified random sampling. There were 300 undergraduate students from a representative university in eastern Taiwan who participated in this study. The students represented a wide range of faculties, including Chinese, English, Clinical and Counseling Psychology, Chemistry, Life Science, Electrical Engineering, Computer Science & Information Engineering, Business Administration, Finance, Accounting, Tourism Recreation & Leisure Study, Educational Administration and Management, Special Education, Physical Education and Kinesiology, Music, Art & Design. We eliminated 11 responses due to incomplete answers, leaving 289 participants who participated in the following analysis. There were 107 men (37%) and 182 women, whose ages ranged from 19 to 23 years, with a mean of 20.65 (SD = 0.89). Their education ranged from 13 to 17 years, with a mean of 14.65 (SD = 0.89). We used data from the sample to explore the construct validity and internal consistency of the BQSPS. A subsample by simple random sampling (N = 70) was used to assess the test-retest reliability of the BQSPS. The remaining subjects (N = 219) were used to test the criterion-related validity and discriminant validity of the BQSPS.

Measures

Rosenberg Self-Esteem Scale (RSES). Rosenberg developed the original Rosenberg Self-Esteem Scale (RSES) [26], which contains ten items, each with a 4-point scale from 1, strongly disagree, to 4, strongly agree. A higher score means that the subject has higher self-esteem. The Chinese version of the RESR also showed good Cronbach’s α (= .85) [27] and construct
validity [28]. In the current study, we used the Chinese version of the RSES to explore the criterion-related validity of the BQSPS by measuring participants’ self-esteem.

**Eysenck Personality Questionnaire (EPQ).** Eysenck and Eysenck developed the original Eysenck Personality Questionnaire (EPQ) [29]. The original EQS contains five subscales, including psychoticism, extraversion, neuroticism, and lying, a total of 90 items. Lu (1995) developed a Chinese short-form version of the EQS [30] with good Cronbach’s $\alpha$ ($= .90$) and construct validity [31]. It contains 25 items that pertain to either neuroticism or extraversion factors. In this study, the Chinese short-form version of the EQS was used to explore the criterion-related validity of the BQSPS by measuring participants’ neuroticism and extraversion.

**The Symptom Checklist-90-R (SCL-90-R).** The English version of the Symptom Checklist-90 (SCL-90) was created by Derogatis [20] and was revised to SCL-90-R [32]. The original SCL-90-R contains 90 items, and each item has a 5-point scale from 0, which means no symptoms, to 4, which means strong symptoms. The original SCL-90-R had good psychometric properties [33, 34]. Yeh’s Chinese version SCL-90-R also had good psychometric characteristics and norms [35]. Cronbach’s $\alpha$ and test-retest reliability of nine symptom dimensions ranged from .77 to .90 and .70 to .93. The original SCL-90-R included nine symptom dimensions: somatization, obsessive-compulsion, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. These symptoms could be calculated into three indexes: the Global Severity Index (GSI), the Positive Symptom Distress Index (PSDI), and the Positive Symptom Total (PST). A T score for the GSI above 63 points, or the T score of any two symptoms dimension above 63 points, generally indicates a significant clinical psychological problem [36]. The current study uses the Chinese version of the SCL-90-R to explore the criterion-related validity of the BQSPS by measuring participants’ symptoms and severity.

**The Putative Pre-Psychotic State Scale (BQPS).** Liu et al. developed the Putative Pre-Psychotic State Scale (BQPS) [9]. The BQPS contains 15 items, with each item answered using “yes” or “no” to minimize the response burden. A “yes” indicates an affirmative response to the item of a deviant experience. In this study, we used the BQPS to analyze its construct validity, criterion-related validity, discriminant validity, internal consistency, and test-retest reliability.

**Statistical analyses**

Independent sample t-test analysis, exploratory factor analysis, Pearson correlation analysis, stepwise regression analysis, internal consistency analysis, test-retest reliability analysis, and ROC analysis used the Statistical Package for the Social Sciences (SPSS), version 14.

**Results**

Because the test sample was found to have good sampling properties ($KMO = .80$; Bartlett’s test, $p < .001$), we adopted principal component analysis with an oblique factor rotation. The scree plot and eigenvalues from the initial factor extraction indicated that a three-component solution explained 45.51% of the variance. According to Tabachnick & Fidell, using an alpha level of .01 (two-tailed), a rotated factor loading for a sample size of at least 300 would need to be at least .32 to be considered statistically meaningful [37]. In this study, we retain an item base on its factor loading at least .40.

Table 1 shows that item 7 had loading (< .40) on component 1. But item 7 had the highest loading (.40) on component 2. After adding item 7 into component 2, Cronbach’s alpha improved from .59 to .60. Therefore, we attributed item 7 to component 2. Finally, component 1 has six items, component 2 has five items, and component 3 has four items. The first
Table 1. Exploratory factor analysis of the putative pre-psychotic states scale.

| Item number and abbreviated wording | Component 1 | Component 2 | Component 3 |
|------------------------------------|-------------|-------------|-------------|
| 12. I am poor at returning social courtesies and gestures. (SA) | .72<sup>b</sup> | -.14 | -.04 |
| 5. I am mostly quiet when with others. (SA) | .69<sup>b</sup> | -.04 | .01 |
| 1. I cannot deal with the pressures associated with crowds. (SA) | .64<sup>b</sup> | .12 | .00 |
| 11. I do not have an expressive and lively way of speaking. (SA) | .60<sup>b</sup> | .08 | .08 |
| 8. I feel nervous when giving a speech in front of a large group of people. (SA) | .58<sup>b</sup> | -.02 | -.08 |
| 2. I feel I cannot get close to people. (SA) | .48<sup>b</sup> | .03 | -.39 |
| 14. Do you often pick up hidden threats or put downs from the words or actions of others? (PS) | .12 | .72<sup>b</sup> | -.04 |
| 6. I sometimes become concerned about the loyalty and trustworthiness of friends or coworkers. (PS) | .02 | .70<sup>b</sup> | -.06 |
| 13. When you see people talking to each other, do you often wonder if they are talking about you? (PS) | .06 | .62<sup>b</sup> | .01 |
| 15. Do you hear some sounds, voices, or calls of your name when nobody is around you? (PS) | -.21 | .55<sup>b</sup> | -.01 |
| 7. I tend to keep my feelings to myself. (SA) | .33 | .40<sup>b</sup> | .01 |
| 4. I feel mentally insufficient and easily fatigued while thinking or reading. (NS) | -.14 | -.00 | -.80<sup>b</sup> |
| 9. I cannot focus on a task and need to take frequent breaks while working (studying). (NS) | -.05 | -.01 | -.70<sup>b</sup> |
| 3. I feel lethargic whatever I do. (NS) | .05 | .06 | -.70<sup>b</sup> |
| 10. I always mess up whatever I do. (NS) | .18 | .03 | -.62<sup>b</sup> |

Variance explained (%): 22.98 10.68 9.85

Note. SA = Social Anxiety; PS = Positive Symptoms; NS = Negative Symptoms.

*Component 1 = Social Anxiety; Component 2 = Positive Symptoms; Component 3 = Negative Symptoms

Item has a high loading on the corresponding component.

https://doi.org/10.1371/journal.pone.0251915.t001

The first component is composed of six items from the Social Anxiety Scale of Núñez et al. [8]. The item loadings range from .48 to .72, while the component explains 24.98% of the total variance. The second component is composed of four items from the Positive Symptoms Scale, with one item from the Social Anxiety Scale of Núñez et al. The range of item loadings is from .40 to .72, and the component explains 10.68% of the total variance. Four items of the Negative Symptoms Scale from Núñez et al. had high loading on the third component. The item loadings ranged from .62 to .80, with the component explaining 9.85% of the total variance. The components structure and contents of each component are very similar to Núñez et al.

Table 2 shows the Pearson correlations between scores on the three BQPS components and scores on the two other instruments (the RSES and the EPQ), with the SCL-90-R in the first sample subgroup (N = 219). As predicted, scores on three components and the total scale of the BQPS were negatively and significantly associated with scores on the RESE and Eysenck-Extraversion Subscale, confirming the criterion-related validity of the BQPS. Also consistent with predictions, scores on three components and the total scale of the BQPS were positively and strongly associated with scores on the Eysenck-Neuroticism Subscale. Table 3 shows that scores on three components and the total scale of the BQPS were positively and significantly associated with scores on all the symptom dimensions of the SCL-90-R.

In the current study, we executed a stepwise regression analysis in two stages. First, we predicted three components of the BQPS by using symptoms dimensions of the SCL-90-R as predictors. We further added self-esteem, extraversion, neuroticism, and predicted three
components of the BQPS again. Table 3 shows that variance was explained for the two models of each component of the BQPS and their beta values.

First, we use a ROC analysis to test the utility of criterion (a). The results show that the best cut-off score is above 7.5 scores with .87 of the area under the curve (AUC) (95% CI:.80-.93) (p < .001). The sensitivity and specificity are .80 and 81, respectively. We concurrently compared

### Table 2. Pearson correlations between scores on the putative pre-psychotic states scale and other psychological measures, and SCL-90-R (subgroup of first sample).

| External measures               | Social Anxiety | Positive Symptoms | Negative Symptoms | Total   |
|--------------------------------|----------------|-------------------|-------------------|---------|
|                                | Beta           | Beta              | Beta              | Beta    |
| RSES                           | -.47***        | -.39***           | -.52***           | -.61*** |
| Eysenck-Extraversion Subscale   | -.71***        | -1.17             | -.20**            | -.52*** |
| Eysenck-Neuroticism Subscale    | .44***         | .53***            | .55***            | .66***  |
| SCL-90-R                        |                |                   |                   |         |
| Somatization                   | .23**          | .39***            | .37***            | .43***  |
| Obsessive-Compulsive           | .39***         | .46***            | .63***            | .63***  |
| Interpersonal Sensitivity      | .44***         | .60***            | .58***            | .70***  |
| Depression                     | .38***         | .51***            | .66***            | .66***  |
| Anxiety                        | .35***         | .46***            | .54***            | .58***  |
| Hostility                      | .21**          | .51***            | .49***            | .51***  |
| Phobic Anxiety                 | .34***         | .46***            | .45***            | .54***  |
| Paranoid Ideation              | .29***         | .63***            | .43***            | .57***  |
| Psychoticism                   | .32***         | .56***            | .50***            | .59***  |

*p < .05, **p < .01, ***p < .001

https://doi.org/10.1371/journal.pone.0251915.t002

Table 3. Stepwise regression analysis of components of the putative pre-psychotic states scale.

| Predictor                     | Social Anxiety | Positive Symptoms | Negative Symptoms |
|-------------------------------|----------------|-------------------|-------------------|
|                               | Model 1      | Model 2      | Model 1      | Model 2      | Model 1      | Model 2      |
| SCL-90-R                      | Beta          | Beta          | Beta          | Beta          | Beta          | Beta          |
| Somatization                  | -.02         | .03          | -.03         | .01          | -.14         | -.08         |
| Obsessive-Compulsive          | .23*         | .08          | -.15         | -.27**       | .30**        | .23*         |
| Interpersonal Sensitivity     | .46***        | .29***       | .30***       | .32**        | .16          | .08          |
| Depression                    | .14          | .07          | -.11         | -.10         | .54***       | .42***       |
| Anxiety                       | .05          | .04          | -.15         | -.15         | -.06         | -.08         |
| Hostility                     | -.29**       | -.15*        | .05          | .08          | -.05         | -.04         |
| Phobic Anxiety                | .10          | .01          | -.03         | -.08         | .01          | -.03         |
| Paranoid Ideation             | -.07         | -.02         | .40***       | .42***       | -.18*        | -.18*        |
| Psychoticism                  | -.06         | .04          | .003         | .07          | -.07         | -.05         |
| Self-Esteem                   |              | -.09         | -.07         | -.20*        |
| Extraversion                  | -.60***      |              | -.02         | .02          |
| Neuroticism                   |              | .21***       | .30***       | .14*         |
| R²                             | .23          | .61          | .43          | .49          |

*p < .05, **p < .01, ***p < .001

https://doi.org/10.1371/journal.pone.0251915.t003
the results of the ROC analysis of SA, PS, NS with BQSPS (see Table 4 and Fig 1). The results support that criterion (a) is appropriate for the sample in the current study. Second, we compare the utility of criterion (a), criterion (b), and the combination of these two by Chi-Square analysis. Table 5 shows that using criterion (a) has the largest value of sensitivity + specificity. It is noteworthy that using the combined criteria could yield the highest sensitivity to the most significant false-positive and the fewest false negatives.

As shown in Table 6, Cronbach’s alpha for the BQSPS and its components ranged from .60 to .78 for the main sample in the study. This suggests that internal consistency for the BQSPS varies from acceptable to good. Table 6 also shows the 2-week test-retest reliability, whose values ranged from $r = .67$ to $r = .82$.

**Discussion**

In the current study, we found that there were three components in our sample. The contents of each component were almost the same as the previous study [8], except that item 7 was moved from social anxiety to positive symptoms. However, because item 7 had a high positive correlation with PS and paranoid ideation, neuroticism and interpersonal sensitivity had larger impacts on PS. Item 7 might reflect a person’s behavioural results derived from his paranoid ideation, neuroticism, or interpersonal sensitivity. This verifies that a stable three-component structure of the BQSPS exists in a normal young population across language. We followed Cohen’s suggestion to interpret a correlation of .1 as small, .3 as moderate, and .5 as large [38]. As expected, relationships with convergent scales, including neuroticism and all symptoms dimensions, ranged from small to large. Also, relationships with discriminant scales, including self-esteem and extraversion, ranged from small to large. This demonstrates that the BQSPS has good criterion-related validities that fit the theoretical psychological expectations. The results are comparable to a previous study using established psychosis screens and un-associated questionnaires to determine construct validity of the BQSPS [10].

We also found some selected criteria contributing to the explained variance on SA, PS, NS. First, extraversion, interpersonal sensitivity, neuroticism, and hostility had significant impacts on SA. Together, they explain 61% of the variance of SA. We note that personality dimensions had significantly larger impacts than symptom dimensions on SA. We found that extraversion was protective against social anxiety, as in a previous study [19]. Second, paranoid ideation, interpersonal sensitivity, neuroticism, and obsessive-compulsion had significant impacts on PS. Together, they can explain the 49% variance of PS. Previous review studies consistently found that paranoia is associated with more negative conscious self-concepts [39, 40]. Our data also supported that finding ($r = -.38, \ p < .001$). Third, depression, obsessive-compulsion, self-esteem, paranoid ideation, and neuroticism had significant impacts on NS. Together, they can explain 52% of the variance of NS. NS addresses four items referring to feelings of tiredness, lethargy and concentration difficulty. These descriptions are similar to some of the symptoms of a depression episode. Our findings showed that there was a strong association between

![Table 4. Results of ROC analysis of BQSPS and subscales.](https://doi.org/10.1371/journal.pone.0251915.t004)

| Scale | AUC(95% CI) | Best cutoff | Sensitivity | Specificity |
|-------|-------------|-------------|-------------|-------------|
| SA    | .72 (.63, .82) | ≥ 3.5 | .55 | .827 |
| PS    | .79 (.71, .87) | ≥ 1.5 | .825 | .659 |
| NS    | .82 (.74, .89) | ≥ 2.5 | .75 | .765 |
| BQSPS | .87 (.80, .93) | ≥ 7.5 | .80 | .81 |

https://doi.org/10.1371/journal.pone.0251915.t004
depression and NS. Finally, we found that neuroticism had a pervasive impact on SA, PS, NS. In summary, the BQPS can reflect some important predictors for psychopathology. We used the SCL-90-R to differentiate our sample into the two groups of psychological distress and no-distress. ROC analysis showed that SA (.72), PS (.79), NS (.82), and BQPS (.87) had acceptable to excellent discriminant validities. The BQPS had the highest AUC by using the cut-off in Liu et al. [9]. We also found that combining two screening criteria in Liu et al.’s study could increase the sensitivity of the BQPS to .95. We compared the results with Müller et al. [21]. Müller et al. developed a new screening tool (Self-screen-Prodrome, SPro) to differentiate cases and non-cases, using the SCL-90-R-subscales of psychoticism [PSYC] and

![ROC Curves](https://doi.org/10.1371/journal.pone.0251915.g001)
paranoid ideation [PARA] ≥ 63 as criteria [21]. They found that the SPro subscale for psychotic risk (SPro-Psy-Risk) could identify cases best, with a sensitivity of 74% and a specificity of 61%. Apparently, the sensitivity of the BQSPS is better than SPro-Psy-Risk’s for identifying cases. We thought this is due to criteria to define cases in the current study are more comprehensive than those of Müller et al. These criteria reflected appropriately aims of the BQSPS, which try to detect early and broadly at-risk mental states characterized by subtle symptoms and functional impairments [9]. The BQSPS had acceptable to good internal consistency and good test-retest reliability, similar to findings of Müller et al. [21].

However, the study has two limitations. First, our subjects were undergraduate college students, and whether the findings could be generalized to other young populations remains to be tested. Second, since the BQSPS did not originally focus on increasing the predictive validity of transition from at-high-risk to psychosis, a longitudinal study is needed to confirm the predictive validity of the BQSPS for the onset of psychosis.

Conclusion
To conclude, this study shows that the BQSPS has good psychometric properties for young adults. We also clarify clinical implications for each component of BQSPS and thereby expand its clinical utility in university settings.

Supporting information
S1 Dataset. Anonymized dataset.
(XLS)
Author Contributions

Conceptualization: Shih-Kuang Chiang, Chen-Chung Liu.

Formal analysis: Pei-Ti Chen.

Investigation: Pei-Ti Chen, Chen-Chung Liu.

Methodology: Shih-Kuang Chiang, Chen-Chung Liu.

Resources: Chen-Chung Liu.

Software: Pei-Ti Chen.

Supervision: Shih-Kuang Chiang.

Writing – original draft: Shih-Kuang Chiang.

Writing – review & editing: Shih-Kuang Chiang.

References

1. Pedrelli P, Nyer M, Young A, Zulauf C, Wilens T. College Students: Mental Health Problems and Treatment Considerations. Acad Psychiatry. 2015; 39: 503–511. https://doi.org/10.1007/s40596-014-0205-9 PMID: 25142250.

2. Kessler RC, Amminger GP, Aguilar-Gaxiola S, Alonso J, Lee S, Ustun TB. Age of onset of mental disorders: a review of recent literature. Curr Opin Psychiatry. 2007; 20(4): 359–364. https://doi.org/10.1097/YCO.0b013e32816ebc89 PMID: 17551351.

3. Blanco C, Okuda M, Wright C, Hasin DS, Grant B, Liu SM, et al. Mental health of college students and their non-college-attending peers: Results from the National Epidemiologic Study on Alcohol and Related Conditions. Arch Gen Psychiatry. 2008; 65(12): 1429–1437. https://doi.org/10.1001/archpsyc.65.12.1429 PMID: 19047530.

4. Eisenberg D, Hunt J, Speer N. Mental health in American colleges and universities: Variation across student subgroups and across campuses. J Nerv Ment Dis. 2013; 201(1): 60–67. https://doi.org/10.1097/NMD.0b013e31827ab077 PMID: 23274298.

5. Arnett JJ. Emerging adulthood: A theory of development from the late teens through the twenties. Am Psychol. 2000; 55(5): 469–480. https://doi.org/10.1037/0003-066X.55.5.469 PMID: 10842426.

6. Fusar-Poli P, Nelson B, Valmaggia L, Yung AR, McGuire PK. Comorbid Depressive and Anxiety Disorders in 509 Individuals With an At-Risk Mental State: Impact on Psychopathology and Transition to Psychosis. Schizophr Bull. 2014; 40(1): 120–131. https://doi.org/10.1093/schbul/sbs136 PMID: 23180756.

7. Fusar-Poli P, Cappuccati M, Rutigliano G, Schultz-Lutter F, Bonoldi I, Borgwardt S, et al. At risk or not at risk? A meta-analysis of the prognostic accuracy of psychometric interviews for psychosis prediction, World Psychiatry. 2015; 14(3): 322–332. https://doi.org/10.1002/wps.20250 PMID: 26407788.

8. Nunez D, Arias VB, Campos S. The Reliability and Validity of Liu’s Self-Report Questionnaire for Screening Putative Pre-Psychotic States (BQSPS) in Adolescents. PLoS ONE. 2016 Dec 14. https://doi.org/10.1371/journal.pone.0167982 PMID: 27973533.

9. Liu CC, Tien YJ, Chen CH, Chiu YN, Chien VL, Hsieh MH, et al. Development of a brief self-report questionnaire for screening putative pre-psychotic states. Schizophr Res. 2013; 143(1): 32–37. https://doi.org/10.1016/j.schres.2012.10.042 PMID: 23182728.

10. Demmin D, DeVylde J, Hilimire M. Screening for subthreshold psychotic experiences and perceived need for psychological services. Early Interv Psychiatry. 2015 Feb 15. https://doi.org/10.1111/eip.12222 PMID: 25702773.

11. Keshavan M, Delisi L, Seidman L. Early and broadly defined psychosis risk mental states. Schizophr Res. 2011; 126(1–3): 1–10. https://doi.org/10.1016/j.schres.2010.06.006 PMID: 21123033.

12. Kline E, & Schiffman J. Psychiatry risk screening: A systematic review. Schizophr Res. 2014; 158(1–3): 11–18. https://doi.org/10.1016/j.schres.2014.06.036 PMID: 25034782.

13. Andersen AM, Bienvenu OJ. Personality and psychopathology. Int Rev Psychiatry. 2011; 23(3): 234–247. https://doi.org/10.3109/09540626.2011.588692 PMID: 21923225.

14. MacDougall AG, Vandermeer MRJ, Norman RMG. Negative future self as a mediator in the relationship between insight and depression in psychotic disorders. Schizophr Res. 2015; 165(1): 66–69. https://doi.org/10.1016/j.schres.2015.03.035 PMID: 25888339.
15. Romm KL, Rossberg JI, Hansen CF, Haug E, Andreassen OA, Melle I. Self-esteem is associated with premorbid adjustment and positive psychotic symptoms in early psychosis. BMC Psychiatry. 2011; 11: 136. https://doi.org/10.1186/1471-244X-11-136 PMID: 2185499

16. Macare C, Bates TC, Heath AC, Martín NG, Ettinger U. Substantial genetic overlap between schizotypy and neuroticism: a twin study. Behav. Genet. 2012; 42: 732–742. https://doi.org/10.1007/s10519-012-9558-6 PMID: 2295544

17. Goodwin RD, Fergusson DM, Horwood LJ. Neuroticism in adolescence and psychotic symptoms in adulthood. Psychol Med. 2003; 33: 1089–1097. https://doi.org/10.1017/s0033291703007888 PMID: 12946093

18. Krabbendam L, Janssen I, Bak M, Bijl RV, Graaf RD, Os GV. Neuroticism and low self-esteem as risk factors for psychosis. Soc Psychiatry Psychiatr Epidemiol. 2002; 37: 1–6. https://doi.org/10.1007/s00228-002-8027-9 PMID: 11924745

19. Spinhoven P, Elzinga BM, Hemert AMV, Rooij MD, Penninx BW. A longitudinal study of facets of extraversion in depression and social anxiety. Pers. Individ. Differ. 2014; 71: 39–44. https://doi.org/10.1016/j.paid.2014.07.014

20. Derogatis LR. SCL-90: Administration scoring and procedure manual—I. 1st ed. Baltimore, MD: Johns Hopkins; 1977.

21. Müller M, Vetter S, Buchli-Kammermann J, Stieglitz RD, Stettbacher A, Riecher-Rössler A. The Self-screen-Prodrome as a short screening tool for pre-psychotic states. Schizophr Res. 2010; 123(2-3): 217–224. https://doi.org/10.1016/j.schres.2010.08.018 PMID: 20840886

22. Jolley AG, Hirsch SR, McRink A, Manchanda R. Trial of brief intermittent neuroleptic prophylaxis for selected schizophrenic outpatients: clinical outcome at one year. BMJ. 1989; 298 (6679): 985–990. https://doi.org/10.1136/bmj.298.6679.985 PMID: 2567190

23. Henquet C, Forti MD, Morrison P, Kuepper R, Murray RM. Gene-environment interplay between cannabis and psychosis. Schizophr Bull. 2008; 34(6): 1111–1121. https://doi.org/10.1093/schbul/sbn108 PMID: 18723841

24. Henquet C, Krabbendam L, Spauwen J, Kaplan C, Lieb R, Wittchen HU, et al. Prospective cohort study of cannabis use, predisposition for psychosis, and psychotic symptoms in young people. BMJ. 2005; 330(7481):11. https://doi.org/10.1136/bmj.38267.664086.63 PMID: 15754485

25. Addington J, Stowkowy J, Weiser M. Screening tools for clinical high risk for psychosis. Early Interv Psychol. 2014; 27(95): 345–356. https://doi.org/10.1111/eip.12193 PMID: 25345316

26. Rosenberg M. Society and the adolescent self-image. 1st ed. Princeton, NJ: Princeton University Press; 1965.

27. Tsai FF. Self-esteem and self-serving attribution: The interaction between the content and the structure of self-concept. M. Sc. Thesis, National Taiwan University. 1997. [cited 2020 Aug 8]. https://hdl.handle.net/11296/prkvwr

28. Chen KH. The Ecological Validity of the Constructs of Identity Importance, Identity Firmness, and Identity Discrepancy: The Therapeutic Effect of the Adolescent Identity Intervention Program. Ph. D. Dissertations, National Taiwan University. 2007. [cited 2020 Aug 8]. https://hdl.handle.net/11296/sweg78

29. Eysenck HJ, Eysenck SBG. Manual of the Eysenck Personality Inventory. 1st ed. London: University of London Press; 1965.

30. Lu L. The relationship between subjective well-being and psychosocial variables in Taiwan. J Soc Psychol. 1995; 135(3): 351–357. https://doi.org/10.1080/002224554.1995.9713964 PMID: 7650933

31. Lu L. A study of related factors of Well-being for Chinese. Report (NSC85-2413-H-037-002), Ministry of Science and Technology.1997. [cited 2020 Aug 8].https://sticnet.stp.farn.org.tw/sticloc/ttsweb? @ @750964495

32. Derogatis LR. SCL-90-R administration, scoring, and procedure manual II. 1st ed. Towson, MD: Clinical Psychometric Research; 1983.

33. Derogatis LR, Cleary PA. Configuration of the dimensional structure of the SCL-90R: A study in construct validation. J Clin Psychol. 1977; 33: 981–989.

34. Martinez S, Stillerman L, Waldo M. Reliability and validity of the SCL-90-R with Hispanic college students. J Clin Psychol. 2005; 27: 254–264. https://doi.org/10.1177/07339866050274911

35. Tsai SY. Normative study of symptom checklist 90-Revised (SCL-90-R) in Taiwan. M. Sc. Thesis, National Taiwan University. 2017. [cited 2020 Aug 8].https://hdl.handle.net/11296/99bf35

36. Derogatis LR, Svitz KL. The SCL-90-R, Brief Symptom Inventory, and Matching Clinical Rating Scales. In: Maruish ME, editor. The use of psychological testing for treatment planning and outcomes assessment. Mahwah, NJ: Lawrence Erlbaum Associates Publishers;1999. pp. 679–724.

37. Tabachnick BG, Fidell LS. Using multivariate statistics ( 5th ed.). Boston, MA: Allyn & Bacon; 2007.
38. Cohen J. Statistical Power Analysis for the Behavioral Sciences. 2nd ed. Hillsdale, NJ: Lawrence Earlbaum Associates Publishers; 1988.

39. Freeman D. Suspicious minds: the psychology of persecutory delusions. Clin psychol Rev. 2007; 27 (4): 425–57. https://doi.org/10.1016/j.cpr.2006.10.004 PMID: 17258852

40. Tiernan B, Tracey R, Shannon C. Paranoia and self-concepts in psychosis: A systematic review of the literature. Psychiatry Res. 2014; 216(3): 303–313. https://doi.org/10.1016/j.psychres.2014.02.003 PMID: 24630916