The 6-item Kessler psychological distress scale to survey serious mental illness among Chinese undergraduates: Psychometric properties and prevalence estimate

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Abstract

Objective: To evaluate the psychometric properties of the 6-item Kessler psychological distress scale (K6) in screening for serious mental illness (SMI) among undergraduates in a major comprehensive university in China.

Method: The K6 was self-completed by 8289 randomly sampled participants. A group of them (n = 222) were re-assessed using K6 and interviewed using the Chinese version of Composite International Diagnostic Interview 3.1 (CIDI-3.1).

Results: The test–retest reliability of the K6 scale was 0.79, the Cronbach’s alpha was 0.84, and its area under the receiver operating curve (AUC) for diagnosing CIDI-3.1 SMI was 0.85 (95% CI = 0.80–0.90). For the optimal cut-off of K6 (12/13), the sensitivity (SEN), specificity (SPE), positive predictive value (PPV), negative predictive value (NPV), and classification accuracy (AC) were 0.83, 0.79, 0.60, 0.93, and 0.80, respectively. The 12-month prevalence of SMI was estimated as 3.97% using this optimal cut-off. Binary logistic regression analysis (including gender, ethnicity, grade, number of siblings and family residency location) showed that only family residency location in rural areas compared to urban areas was significantly associated with more SMI.

Conclusions: This study documented the value of using the K6 for detecting SMI in Chinese undergraduate populations and supported its cross-cultural reliability and validity.

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1. Introduction

Chinese people have tended to view university students as ‘favored by heaven’ and being less vulnerable to mental distress or disorders. With the rapid growth of universities and colleges accompanying the great socio-economic transition, however, mental health problems of university students have received unprecedented attention in recent decades in China [1]. Previous mental health surveys which mostly used self-reported dimensional scales such as 90-Symptom Checklist (SCL-90), Self-Rating Anxiety Scale, and Self-Rating Depression Scale have suggested high prevalences of mental health problems (10%–30%) including anxiety, phobia, obsessive and/or compulsive, and depression symptoms or syndromes among Chinese college students [2–4]. Recent surveys using structured diagnostic interviews by clinicians further highlighted the high prevalences of mental health problems among Chinese university students. For example, Chen et al. [5] found that the current prevalence of depressive symptoms and major depressive disorder (MDD) were 11.7% and 4.0% respectively among university students in Harbin. Kou et al. [6] found that the lifetime, 12-month and 30-day prevalences of neurotic disorders were 25.6%, 15.7% and 6.8% respectively.
among the Changchun university students. These estimates were comparable to or even higher than the highest prevalences of comparable disorders (e.g., 2.1% for 30-day MDD and 5.6% for 30-day anxiety disorders) found in the recent Chinese community-based adult studies [7].

In view of this pressing problem, many Chinese universities have established mental health support programs on campus [8,9]. Due to the vigorous extension of these support programs and limited availability of caregivers, however, the need for mental health service estimated by aforementioned surveys is overwhelming [10]. Actually, many “cases” detected by aforementioned community level surveys may not require professional treatment [11]. What is more, the financial and human resources for carrying out structured diagnostic interviews and/or long dimensional scales such as SCL-90 are limited for most circumstances but the best-funded epidemiology studies [12]. Therefore, the need for developing a simpler and more efficient strategy which can rapidly capture the smaller portion of students with clinically significant serious mental illness (SMI) is increasingly recognized [11]. Indeed, the importance of SMI has been increasingly recognized by health policy makers and psychiatric epidemiologists around the world. In the United States (US), Public Law (PL) 102-321 has stipulated the definition of SMI, under which a person has at least one 12-month DSM disorder, other than a substance use disorder, and “serious impairment” [13]. In China, recently, the Mental Health Law (published on October 26, 2012 and effective from May 1, 2013) has further suggested the importance of study on SMI by proposing a conception of severe mental disorders (SMD) which defined similarly to SMI in the US PL 102-321 and includes mental disorders characterized by severe symptoms that result in serious impairment in social adaptation or other types of functioning, impaired awareness of objective reality or of one’s medical condition, or an inability to deal with one’s own affairs [14].

To screen for SMI quickly and accurately, a number of instruments, including 6-item Kessler psychological distress scale (K6), the 10-item Kessler psychological distress scale (K10), the Composite International Diagnostic Interview Short Form, and the World Health Organization Disability Assessment Schedule, had been compared in a study [13]. Among them, the K6, which was initially designed as a screening scale to monitor population prevalences of and trends in non-specific psychological distress [15], was identified as the most promising one due to its brevity and efficacy. Since then the K6 has been validated and used as a screening tool for SMI in psychiatric epidemiological studies worldwide including China [16–21].

Above studies notwithstanding, there is a general lack of surveys on the psychological properties of K6 and prevalence of SMI among Chinese university students. Therefore, the present study carried out a two-stage cross-sectional epidemiological survey with a view to evaluating the psychometric properties of the K6 and investigating the prevalence and sociodemographic correlates of SMI in a major Chinese comprehensive university.

2. Materials and methods

This two-stage cross-sectional survey was performed in a national comprehensive university located in southwestern China. Its undergraduates come from across the country. The study was approved by the ethics committee of Sichuan University, and written-informed consent was obtained from each participant of this study.

2.1. Sampling

There were 41228 undergraduates in the University, in order to get a representative sample, we using a multistage stratified cluster sampling method. We randomly chose 192 classes from 4 grades in 28 colleges. All undergraduates in each randomly-sampled class were invited to participate in this study. The proportion of classes sampled from each college depended on its proportion of student number in the university. Finally, a total of 8837 undergraduates were invited. Of these, 8289 undergraduates signed the informed consent letters and participated in the first stage of this study, which resulted in an overall effective response rate of 93.80%.

In the second stage, participants were recruited from the respondents of the first stage using a stratified method as follows: In the first stage, participants were asked to leave their telephone numbers if they were interested in the participation of a face-to-face interview regarding their mental health conditions, and 4050 participants responded positively. Among them, 887 participants scored 8 or above on the K6, and 3163 participants scored 7 or below. As some studies reported that respondents who scored 8 or above on the K6 were more likely to have SMI [12], we planned to invite all participants scored 8 or above to participate in the second stage survey and contacted them via telephone call with a maximum of five attempts. Among them, 529 (59.64%) did not answer the phone or hung up immediately, 261 (29.43%) initially agreed to participate, and 97 (10.94%) declined. In line with one previous study [20], a higher proportion of screened positives than negatives for the interview are needed when less than 50% of respondents screen positive. Therefore, we followed a typical 2:1 section rule to maximize statistical power, and randomly invited 450 subjects among participants who scored 7 or below. Among them, 232 (51.56%) did not answer the phone or hung up immediately, 156 (34.67%) agreed to participate, and 62 (13.78%) rejected. In total, 417 first-stage participants initially agreed to participate in the second stage survey, but only 222 of them (148 of these participants scored 8 or above on the K6 in the first stage survey) showed up and completed the K6 and interview of the second stage survey. Therefore, of the undergraduates who were successfully contacted by telephone in the second stage, the cooperation rate was 38.54% (222/[417 + 97 + 62] × 100%).

2.2. Instruments

The K6, Patient Health Questionnaire (PHQ)-15, and a questionnaire about suicide ideation, plan and attempt were included in the self-report questionnaire that was administered in
the first stage survey. Relevant sociodemographic information was also collected, including gender, year of study, ethnicity, number of siblings, and family residency location (categories of each variable are shown in Table 2). Only the sociodemographic information and the data collected by K6 were analyzed in the present study, and other data were reported in other separate articles.

The Mandarin Chinese version of K6 has been used and validated in the World Mental Health (WMH) Survey [13]. It comprises six questions that ask respondents to rate how frequently they have felt ‘nervous’, ‘hopeless’, ‘restless or fidgety’, ‘so depressed that nothing could cheer you up’, ‘that everything was an effort’, and ‘worthless’ during the past 30 days [15,22]. This reference period was modified to ‘the 30-day period during the past 12 months they had the most severe psychological distress’ to match the recall period in the Composite International Diagnostic Interview (CIDI) interview of the second stage survey so as to provide more accurate prevalence estimates for health policy planning purposes [13]. Response options included ‘none of the time’ (0), ‘a little of the time’ (1), ‘some of the time’ (2), ‘most of the time’ (3), and ‘all of the time’ (4). The range of score for K6 was thus from 0 to 24.

The second stage survey used the Chinese World Mental Health initiative (WMH) version of the CIDI Version 3.1 (CIDI-3.1) for the face-to-face interview. Its Chinese version of 3.1 has been repeatedly validated [23,24]. In this study, CIDI interviews were used to assess mood disorders (dysthymia, major depressive disorder, bipolar I and II disorder), anxiety disorders (generalized anxiety disorder, agoraphobia, obsessive–compulsive disorder, panic disorder, social phobia, specific phobia, posttraumatic stress disorder) and behavioral disorders (intermittent explosive disorder, attention deficit/hyperactivity disorder, conduct disorder) [25] based on the definitions and criteria of the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV-TR, Chinese version) [26]. Consistent with recent WMH surveys [13], respondents were classified as having SMI during the 12 months before interview if they met the criteria for one or more DSM-IV/CIDI mental disorders and had serious impairment.

2.3. Procedure

Before the survey started, investigators for the first stage survey were trained and supervised by 3 mental health professionals on the whole procedure of the survey and the correct instruction for the use of the self-report questionnaire. The CIDI interviewers for the second-stage survey included six Master Degree Candidates majoring in psychiatry. They had been trained for four days by a qualified CIDI trainer from the Chinese University of Hong Kong before the survey and supervised by an attending psychiatrist (who had been trained for CIDI interview in Chinese University of Hong Kong) during the survey. The first stage was carried out from September 11 to November 20, 2011. Surveys for each class began with a standardized description of the nature of this study and invited voluntary participation. Those who consented were asked to complete the questionnaires depicted above. When they handed in the responded questionnaires, the investigators quickly browsed the questionnaire, and if any item was found to be missed to response, the participants were asked to refill in the missed item. The second stage study was carried out between October 28 and December 30, 2011 (the time interval between the first and second assessments is 32–53 days interval). After obtaining written informed consent, respondents were asked to complete the K6 again and interviewed by one of the six CIDI interviewers. The interviewers were blinded to the respondents’ K6 responses.

2.4. Statistical analysis

Data analyses were conducted using SPSS 18.0. The overall K6 global score correlation coefficient was used for measuring test–retest reliability and Cronbach’s alpha was used to measuring the internal consistency of the K6, while factor analysis was used to assess its structure validity. The concordance between the CIDI interview and the K6 in the screening of SMI was examined using the receiver operating characteristic (ROC) curve. Several validation indicators including sensitivity (SEN), specificity (SPE), positive predictive value (PPV), negative predictive value (NPV), total classification accuracy (AC) and area under ROC (AUC) were observed across different cut-offs. The optimal cut-off of K6 was used to calculate the 12-month prevalence estimate of SMI. The sociodemographic correlates of SMI were examined using chi-square tests and binary logistic regression analysis. Statistical significance was based on two-side tests evaluated at the 0.05 level of significance.

3. Results

3.1. Sample characteristics

A total of 8289 undergraduates participated in the first stage of this study. The proportions of freshmen, sophomores, juniors and seniors were 26.7% (n = 2213), 27.3% (n = 2259), 26.1% (n = 2165), and 19.8% (n = 1652), respectively. There were 4144 (50.0%) males and 3955 (47.7%) females. The majority of participants (62.7%, n = 5199) reported urban residency of their family, while 34.0% (n = 2821) of the participants had their family living in rural areas. Most of the participants were Han (90.2%, n = 7480), with 641 (7.7%) participants being ethnic minorities. There were 4395 (53.0%) participants who were the only child, while 3789 (45.7%) participants had siblings (Table 1).

3.2. Distribution of the K6

The distribution of K6 scores was positively skewed (Fig. 1), with a J-shaped curve illustrating that more than half (53.4%) of the participants scored 4 or lower on the K6 (proportions of those who scored ‘0’, ‘1’, ‘2’, ‘3’ and ‘4’ were...
5.6%, 8.5%, 13.6%, 13.8%, and 11.8%, respectively). On the basis of a previous validation study [22, 27], a score of 13 or higher indicates high psychological distress, a score of 8 to 12 indicates moderate psychological distress, and a score of 0 to 7 indicates low psychological distress. Then in our survey, the undergraduates with low psychological distress, moderate psychological distress and high psychological distress are 79.3%, 16.7% and 4%.

3.3. Reliability and factor structure of the K6

The 32- to 53-day interval test–retest Spearman correlation coefficient was 0.79 indicated moderate to high test–retest reliability values in the current study. The paired t-test to compare between the K6 scores of the first-test and retest did not find significant difference (t = −0.65, p = 0.51). The Cronbach’s alpha was 0.84, indicating a high internal consistency reliability.

The Kaiser–Meyer–Olkin measure of sampling adequacy was 0.86, and the Bartlett’s Test of Sphericity was significant (p < 0.001). Exploratory factor analysis using principal components yielded a strong first factor (eigenvalue = 3.34, explaining 55.60% variance) and a much weaker second factor (eigenvalue = 0.81, explaining 13.50% variance). This supported a one-factor model over a two-factor model for the K6.

3.4. Comparative accuracy of the K6 in CIDI3.1 SMI screening

The AUC of the K6 for screening CIDI-3.1 SMI was 0.85 (95% CI = 0.80–0.90; see Fig. 2). The SEN, SPE, PPV, NPV, and AC across different K6 cut-offs against SMI are shown in

![Cumulative Percent](image1)

![ROC Curve](image2)

Fig. 1. The cumulative prevalence curve showing the distribution of 6-item Kessler psychological distress scale (K6) scores in a major comprehensive university of China (N = 7775).

Fig. 2. The receiver operating characteristic (ROC) curve for the 6-item Kessler psychological distress scale (K6) scores predicting clinically diagnosed cases of serious mental illness (SMI)—sensitivity against 1 – specificity.
Table 2 Validity indicators of K6* across different cut-offs.

<table>
<thead>
<tr>
<th>K6* cut-off</th>
<th>SEN*</th>
<th>SPE*</th>
<th>PPV*</th>
<th>NPV*</th>
<th>AC*</th>
<th>AUC* (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/8</td>
<td>0.98</td>
<td>0.31</td>
<td>0.34</td>
<td>0.98</td>
<td>0.49</td>
<td>0.65 (0.57–0.72)</td>
</tr>
<tr>
<td>8/9</td>
<td>0.97</td>
<td>0.41</td>
<td>0.37</td>
<td>0.97</td>
<td>0.56</td>
<td>0.69 (0.62–0.76)</td>
</tr>
<tr>
<td>9/10</td>
<td>0.93</td>
<td>0.51</td>
<td>0.41</td>
<td>0.96</td>
<td>0.62</td>
<td>0.72 (0.65–0.79)</td>
</tr>
<tr>
<td>10/11</td>
<td>0.93</td>
<td>0.63</td>
<td>0.48</td>
<td>0.96</td>
<td>0.71</td>
<td>0.78 (0.72–0.85)</td>
</tr>
<tr>
<td>11/12</td>
<td>0.88</td>
<td>0.70</td>
<td>0.51</td>
<td>0.94</td>
<td>0.75</td>
<td>0.79 (0.73–0.86)</td>
</tr>
<tr>
<td>12/13</td>
<td>0.83</td>
<td>0.79</td>
<td>0.60</td>
<td>0.93</td>
<td>0.80</td>
<td>0.81 (0.74–0.88)</td>
</tr>
<tr>
<td>13/14</td>
<td>0.62</td>
<td>0.83</td>
<td>0.58</td>
<td>0.86</td>
<td>0.78</td>
<td>0.73 (0.64–0.81)</td>
</tr>
<tr>
<td>14/15</td>
<td>0.52</td>
<td>0.90</td>
<td>0.65</td>
<td>0.84</td>
<td>0.80</td>
<td>0.71 (0.62–0.79)</td>
</tr>
<tr>
<td>15/16</td>
<td>0.35</td>
<td>0.94</td>
<td>0.68</td>
<td>0.80</td>
<td>0.78</td>
<td>0.64 (0.55–0.73)</td>
</tr>
<tr>
<td>16/17</td>
<td>0.28</td>
<td>0.96</td>
<td>0.71</td>
<td>0.79</td>
<td>0.76</td>
<td>0.62 (0.53–0.71)</td>
</tr>
<tr>
<td>17/18</td>
<td>0.10</td>
<td>0.99</td>
<td>0.78</td>
<td>0.75</td>
<td>0.75</td>
<td>0.56 (0.46–0.64)</td>
</tr>
</tbody>
</table>

K6: 6-item Kessler psychological distress scale; SEN: sensitivity; SPE: specificity; PPV: positive predictive value; NPV: negative predictive value; AC: classification accuracy; AUC: area under the receiver operating characteristic (ROC) curve.

Table 2. The optimal cut-off which compromised best between SEN, SPE, PPV, NPV and AC was 12/13. For this optimal cut-off, the AUC was 0.81 (95% CI: 0.74–0.88; see Table 2). Its SEN and PPV were 0.83 and 0.60 respectively, indicating that 83% of SMI cases captured by CIDI were correctly identified by the K6 and 60% of SMI cases identified by the K6 were also correctly captured by CIDI. Its SPE and NPV were 0.79 and 0.93 respectively, indicating that 79% of non-cases were correctly identified by the K6 and 93% of non-cases classified by the K6 were “truly” having no SMI.

3.5. Prevalence and socio-demographic correlates of SMI

Based on the optimal cut-off of K6 scores depicted above, the prevalence estimate of SMI was 3.97% (n = 329). Chi-square tests showed that the estimates were significantly different by groups of family residency location (χ² = 7.59, p = 0.006) and number of siblings (χ² = 3.75, p = 0.05) (Table 1). Further binary logistic regression analysis found that only the family residency location in rural areas compared to that in urban areas was significantly associated with more SMI (OR = 1.37, 95% CI = 1.10–1.72).

4. Discussion

K6 has proved to be a useful tool in screening for SMI in the Chinese community [13]. This study provided an initial evidence that the K6 performs also as a screening scale for detecting SMI in this university-based epidemiological survey in China. The finding of the present study supported that the K6 scale has high reliability in this studied university student population. There are not only no significant difference but also highly correlated between the test and the re-test scores, which indicated that other scales in our survey might have little impact on the result of the K6 scale. That might be partly explained by the fact that the K6 scale was placed in the front part of the questionnaire in both stage surveys. The distribution of K6 scores revealed approximately half of undergraduates scored 0–4, which is fairly comparable to that found in one US study on adolescents [21]. The high internal consistency of K6 found in this study is highly consistent with many previous studies in general populations [13,22] and African women after pregnancy [28,29]. Following the generally accepted Kaiser criterion of retaining factors with an eigenvalue ≥1.0, we found a one-factor structure for the K6. It is consistent with most previous studies which confirmed that the K6 is a valid scale that unidimensionally measures psychological distress [22]. The AUC (0.85) of K6 scale for predicting clinically diagnosed cases of SMI found in this study is comparable to the excellent ones in Western populations (i.e., 0.82–0.91) [16,30]. The optimal cut-off (i.e., 12/13) found in this study is also the same as those in most previous studies [12,13,16,28,31,32]. The K6 scale is thus a powerful screening instrument for SMI in Chinese university undergraduates as in many other cross-national/cultural populations. It is however noteworthy that the present study found low PPV but high NPV of the K6 scale in screening for SMI as in many other studies [12,30,32–34], which indicates that K6 is a strong screen-out but moderate screen-in tool for detecting SMI.

Adopting 12/13 as the cut-off score of K6, the prevalence estimate of SMI in the undergraduate population is 3.97%. It is fairly comparable to the results from the 2013 national survey on drug use and health reported by Substance Abuse And Mental Health Services Administration (SAMHSA), in which 10.0 million (4.2%) adults aged 18 or older were estimated to have SMI in the past year in the USA [35]. Compared with many other published studies using K6 to estimate the prevalence of SMI, however, the prevalence estimate in this study was somewhat lower. For example, the prevalence estimates of SMI based on K6 in the Australian general population [16] and Japanese employees [31] were 8.0% and 10.8% respectively. This difference might be partly attributed to cultural differences in interpretation or expression of emotions, that is, Asian people were indicated as less willing to express emotional distress than their Western counterparts [36,37]. In addition to a relatively lower prevalence estimate of SMI (6.5%) in a Hong Kong Chinese population survey [12], Asian people were reported to tend to give lower scores of K6 than other races/ethnicities, even after they had migrated to other countries as indicated by one study conducted in the US. It was found that the prevalence estimates of SMI screened by K6 in Caucasians, Hispanics, African Americans, and Asian Americans were 8.2%, 9.3%, 10.3%, and 6.0%, respectively [33]. Another reason for the lower prevalence estimate of SMI in this study may be due to the fact that the participants were only undergraduates. It is reported that healthy people, physically or psychologically, might achieve better at school, and are expected to be more likely to enter national comprehensive universities, especially in China [38]. Other studies which used other tools/scales to examine mental health problems in Chinese university/college students usually reported a much higher prevalence [5,6,8]. It may be largely explained by the fact that different research...
methodologies and assessment standards which aim to investigate different level of severity of mental health problems lead to different results [39]. For example, the prevalence estimates of SMI reported by National Survey on Drug Use and Health (NSDUH) and K6 surveys in US populations were much lower than the prevalence of mental disorders reported by National Comorbidity Survey (NCS) and its replication (NCSR) [40]. That has usually been explained by surveys on SMI aimed to a more serious type of mental health problems [22]; accordingly, the present study which aimed to investigate SMI found a lower prevalence estimate than those reported by other surveys in the Chinese university/college student populations (such as those by Chen et al. [3] and Kou et al. [6]), which is consistent to research anticipation.

Our results demonstrated that family residency location was the only significant independent risk factor associated with SMI in this undergraduate population. This is in line with some previous findings that students from rural areas were susceptible to mental disorders [41]. The possible reasons include higher economic burden, more fundamental changes in growing environment, experience of being “left-behind children” which resulted in the lack of parental care, and more stress-related experience of adapting to university life in a large city [42–45]. The present study found no differences in SMI prevalence across gender, ethnicity, year of study and number of siblings. It is consistent with the results of several previous studies on college students in Hong Kong and China [46,47], but different from those Chinese studies which found more mental health problems, especially emotional symptoms/syndromes, among female college students [47,48]. Further studies are needed to clarify the issue of gender difference in mental health among university students.

Although the optimal cut-off of K6 in this study is consistent with those found in most cross-cultural studies, some limitations of this study are noteworthy. First, the relatively low response rate for the CIDI interview in the second stage survey may increase the risk of underreporting of SMI. Previous studies have documented that the prevalence of mental disorders may be higher in those who declined a face-to-face mental disorder diagnostic interview in the general community [40,49]. The most probable reason for the low response rate for the CIDI interview, however, is that the second stage survey carried out during the mid-term exam. To shed some light on the possible effect of sample-selection biases on the prevalence estimate, we have compared the available sociodemographics between students who completely participated in the second stage and those who did not consent to participate to or complete the second stage, and found that there are no significant differences between gender ($\chi^2 = 0.08, p = 0.78$), ethnicity ($\chi^2 = 0.63, p = 0.43$), and family residency location ($\chi^2 = 0.69, p = 0.41$), but found that students from the only-child family ($\chi^2 = 4.16, p = 0.04$) and high-grade students ($\chi^2 = 13.60, p = 0.004$) were less consented to participate or complete in the second stage. The refusal reasons reported by high-grade students include job hunting, preparing for the postgraduate entrance examination, being internship in institutions far away from the university and no time to come back, and some students from only-child family reported “not want to take part in” as the reason. Regarding the less cooperation of students from the only-child family, previous studies have reported similar findings [50]. Second, although we checked the questionnaire when the students handed in, there are still 74 pieces of questionnaires with missing data in the first stage. Considering that a small number of data were missing, we only included those with complete K6 data ($n = 8215$) into analysis. Moreover, we have tried to statistically analyze the sociodemographic characters of these 74 subjects with missing data, but failed to do so because there were too many other missed items including sociodemographics in their questionnaires and the survey was carried out anonymously. Whether people with mental health problems were less likely to participate in our survey as found in previous studies deserves further research [40,49]. Third, we included not only K6 scale, but also other questionnaires in the research, and there is a possibility that other questionnaires may have affected the K6 responses. However, we only have 3 main sub-scales in the first stage, and K6 scale is in the front part. The total number of items in these self-administered scales in the two stages was no more than 70. So other completed questionnaires in the first stage may have little affected the K6 responses. Fourth, the study was only based on one major Chinese comprehensive university sample, the results of which may not be generalizable to undergraduates of other Chinese universities. Third, this study was based on a cross-sectional survey which only provides inferences rather than establishing causal relationships between risk factors and SMI.

Above limitations notwithstanding, the present study has documented the first evidence for detecting SMI using the K6 in Chinese undergraduate population and has further enriched the evidence of good cross-cultural reliability and validity of this scale.

**Declaration of interest**

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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