CONSTRUCT VALIDITY AND PREVALENCE RATE OF BORDERLINE PERSONALITY DISORDER AMONG CHINESE ADOLESCENTS

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The construct of borderline personality disorder (BPD) among adolescents is a controversial topic. No research has examined the BPD construct among Chinese adolescents because the Chinese Classification of Mental Disorders-III rejects BPD as a valid diagnostic category. The present study explored the construct validity and prevalence of BPD among Chinese adolescents in Hong Kong. A total of 4,110 high school students completed the McLean Screening Instrument for borderline personality disorder (MSI-BPD) and other measures assessing various BPD traits twice over a one-year period. DSM-IV-TR BPD criteria set as measured by the MSI-BPD demonstrated good internal consistency, concurrent validity and test-retest reliability. Confirmatory factor analysis of the MSI-BPD revealed four theoretically meaningful factors, namely affect dysregulation, impulsivity, interpersonal disturbances, and self/cognitive disturbances. Prevalence rate of BPD, according to a stringent simulated diagnostic procedure used in this study, was estimated to be 2% among Chinese adolescents in Hong Kong. Findings support that BPD is a valid clinical construct among Chinese adolescents. More research on BPD among the Chinese population is warranted.

Borderline personality disorder (BPD) is characterized by mood and impulse dysregulation, chaotic interpersonal relationships, and self-image disturbances. The prevalence rate of BPD has been found to be about 1–2% in general population (Torgersen, Kringlen, & Cramer, 2001; Widiger & Weissman, 1991). According to DSM-IV-TR (American Psychiatric Association, 2000), diagnosis of personality disorders can be given to adolescents. However, since some borderline features such as emotional instability and identity confusion are quite common among adolescents, differentiating genuine BPD symptoms from normative personality features during adolescence is no easy task. Some researchers were therefore
skeptical about the applicability of the BPD diagnosis in adolescents (Kutcher & Korenblum, 1992; Marton et al., 1989). Others (Paris, 2003; Zanarini, Frankenburg, Khera, & Bleichmar, 2001), on the other hand, argued that adolescence is a critical period when symptoms of personality disorders first emerge and should be studied accordingly.

**CONSTRUCT VALIDITY OF BPD AMONG ADOLESCENTS**

Several studies have examined the construct validity of BPD among adolescents. Internal consistencies of DSM-III-R BPD criteria as assessed by personality disorder examination (PDE) were found to be .76 in adolescent psychiatric inpatients, with mean inter-item correlations of .28 (Becker et al., 1999). Studies examining concurrent validity revealed that adolescents with BPD reported significantly more problems at school or at work than their normal peers, and the BPD diagnosis was associated with more suicide attempts, anxious/depressed mood, and internalizing and externalizing behavior problems (Bernstein et al., 1993; Westen, Shedler, Durett, Glass, & Martens, 2003).

In a factor analytic study of the DSM-III-R BPD criteria set assessed by PDE among hospitalized adolescents, Becker, McGlashan, and Grilo (2006) found four subcomponents of BPD symptoms. They were (1) irritability (affective instability, inappropriate anger, identity disturbances), (2) impulsivity (impulsive acts, identity disturbances), (3) poorly modulated relationships (unstable relationships, abandonment fears), and (4) self-negation (self-mutilating or suicidal behaviors, boredom, and emptiness). Even though this four-factor solution was based on DSM-III-R BPD criteria set, which did not include the criterion of transient dissociative or psychotic symptoms, it resembles the four-factor model proposed by Lieb, Zanarini, Schmahl, Linehan, and Bohus (2004). According to Lieb et al., the core pathology of BPD can be conceptually divided into four major domains: (1) affective disturbances (affective instability, inappropriate anger, chronic emptiness); (2) impulsivity (impulsive acts, self-mutilating, or suicidal behaviors); (3) unstable relationships (unstable relationships, fear of abandonment); and (4) disturbed cognition (identity disturbances, transient dissociative/psychotic symptoms).

The lack of diagnostic stability over time among adolescents creates another challenge to the application of the BPD diagnosis to adolescents. Bernstein et al. (1993) reported that only 29% and 24% adolescents who received moderate or severe BPD diagnosis in their study persisted to have the diagnosis two years later. Other researchers (Meijer, Goedhart, & Trefers, 1998), however, indicated that while the BPD diagnosis may change over time, different BPD symptoms differ in terms of stability. For example, self-mutilation, suicidal gesture, and transient dissociative/psychotic symptoms were less stable, persisting in only 30% of adolescent inpatients who endorsed them at baseline. Symptoms like mood lability and anger dyscontrol were more stable, persisting in 70% of the patients. Perhaps
individuals vulnerable for BPD may display stable trait of mood dysregulation, but they show acting-out behavior, self-mutilation or suicidal gesture, or transient dissociative features only in time of extreme emotional distress (McGlashan et al., 2005).

**PREVALENCE OF BPD IN ADOLESCENTS**
The prevalence of BPD in adolescents is uncertain as few systematic epidemiological studies have been conducted. In a U.S. community sample of adolescents (Bernstein et al., 1993), participants (n = 733) completed a battery of diagnostic instruments including Personality Diagnostic Questionnaire (Hyler et al., 1988) and Quality of Life Interview (Cohen, 1986). Diagnostic scales for personality disorders were retrospectively developed by selecting items from the battery of instruments. Among the 17 items selected to assess the DSM-III-R BPD criteria, none matched the criterion of identity disturbances. In this study, 7.8% of subjects was classified as moderate BPD and 3.0% severe BPD. No gender difference was observed. Findings from this study should be interpreted with caution since the diagnostic items were derived from scales not originally intended to measure BPD features.

In a French study (Chabrol, Montovany, Chouicha, Callahan, & Mullet, 2001), a sample of 1,363 high school students completed the self-report Screening Test for Comorbid Personality Disorders (STCPD; Dowson, 1992). Among them, 107 volunteered to be interviewed using the Revised Diagnostic Interview for Borderlines (DIB-R; Zanarini, Gunderson, Frankenburg, & Chauncey, 1989). A regression analysis was conducted using the DIB-R score as criterion and STCPD score as predictor. The BPD cut-off point for STCPD was then derived by substituting the DIB-R clinical cut-off point into the regression equation. According to the derived STCPD cut-off point, about 10% of boys and 18% of girls were classified as BPD. A major limitation of this study is that the BPD diagnostic cut-off for STCPD was inferred from the smaller volunteered sample to the larger random sample, which may not be comparable.

Findings of these two available studies reported prevalence rates of BPD among adolescents much higher than the 1-2% observed among general population (Torgersen et al., 2001; Widiger & Weissman, 1991). Due to methodological limitations of these studies, it is difficult to assess to what extent these estimated figures have been confounded by false positives. More stringent epidemiological studies in the future are clearly needed.

**BPD AMONG THE CHINESE POPULATION**
The BPD construct met strong resistance in the psychiatric profession in China. Committee members of the Chinese Classification of Mental Disorders-III (CCMD-III; Chinese Psychiatry Association, 2001) argued that BPD is a vague construct and some of its diagnostic features (e.g., fear of aban-
donment) may not be appropriate culturally when used in China. As a result, the CCMD-III does not include the BPD diagnosis in its nomenclature, and consequently most clinicians and researchers in China are not familiar with this clinical construct (Zhong & Leung, 2007). Preliminary empirical studies examining the construct validity of BPD, however, suggested that the clinical syndrome of BPD as observed among Chinese adult psychiatric patients was comparable to that reported in the West (Leung, Cheung, & Cheung, 2004). The DSM-IV-TR BPD criteria set, as measured by the Chinese Personality Disorder Inventory, showed acceptable internal consistency ($\alpha = .71$) and good concurrent validity among Chinese adult psychiatric patients (Leung et al., 2004; Leung, Chan, & Cheung, 2007). These findings suggest that BPD patients do exist in China and systematic research to study the characteristics of this population is clearly needed. This is an important clinical topic because the prevalence of BPD has been estimated to be at 1–2% among general population in the West (Torgersen et al., 2001; Widiger & Weissman, 1991), and if this prevalence figure is generalizable to China, a country with 1.3 billion people, it means 13 to 26 million Chinese could be suffering from BPD without ever been properly diagnosed or treated.

PURPOSES OF THIS STUDY

Previous studies in the West indicated that the BPD construct shows acceptable internal consistency and concurrent validity among adolescents. Studies conducted with Chinese adult psychiatric patients also provide preliminary empirical support to the construct validity of BPD among the Chinese. To our knowledge, no study has examined the BPD construct among Chinese adolescents. The present study explored the construct validity and prevalence of BPD in a large sample of Chinese adolescents in Hong Kong over a one-year period. We also conducted confirmatory factor analyses (CFA) to examine the factorial structure of the DSM-IV-TR BPD criteria set as assessed by McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al., 2003) among our adolescent sample.

Several models were available to guide our analyses (Lieb et al., 2004; Sanislow et al., 2002). Lieb et al.'s four-factor model suggested that BPD symptoms can be conceptually divided into four major domains: (1) affective disturbances (affective instability, inappropriate anger, chronic emptiness); (2) impulsivity (impulsive acts, self-mutilating or suicidal behaviors); (3) unstable relationships (unstable relationships, fear of abandonment); and (4) disturbed cognition (identity disturbances, transient dissociative/psychotic symptoms).

In a CFA study of DSM-IV-TR BPD symptoms among adult psychiatric patients, Sanislow et al. (2002) reported that the BPD symptoms can be explained both by a single-factor model as well as a three-factor model. Detailed analysis suggested that the three-factor model provided a better
fit. These factors included (1) affective dysregulation (affective instability, inappropriate anger, abandonment fears), (2) behavioral dysregulation (impulsive acts, self-mutilating or suicidal gestures) and (3) disturbed relatedness (unstable relationships, identity disturbance, chronic emptiness, transient dissociative/paranoid symptoms). Sanislow et al. suggested that these three factors describe the physiological traits, symptomatic behaviors, and personality deficits of BPD patients. Sanislow et al., however, warned that abandonment fear, which loaded unexpectedly with the affective dysregulation factor, could be a statistical artifact because of the item’s relatively low endorsement rate.

In the present study, we used CFA to compare five different models. They included: (1) Lieb et al.’s (2004) four-factor model; (2) a modified four-factor model in which we assumed chronic emptiness would cluster better with cognitive rather than affective symptoms as we speculated emptiness may reflect dissociative symptoms (Sanislow et al., 2002); (3) Sanislow et al.’s three-factor model; (4) a modified three-factor model in which we assigned abandonment fear to disturbed relatedness rather than affective dysregulation factor; and (5) Sanislow et al.’s (2002) one-factor model. Moreover, since the paranoid ideation item of the MSI-BPD (i.e., I have often been distrustful of other people when emotionally distressed) clearly assesses interpersonal distrust, we hypothesized that it would cluster with unstable interpersonal relationship and fear of abandonment to form the factor of interpersonal disturbances.

METHOD
SUBJECTS

Participants came from five high schools in Hong Kong. At Time 1, a total of 5,224 adolescents, aged between 12 and 20 years (M = 14.6, SD = 1.80) were tested. Among them, 68.7% (N = 3,318) were females and 31.3% (N = 1,906) were males. At Time 2, a total of 5,461 adolescents (62.7% females and 37.3% males), aged between 12 and 20 years (M = 14.7, SD = 1.99), were tested. Among the Time 1 sample, 4,110 participants (63.6% females and 38.4% males) were successfully retested at Time 2. Attrition of sample was mainly due to graduation of senior students.

MEASURES

MSI-BPD. The Chinese version of the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al., 2003) was used to measure the construct of BPD (Wang, Leung, & Zhong, 2008). In the MSI-BPD, each BPD diagnostic criterion was assessed by one item, with the exception of transient psychotic feature which was assessed by two separate items. According to Zanarini et al., MSI-BPD had adequate one-week test-retest reliability (r = .72), good internal consistency (α = .74).
and item-total correlation (ranged between .45 and .63). In this study, participants rated their level of symptom severity on a four-point scale, i.e., 1 (very disagree); 2 (disagree); 3 (agree); 4 (very agree). Summation of the ten item ratings gives a dimensional score. When categorical response was required (i.e., determining item endorsement), a rating of 1 or 2 was converted into a "no" response and a rating of 3 or 4 into a "yes" response. The diagnostic cutoff of the MSI-BPD is seven. Subjects who endorsed seven or more items could be considered as a BPD case.

Affective Instability. Affective instability was measured by "Reactivity to Situations" subscale of the Mood Survey (Underwood & Froming, 1980). It had adequate 7-week test-retest reliability (r = .83) and concurrent validity with emotionality (r = .69). It consists of 7 items, e.g., Sometimes my moods swing back and forth very rapidly. Responses were made on a four-point scale ranging from 1 (very disagree) to 4 (very agree). Higher scores indicate more labile affect. This scale had a Cronbach’s alpha of .92 in this study.

Impulsive Behavior. A ten-item impulsivity scale extracted and modified from the Revised Diagnostic Interview for Borderlines (DIB-R; Zanarini et al., 1989) was used to assess impulsive behavior. Participants rated how frequent they displayed various behaviors (e.g., binge eating, verbal outburst) over the past two years on a 4-point scale from 1 (never) to 4 (six or more times). Higher scores indicate more impulsive behaviors. This scale had a Cronbach’s alpha of .76 in this study.

Instability of Self. Instability of sense of self was measured by five items modified from the Rosenberg’s Stability of Self Scale (Alaska & Olweus, 1986). Ratings were made on a 4-point scale from 1 (very disagree) to 4 (very agree). Higher scores indicate a more unstable sense of self. This scale had a Cronbach’s alpha of .90 in this study.

Self-Deflation Proneness. The Self-Deflation Proneness scale (SDPS; Poon, 2003), a 10-item instrument, was used to assess the fragility of one’s sense of self. A sample item is “Even minor setbacks can shatter my self-confidence.” The SDPS had excellent internal consistency (α = .94) and good one-year test-retest reliability (r = .63). Items were rated from 1 (strongly agree) to 5 (strongly disagree). Higher scores reflect a more fragile sense of self. This scale had a Cronbach’s alpha of .95 in this study.

Disturbed Interpersonal Relationships. Disturbed interpersonal relationships were assessed by five items extracted and modified from the DIB-R (Zanarini et al., 1989). A sample item was “I repeatedly worried about being abandoned by someone close to me.” Items were rated from 1 (very disagree) to 4 (very agree). Higher scores reflect more problematic interpersonal relationships. This scale had a Cronbach’s alpha of .78 in this study.

Depression. The Chinese version of the Depression Subscale of Symptoms Checklist-90 (SCL-90; Derogatis, Lipman, & Covi, 1973) was used to assess depressive symptoms. The original scale had 13 items. One item, “Loss of sexual interest or pleasure,” was deleted in this study as school authorities considered it inappropriate for younger adolescents. Responses
were made on a five-point scale from 1 (never) to 5 (always). This scale had a Cronbach's alpha of .92 in this study.

With the exception of the MSI-BPD, Self-Deflation Proneness Scale, and SCL-90-Depression Scale for which Chinese versions were available, all other measures were first translated into Chinese by the first author and then back translated independently by two bilingual researchers. Fidelity was judged to be very high to place confidence in the translation as a whole. The whole questionnaire package was then reviewed and modified by the second author to make sure all items would be culturally relevant and understandable by young Chinese adolescents in Hong Kong.

Simulated Diagnostic Method In this study, we were not able to conduct diagnostic interview with our subjects as we originally planned because school authorities of the participating schools expressed serious concerns about the possible labeling effect and insisted on strict principle of anonymity. To deal with this constraint, we developed a stringent simulated diagnostic procedure to assess BPD diagnosis during the Time 2 testing. According to this procedure, we selected three highly relevant items to assess each of the BPD diagnostic criteria (see Appendix 1). Some of these items were extracted from measures we used to assess relevant BPD features. Other items were selected from the DIB-R (Zanarini et al., 1989). Participants had to endorse all three relevant items to be considered as meeting a specific BPD criterion. For instance, to meet the criterion for identity disturbance, participants had to endorse the following three items: "I am confused about my own self," "My values change quickly," and "My vocational goal changes often." Following the DSM-IV-TR cut-off rule, participants had to meet at least five criteria to be considered as a BPD case.

PROCEDURE

The study required written parental consent for student participation and followed standard data collection protocols approved by the Ethics in Human Research Committee of the Chinese University of Hong Kong. Subjects completed the questionnaires in classrooms during a 45-minute period. Students absent from school on the day of testing were administered questionnaires later under the supervision of school personnel. The study was framed as a “Study of Emotion and Mental Health among Adolescents.” Strict confidentiality of the study was emphasized. To protect the privacy of the subjects, students were not required to provide full names on the questionnaires. Instead, they were asked to put down their surnames and date of birth, and from that a unique ID for each subject (e.g., CHAN101492) was created for data-matching purpose over repeated testing. Because of the cooperation of the school authorities and their strong encouragement for their students to participate in the study, overall student participation rates were close to 99% for both Time 1 and Time 2 testing.
RESULTS

Preliminary analyses were first done separately for female and male sub-
jects. Since result patterns were comparable, the two samples were com-
bined for most analyses.

CONSTRUCT VALIDITY OF BPD AMONG CHINESE ADOLESCENTS

Internal Consistency. Table 1 shows the item-total correlations and in-
teritem correlations for MSI-BPD. For Year 1 data, item-total correlations
ranged from .48 to .66. Interitem correlations ranged from .25 to .60 (p <
0.01), and mean interitem correlation was .39. These findings indicated
that BPD features as measured by MSI-BPD clustered well together as a
clinical syndrome among Chinese adolescents. The highest interitem cor-
relation was between inappropriate anger and affective instability (r = .60).
Similar results were replicated in the Time 2 data. Cronbach's alpha coeffi-
cient was .86 and .87 for Time 1 and Time 2, respectively.

Concurrent Validity. Pearson correlations between MSI-BPD and (1) af-
fective instability, (2) impulsive behaviors, (3) instability of self/self-defla-
tion proneness, and (4) disturbed interpersonal relationships, the four ma-
jor domains of BPD pathology, were .74, .48, .75/.63, and .78 (p < .001)
at Time 1 and .74, .51, .66/.62, and .75 (p < .001) at Time 2, respectively.
MSI-BPD score was also positively correlated with depression (r = .70 and
.72 for Time 1 and Time 2, respectively, p < .001). Partial correlations be-
tween MSI-BPD and affective instability, impulsive behaviors, instability
of self/self-deflation proneness, and disturbed interpersonal relationship,
after controlling for depression, were .53, .31, .54/.29, and .62 (p < .001)
at Time 1 and .51, .33, .41/.26, and .56 (p < .001) at Time 2, respectively.
These findings indicated that the relationships between MSI-BPD and
other cross-validating measures remain, albeit at an attenuated degree,
even when the effect of depressed mood was partialled out.

Factorial Validity. Table 2 presents the CFA results of the MSI-BPD in
our samples. The CFAs were run by EQS. Since the data violated the as-
sumption of multivariate normality, analyses were rescaled by Satorra
Bentler modification (Satorra, Chou, & Bentler, 1991). For all multifactor
models, factors were allowed to correlate with each other. For model com-
parison, chi-square, which was susceptible to large sample size, was not
suitable for comparing nonnested model. Therefore, CAIC, which adjusted
for sample size and was useful for comparing nonnested model, was exam-
ined. Similar to chi-square, lower CAIC indicated better fit.

Results revealed that all models provided acceptable fit indices, with
NFI, NNFI, and CFI above .90 and RMSEA below .08. Fit estimates of the 1-
factor model indicated adequate fit for data from both time points, though
marginally acceptable for Time 2 (NFI = .917, CFI = .920, NNFI = .900,
RMSEA = .078 at Time 2). However, the largest, χ², CAIC, RMSEA, and low-
est NFI, CFI, and NNFI, together, indicated that the single factor model
was not as good in terms of model fit when compared to other multifactor
models.
<table>
<thead>
<tr>
<th>Item</th>
<th>Affective Instability</th>
<th>Self-destructive behaviors</th>
<th>Impulsive behaviors</th>
<th>Identity disturbance</th>
<th>Unstable relationships</th>
<th>Identity</th>
<th>Disassociation</th>
<th>Dissociative symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abandonment</td>
<td>0.60 (67)</td>
<td>-0.48 (48)</td>
<td>0.47 (49)</td>
<td>-0.39 (39)</td>
<td>-0.27 (24)</td>
<td>-0.35 (31)</td>
<td>-0.48 (51)</td>
<td>-0.26 (29)</td>
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<tr>
<td>Emptiness</td>
<td>-0.60 (60)</td>
<td>-0.48 (48)</td>
<td>0.47 (49)</td>
<td>-0.41 (41)</td>
<td>-0.35 (35)</td>
<td>-0.38 (40)</td>
<td>-0.41 (41)</td>
<td>-0.38 (40)</td>
</tr>
<tr>
<td>Chronic</td>
<td>-0.60 (60)</td>
<td>-0.48 (48)</td>
<td>0.47 (49)</td>
<td>-0.32 (32)</td>
<td>-0.26 (26)</td>
<td>-0.35 (35)</td>
<td>-0.41 (41)</td>
<td>-0.38 (40)</td>
</tr>
<tr>
<td>Suicidal ideation</td>
<td>-0.59 (59)</td>
<td>-0.48 (48)</td>
<td>0.47 (49)</td>
<td>-0.42 (42)</td>
<td>-0.39 (39)</td>
<td>-0.40 (40)</td>
<td>-0.42 (42)</td>
<td>-0.39 (39)</td>
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<tr>
<td>Paranoia</td>
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<td>0.47 (49)</td>
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<td>-0.35 (35)</td>
<td>-0.40 (40)</td>
<td>-0.39 (39)</td>
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<td>-0.48 (48)</td>
<td>0.47 (49)</td>
<td>-0.37 (37)</td>
<td>-0.40 (40)</td>
<td>-0.36 (36)</td>
<td>-0.37 (37)</td>
<td>-0.39 (39)</td>
</tr>
<tr>
<td>Chronic</td>
<td>-0.60 (60)</td>
<td>-0.48 (48)</td>
<td>0.47 (49)</td>
<td>-0.40 (40)</td>
<td>-0.25 (25)</td>
<td>-0.35 (35)</td>
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<tr>
<td>Suicidal ideation</td>
<td>-0.59 (59)</td>
<td>-0.48 (48)</td>
<td>0.47 (49)</td>
<td>-0.37 (37)</td>
<td>-0.40 (40)</td>
<td>-0.36 (36)</td>
<td>-0.37 (37)</td>
<td>-0.39 (39)</td>
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<tr>
<td>Identity</td>
<td>-0.60 (60)</td>
<td>-0.48 (48)</td>
<td>0.47 (49)</td>
<td>-0.35 (35)</td>
<td>-0.26 (26)</td>
<td>-0.35 (35)</td>
<td>-0.48 (51)</td>
<td>-0.38 (53)</td>
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<tr>
<td>Disassociation</td>
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<td>-0.48 (48)</td>
<td>0.47 (49)</td>
<td>-0.39 (39)</td>
<td>-0.27 (24)</td>
<td>-0.35 (31)</td>
<td>-0.48 (51)</td>
<td>-0.38 (53)</td>
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<tr>
<td>Dissociative</td>
<td>-0.60 (60)</td>
<td>-0.48 (48)</td>
<td>0.47 (49)</td>
<td>-0.39 (39)</td>
<td>-0.27 (24)</td>
<td>-0.35 (31)</td>
<td>-0.48 (51)</td>
<td>-0.38 (53)</td>
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</table>

Note: Values in parentheses are for Time 2 data. Cronbach's alpha coefficients are .96 and .87 for Time 1 and 2 respectively.
Comparing the two three-factor models \((df = 32)\), the modified three-factor model yielded a lower chi-square and CAIC \((\chi^2 = 341.0, \text{CAIC} = 35.6)\). Goodness of fit indices were also more satisfactory \((\text{NFI} = .972, \text{CFI} = .975, \text{NNFI} = .964, \text{RMSEA} = .043)\), suggesting that it fits better than Sanislow et al.'s (2002) original three-factor model. In the modified model, intercorrelations between factors ranged from .76 to .83. All factor loadings were above .50 (see Figure 1).

Comparing with Lieb et al.'s (2004) four-factor model, the modified four-factor model yielded a lower chi-square and CAIC \((\chi^2 = 299.5, \text{CAIC} = 22.7, \text{df} = 29)\), whereas goodness-of-fit indices were also more satisfactory \((\text{NFI} = .975, \text{CFI} = .978, \text{NNFI} = .965, \text{RMSEA} = .043)\). This suggested that the modified four-factor model fits better than Lieb et al.'s model. In the modified model, intercorrelations between factors ranged from .76 to .97. All factor loadings were above .50 (see Figure 2).

### Table 2: Confirmatory Factor Analyses of DSM-IV-TR BPD Criteria Set as Assessed by MSI-BPD in Chinese Adolescents

<table>
<thead>
<tr>
<th>Model</th>
<th>(\chi^2)</th>
<th>df</th>
<th>(p)</th>
<th>CAIC</th>
<th>NFI</th>
<th>CFI</th>
<th>NNFI</th>
<th>RMSEA</th>
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</thead>
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<tr>
<td>Time 1 data (N = 5,224)</td>
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<tr>
<td>Lieb 4-factor</td>
<td>572.7</td>
<td>29</td>
<td>&lt;.0001</td>
<td>295.8</td>
<td>.953</td>
<td>.955</td>
<td>.931</td>
<td>.060</td>
</tr>
<tr>
<td>Modified Lieb 4-factor</td>
<td>299.5</td>
<td>29</td>
<td>&lt;.0001</td>
<td>22.7</td>
<td>.975</td>
<td>.978</td>
<td>.965</td>
<td>.043</td>
</tr>
<tr>
<td>Sanislow 3-factor</td>
<td>471.3</td>
<td>32</td>
<td>&lt;.0001</td>
<td>165.9</td>
<td>.961</td>
<td>.964</td>
<td>.949</td>
<td>.052</td>
</tr>
<tr>
<td>Modified Sanislow 3-factor</td>
<td>341.0</td>
<td>32</td>
<td>&lt;.0001</td>
<td>35.6</td>
<td>.972</td>
<td>.975</td>
<td>.964</td>
<td>.043</td>
</tr>
<tr>
<td>One-factor</td>
<td>812.7</td>
<td>35</td>
<td>&lt;.0001</td>
<td>478.6</td>
<td>.933</td>
<td>.936</td>
<td>.918</td>
<td>.066</td>
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<tr>
<td>Time 2 data (N = 5,461)</td>
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<tr>
<td>Lieb 4-factor</td>
<td>826.5</td>
<td>29</td>
<td>&lt;.0001</td>
<td>548.4</td>
<td>.942</td>
<td>.944</td>
<td>.913</td>
<td>.072</td>
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<tr>
<td>Modified Lieb 4-factor</td>
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<td>29</td>
<td>&lt;.0001</td>
<td>322.9</td>
<td>.958</td>
<td>.960</td>
<td>.938</td>
<td>.061</td>
</tr>
<tr>
<td>Sanislow 3-factor</td>
<td>774.1</td>
<td>32</td>
<td>&lt;.0001</td>
<td>467.3</td>
<td>.946</td>
<td>.948</td>
<td>.927</td>
<td>.066</td>
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<tr>
<td>Modified Sanislow 3-factor</td>
<td>678.1</td>
<td>32</td>
<td>&lt;.0001</td>
<td>371.2</td>
<td>.952</td>
<td>.955</td>
<td>.936</td>
<td>.061</td>
</tr>
<tr>
<td>One-factor</td>
<td>1177.0</td>
<td>35</td>
<td>&lt;.0001</td>
<td>841.4</td>
<td>.917</td>
<td>.920</td>
<td>.900</td>
<td>.078</td>
</tr>
</tbody>
</table>

Comparing the two models, the modified three-factor model yielded a lower chi-square and CAIC \((\chi^2 = 341.0, \text{CAIC} = 35.6)\). Goodness of fit indices were also more satisfactory \((\text{NFI} = .972, \text{CFI} = .975, \text{NNFI} = .964, \text{RMSEA} = .043)\), suggesting that it fits better than Sanislow et al.'s (2002) original three-factor model. In the modified model, intercorrelations between factors ranged from .76 to .83. All factor loadings were above .50 (see Figure 1).

Comparing with Lieb et al.'s (2004) four-factor model, the modified four-factor model yielded a lower chi-square and CAIC \((\chi^2 = 299.5, \text{CAIC} = 22.7, \text{df} = 29)\), whereas goodness-of-fit indices were also more satisfactory \((\text{NFI} = .975, \text{CFI} = .978, \text{NNFI} = .965, \text{RMSEA} = .043)\). This suggested that the modified four-factor model fits better than Lieb et al.'s model. In the modified model, intercorrelations between factors ranged from .76 to .97. All factor loadings were above .50 (see Figure 2).
Comparing the modified three-factor model and the modified four-factor model, the latter had lower CAIC and slightly higher NFI, CFI, and NNFI. This suggested that the modified four-factor model provides a slightly better fit. However, the same value of RMSEA revealed that the two models were very similar in terms of degree of fitness. Thus, it is open to interpretation as to which model is better conceptually. While the modified three-factor model is more parsimonious, the modified four-factor model provides a more detailed account of symptom composition of BPD. It is important to note that even the modified four-factor model seems to provide a better conceptual organization of the various BPD symptoms, the high correlation between self-identity and interpersonal disturbances (r = .97) indicated that these two factors were closely related empirically in our adolescent sample.

PREVALENCE OF BPD AMONG CHINESE ADOLESCENTS

When we used the MSI-BPD cutoff as specified by Zanarini et al. (2003), 7.4% females and 4.2% males at Time 1 and 7.7% females and 5.0% males at Time 2 met the BPD diagnosis. The prevalence rates were significantly higher for females in both years ($\chi^2 = 20.83$ and 14.51, respectively, $df = 1$, $p < .001$). When the stringent simulated diagnostic procedure was applied during the Time 2 testing, only 2.2% females and 1.8% males met the BPD diagnosis, and no significant gender difference was observed ($\chi^2 = 0.81$, $df = 1$, $p > .05$).
STABILITY OF BPD FEATURES AS ASSESSED BY MSI-BPD

Among the 4,110 subjects who participated in both Time 1 and Time 2 testing over a 12-month period, the total MSI-BPD score at Time 1 was significantly correlated with that at Time 2 (r = .60 for females and .51 for males, respectively, p < .001). These test-retest correlations indicate that BPD features among adolescents, when measured as a unitary dimension, show reasonable degree of stability over a 12-month period. When a categorical approach was used, however, a different picture emerged. Table 3 shows the percentages of subjects who repeatedly endorsed the BPD features as assessed by MSI-BPD over the one-year period. Out of the participants who scored above the diagnostic cutoff of MSI-BPD at Time 1, only 36.8% females and 36.2% males scored above the diagnostic cutoff again at Time 2. When the endorsement rates of each BPD feature was examined individually, different pattern of results emerged for adolescent girls and boys. Comparing to girls, boys seem to have a more unstable symptoms endorsement pattern over time, particularly in affective instability (65.2% vs. 48.4%), anger dyscontrol (50.5% vs. 40.4%), impulsive behaviors (43.4% vs. 25.9%), unstable relationships (53.2% vs. 43.4%), and identity disturbances (52.2% vs. 41%). Among the various BPD features, paranoid ideation had the most stable endorsement pattern, with 63.5% girls and 62.1% boys endorsed that item repeatedly at both time points. Affective instability was also relatively stable, with 65.2% girls and 48.4% boys endorsed the item repeatedly over time. The BPD features that were less stably endorsed included impulsive behaviors, fear of abandonment, and self-mutilating/suicidal behaviors.

<table>
<thead>
<tr>
<th>Individual Symptoms</th>
<th>Above MSI-BPD cutoff</th>
<th>Scored positive at both T1 and T2 (%)</th>
<th>Boys</th>
<th>Scored positive at both T1 and T2 (%)</th>
<th>χ²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affective instability</td>
<td>65.2</td>
<td>48.4</td>
<td></td>
<td>28.4</td>
<td>.007</td>
<td>NS</td>
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<tr>
<td>Anger dyscontrol</td>
<td>50.5</td>
<td>40.4</td>
<td></td>
<td>7.82</td>
<td>&lt;.05</td>
<td></td>
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<tr>
<td>Impulsive behaviors</td>
<td>43.4</td>
<td>25.9</td>
<td></td>
<td>15.6</td>
<td>&lt;.01</td>
<td></td>
</tr>
<tr>
<td>Unstable relationships</td>
<td>53.2</td>
<td>43.4</td>
<td></td>
<td>7.26</td>
<td>&lt;.05</td>
<td></td>
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<tr>
<td>Abandonment fear</td>
<td>31.7</td>
<td>35.3</td>
<td></td>
<td>.708</td>
<td>NS</td>
<td></td>
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<tr>
<td>Identity disturbance</td>
<td>52.2</td>
<td>41.0</td>
<td></td>
<td>7.43</td>
<td>&lt;.05</td>
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<td>Chronic emptiness</td>
<td>46.3</td>
<td>45.4</td>
<td></td>
<td>.057</td>
<td>NS</td>
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<td>Self-mutilation/suicide</td>
<td>44.4</td>
<td>34.4</td>
<td></td>
<td>2.05</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Paranoid ideation</td>
<td>63.5</td>
<td>62.1</td>
<td></td>
<td>.214</td>
<td>NS</td>
<td></td>
</tr>
<tr>
<td>Dissociative symptom</td>
<td>49.7</td>
<td>46.8</td>
<td></td>
<td>.585</td>
<td>NS</td>
<td></td>
</tr>
</tbody>
</table>

NS = Not Significant
DISCUSSION
CONSTRUCT VALIDITY OF BPD AMONG CHINESE ADOLESCENTS

The present study examined the construct validity and prevalence of BPD among Chinese adolescents in Hong Kong. Findings indicate that the DSM-IV-TR BPD criteria set as assessed by the MSI-BPD measures a reliable and coherent personality construct among Chinese adolescents as demonstrated by the high internal consistency and item-total correlations. The BPD construct as measured by MSI-BPD also has good concurrent validity and factorial validity. These findings lend further empirical support to the generalizability of the BPD construct among the Chinese population (Leung et al., 2004; Leung et al., 2007).

Results of item analysis indicate that among the ten MSI-BPD features, affective instability had the highest item-total correlation and correlated highly with most of the other BPD symptoms, particularly anger dyscontrol and impulsive behaviors. Similar results were also observed in adult psychiatric patients (Grilo et al., 2001; Johansen, Karterud, Pedersen, Gude, & Falkum, 2004), highlighting the importance of emotion dysregulation in the BPD construct (Leung & Zhong, 2006; Linehan, 1993).

According to DSM-IV-TR, BPD is characterized by frequent mood and impulse dysregulation, unstable self-image, and chaotic interpersonal relationships (American Psychiatric Association, 2000). Findings of this study lend support to the concurrent validity of the BPD construct as measured by the MSI-BPD in our Chinese adolescent sample. As expected, significant moderate to high positive correlations were observed between MSI-BPD scores and independent measures of affective instability, impulsive behaviors, unstable and fragile self-image, and disturbed interpersonal relationships. Since BPD features and depressive symptoms are highly correlated (Marton et al., 1989; Zimmerman & Mattia, 1999), it is possible that the correlation between BPD features and other personality measures may be attributed to their common variance with depression. However, after controlling for depression in our analyses, all partial correlations between MSI-BPD and its concurrent correlates remained significant even though at an attenuated level. These findings are consistent with previous studies which indicated that the BPD pathology was associated with high mood lability (Zeigler-Hill & Abraham, 2006), fragile self-concept (Pinto, Grapentine, Francis, & Picarello, 1996), frequent interpersonal conflicts, and low relationship satisfaction (Daley, Burge & Hamm, 2000).

CFA results in this study indicate that the DSM-IV-TR BPD criteria set as assessed by MSI-BPD can be represented by either a four-factor or a three-factor model among Chinese adolescents. The four-factor model includes affective dysregulation, impulsivity, interpersonal disturbances, and self/cognitive disturbances. The three-factor model combines the interpersonal and self/cognitive disturbances components into a single factor. While the three-factor model is more parsimonious, the four-factor
model provides a more detailed conceptualization of symptom composition of the BPD pathology. Overall, findings of the CFA results are consistent with the current conceptualization of the BPD pathology (Lieb et al., 2004; Leung & Zhong, 2006; Linehan, 1993).

Many researchers believed that emotional vulnerability, which manifested as mood lability and frequent anger outburst (similar to the affective dysregulation factor in our CFA results), may represent an important predisposing personality trait in the development of BPD (Lieb et al., 2004; Leung & Zhong, 2006; Linehan, 1993). Frequent mood dysregulation may impair interpersonal relationships (Linehan, 1993). The interpersonal disturbances factor found in this study, which included unstable relationships, interpersonal distrust, and fear of abandonment, may reflect this ambivalent relationship pattern (Millon & Davis, 1996). Frequent mood dysregulation may also impede the development of stable self-cognition and disrupt other cognitive functioning (Zimmerman & Mattia, 1999). Our self/cognitive disturbances factor which included unstable self-cognition, chronic feeling of emptiness, and dissociative symptoms may reflect problems in the cognitive domain. Impulsive acts and self-mutilation may represent maladaptive behavioral reactions in time of intense painful affects (Linehan, 1993). Our impulsivity factor which included impulsive acting-out behavior and suicidal acts may represent the impulsive component within the borderline syndrome (Brodsky, Malone, Ellis, Dulit, & Mann, 1997). These four factors correspond to the four major domains of BPD functioning as stated in Lieb et al.’s model.

PREVALENCE OF BPD FEATURES AMONG CHINESE ADOLESCENTS

Using only the MSI-BPD as a screening tool, 7.4% girls and 4.2% boys were classified as suffering from BPD at Time 1, and 7.7% girls and 5.0% boys at Time 2. These prevalence figures should be viewed with caution as self-report instruments, when compared to structured clinical interviews, are prone to overdiagnose personality disorders (Hunt & Andrews, 1992; Hyler, Skodol, Kellman, Oldham, & Rosnick, 1990; Modestin, Erni, & Oberson, 1998; Zimmerman & Coreyell, 1990). Since the school authorities refused to let us identify subjects for clinical interview, we developed a stringent simulated diagnostic procedure for Time 2 testing with the intention of achieving a more reliable estimate of the prevalence of BPD among our adolescent sample. According to this simulated diagnostic procedure, subjects had to endorse three relevant behavior features to be considered as meeting a specific BPD diagnostic criterion. We believe this stringent requirement would have enhanced the possibility that subjects truly display the concerned behavior characteristics. Based on this procedure, 2.2% girls and 1.8% boys in our study met the BPD diagnosis. These prevalence figures are highly comparable to those reported among general population in the West (Torgersen et al., 2001; Widiger & Weissman, 1991).
Without collaborative information from structured clinical interviews, these prevalence figures should be regarded as preliminary estimates await confirmation from future studies. It is important, however, to realize that even interview-based diagnoses display poor reliability and questionable validity as evidenced by the different findings yielded from different structured interviews (Hyler et al., 1990). This is particularly relevant when subjects are young adolescents whose responses may be easily influenced by social desirability, hence under-reporting in face-to-face interview (Moum, 1998). Anonymous self-report methodology, when applied with well-planned cross-validating questions, may help eliciting more honest responses as well as eliminating interviewer bias.

**STABILITY OF BPD FEATURES**

Our findings indicate that the BPD pathology, when assessed as a dimension with the MSI-BPD, displayed moderate one-year test-retest stability. This finding is consistent with what was reported in a previous study (Crawford, Cohen, & Brook, 2001). When the categorical approach was used, however, only 36.8% girls and 36.2% boys in this study scored above the diagnostic cutoff consistently at both time points. The finding that BPD as a diagnosis is not stable over time may appear counterintuitive as personality disorders by DSM definition should be enduring. Some researchers pointed out that BPD is a diagnosis with heterotypic continuity which consists of both state and trait symptoms (Mattanah, Becker, Levy, Edell, & McGlashan, 1995). While trait symptoms may persist over time, state symptoms do not. Our findings reveal that affective instability and interpersonal distrust were the more stable features among our adolescent sample. Fear of abandonment, self-mutilating/suicidal behavior, and impulsive behaviors were less stable. Similar findings were also observed in adult patients (Meijer, Goedhart, & Treffers, 1998). It is possible that affective instability represents the predisposing vulnerability trait of BPD (Leung & Zhong, 2006; Linehan, 1993). This stable trait of affective instability, even at subthreshold level, may impede the development of a stable sense of self and secure interpersonal bonding, making them more vulnerable to full-blown BPD in the future (Morey & Zanarini, 2000). Based on this reasoning, a person vulnerable for BPD may not display all the required symptoms of BPD as some acute symptoms, like suicidal behaviors and impulsive acts, may occur only in time of severe emotional distress (Linehan, 1993). Future research should examine the possible developmental sequences of different BPD symptoms to develop a better understanding of the pathogenesis of this complex disorder.

**STRENGTHS AND LIMITATIONS**

There are several strengths in this study. First, the large sample size ensures sufficient variability within the sample and enhances the reliability...
of the findings. Second, our sample was followed longitudinally over a one-year period. The replication of results over time lends further support to the reliability of our findings. Findings of this study, however, should be considered in light of certain limitations. First, our data were based solely on adolescents' self-report. Because of strong objections from school authorities, we were unable to conduct structured clinical interviews with our subjects as originally planned. Instead, we needed to develop a stringent simulated diagnostic procedure to assess prevalence of BPD among our subjects. These findings await external cross-validation, either by interview data or data from other informants such as peers or parents in future studies. Considering the strong concern with labeling or stigmatizing effects of mental illness in the Chinese culture, other means of collecting cross-validating data should be explored in future studies. Second, our sample of school adolescents may not be fully representative of all the adolescents in Hong Kong. It is possible that school drop-outs may contain more BPD individuals. Future studies examining BPD features among school drop-outs may be fruitful.

Despite the limitations, findings from this study demonstrate that BPD is a reliable and coherent personality construct with good concurrent validity, factorial validity, and acceptable test-retest reliability among Chinese adolescents in Hong Kong. A stringent simulated diagnostic procedure revealed that 2.2% female and 1.8% male adolescents met the BPD diagnosis. The CCMD-III (Chinese Psychiatric Association, 2001) does not include BPD diagnosis in its nomenclature, claiming that the BPD diagnosis is a vague construct that lacks precise boundaries and some of its diagnostic features (e.g., fear of abandonment) may not be appropriate culturally when used in China. Our findings, however, lend empirical support to the BPD construct and suggest that cultural factors do not seem to affect the expression of this syndrome among Chinese adolescents. Further research on this topic with the Chinese population is clearly warranted.

APPENDIX 1. ITEMS FOR CROSS-VALIDATING DSM-IV-TR BPD DIAGNOSTIC CRITERIA

1. Fear of abandonment
   — I always worried about being abandoned by others.
   — To avoid being rejected by others, I allowed other people to force me to do things that I didn't want to do.
   — I am very dependent on others in relationships, even feeling that I cannot live without him/her.

2. Unstable relationships
   — I either love or hate other people in an extreme way.
   — My relationships with other people are very unstable.
   — I had repeated breakups with other people.
3. Identity disturbance
   — I am confused about my own identity.
   — My values change quickly.
   — My vocational goal changes often.

4. Impulsivity
   — I have deliberately damaged properties (e.g. smashed dishes or broke furniture).
   — I have gone on spending sprees where I spent a lot of money.
   — I have eaten uncontrollably to an extent that I felt sick.

5. Recurrent self-injurious or suicidal behavior
   — I have deliberately cut myself.
   — I have deliberately bit myself.
   — I have attempted suicide.

6. Affective instability
   — My moods always vary.
   — Sometimes my moods swing back and forth very rapidly.
   — Compared to my friends, I’m more up and down in my mood states.

7. Chronic emptiness
   — I feel numb about many things around me.
   — Sometimes I don’t have any feeling at all.
   — Sometimes I feel quite empty inside me.

8. Inappropriate anger
   — I have threatened to physically harm someone (e.g. tell someone that I would punch him).
   — I have lost my temper and really shouted, yelled or screamed at someone.
   — I have physically assaulted or verbally abused someone.

8. Transient dissociative features
   — In extreme emotional distress, sometimes I feel unreal.
   — When I feel extremely painful, sometimes I experience a feeling of detachment from my body.
   — When I’m very disturbed emotionally, sometimes I feel things around me are unreal.

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