Psychometric Properties and Factor Structure of the Personality Inventory for DSM-5–Brief Form (PID-5-BF) in Iranian Student and Clinical Samples

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Research Article

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Abstract

Background

The Personality Inventory for DSM–5, Brief Form (PID-5-BF) was developed to assess the DSM-5's alternative trait model for diagnosing personality disorders. Psychometric properties of PID-5-BF have been verified in some Western countries, but to our knowledge, no study has examined the psychometrics of PID-5-BF in Iranian settings. This is the first study designed to examine the factor structure, internal consistency, and convergent/discriminate validity of the Persian PID-5-BF with student and clinical samples in Iran.

Methods

378 university students (n = 378; M_age = 16.35; 55.6 % females) and 150 clinical patients (n = 150; M_age = 43.81; 58.7 % men) completed the Persian version of the PID-5-BF and NEO-FFI. Confirmatory factor analyses (CFAs) were performed to examine the five-factor model of PID-5-BF. Also, internal consistency and external validity of PID-5-BF were calculated.

Results

Confirmatory factor analysis supported the proposed five-factor model of PID-5-BF in both groups. The Chronbach's alpha coefficient ranged from .57 (Disinhibition) to .65 (Psychoticism) for the student sample and from .48 (Antagonism) to .67 (Detachment) for the clinical sample, while when relying on the MIC values, the PID-5-BF subscales indicated acceptable internal consistency in both groups. PID-BF-5 significantly differentiated the clinical sample from the student sample (p < .001), indicating the measure's adequate discriminate validity. Additionally, PID-5-BF subscales yielded hypothesized association with the external criterion variable in only the student sample.

Conclusion

Our results support the use of the PID-5-BF as a screening measure of dimensional maladaptive personality traits in Iranian samples. However, future studies are needed to examine the convergent validity of PID-5-BF in Iranian clinical samples with suitable external criterion measures.

Background

An alternative model for the diagnosis of personality disorders (PD) was proposed before the publication of the Diagnostic and Statistical Manual of Mental Disorders–Fifth Edition (1). However, the proposed alternative model for personality disorders (AMPD) was rejected as the primary model for diagnosing PDs, and DSM-5 placed this model in its section III– emerging models and measures (2). According to the AMPD, impairments in personality functioning and pathological personality traits characterize PDs. Criterion A refers to disturbances in personality functioning expressed in the domains of self (identity or self-direction) and interpersonal functioning (empathy or intimacy). Criterion B requires an individual to have one or more pathological personality traits based on five-dimensional personality domains, including Negative Affectivity, Detachment, Antagonism, Disinhibition, and Psychoticism (1).

Along with the proposed trait model, Krueger et al. (3) developed a self-report measure for assessing maladaptive personality traits, namely, the Personality Inventory for the DSM-5 (PID-5). The PID-5 is a 220-item self-report measure with a 4-point response scale. It yields 25 primary scales, the combination of which results in five higher-order scales (Negative Affectivity, Detachment, Antagonism, Disinhibition, and Psychoticism). The preliminary psychometric study through exploratory factor analysis showed that the PID-5 factored into five separate trait domains (3). A burgeoning amount of studies have replicated the five-factor model of PID-5 and proposed its appropriate psychometrics properties as well (4–9). A systematic review by Al-Dajani et al. (10) showed that PID-5 enjoys a generally adequate internal consistency and reliability. Also, the acceptable validity of the PID-5 has been reported by examining its association with related external measures (10, 11).

While a majority of studies have investigated the PID-5, there are other alternative forms of the PID-5, including an informant report form (PID-5-IRF), a 100-item Short form (PID-5-SF, 12), and a Brief form (PID-5-BF, 1). PID-5-IRF was introduced to support the self-report
measure of PID-5, wherein response bias was a concern. PID-5-SF is the shortened version of PID-5 and includes 100 items. Its factor structure is very similar to the PID-5 (12).

However, the psychometric properties of PID-5-BF that is the main subject of the current study, have been studied less than other alternatives of PID-5. Fossati et al.'s (13) study was among the first few studies to examine the psychometric of the PID-5-BF. While their results replicated the proposed five-factor model for the structure of the measure, one item (Item 11) did not load significantly on the related factor, and several items did not show their largest positive loading on their corresponding expected factors. Notwithstanding, since this study was conducted on adolescents, the results cannot be generalized to the adult population. In another study, Bach et al. (14) examined the psychometric properties of all three PID-5 forms simultaneously in large Danish clinical and community-dwelling samples. The authors found that the three PID-5 forms provided a highly consistent factor structure. Anderson et al. (2) examined the U.S. version of PID-5. Their results yielded an adequate model fit for the five-factor model of the PID-5-BF in the community and combined undergraduate samples. Also, all items loaded to an acceptable degree on their corresponding factors in both samples. The authors suggested PID-5-BF as a screening measure of dimensional maladaptive personality traits.

Overall, the internal consistency of the PID-5-BF and the factors was most often in the acceptable to good range in both community and clinical samples (2, 13, 14). Also, significant associations have been found between PID-5-BF dimensions and related external criterion measures, which support the measure's validity. Negative Affectivity and Detachment domains have been positively associated with indices of internalizing psychopathology (e.g., depression, anxiety, and emotional dysregulation), anger, sensation seeking, and recent experiences of dissociation and negatively with Extraversion and Conscientiousness. Positive small to moderate associations were found between Disinhibition and Antagonism with aggression and alcohol and drug use. Additionally, the Psychoticism dimension of the PID-5-BF showed a strong positive association with depression and emotion dysregulation (15).

Finally, Bach et al. (14) found that PID-5-BF can effectively differentiate psychiatric from community participants and indicated that the PID-5-BF was beneficial in assessing DSM-5's Section II categorical PDs. Similarly, Porcerelli et al. (16) investigated the psychometrics of PID-5-BF in a Primary Care Sample and supported the convergent and discriminant validity of the measure. Accordingly, PID-5-BF can be used as a useful psychiatric screening tool in the primary care setting. Notwithstanding, these studies have been conducted in Western countries, and their results cannot be generalized to the Iranian population.

We found only two studies investigating the factor structure and psychometrics of PID-5-BF in Eastern cultures (17, 18). Untalan (18) studied the psychometrics of PID-5-BF with a Filipino college student sample, and the results did not yield adequate fitness for the five-factor model of the PID-5-BF. Similarly, Zhang et al. (17) found a six-factor model for the structure of the PID-5-BF, which was more applicable than the five-factor model. In the new six-factor model, the Negative Affect domain was divided into two factors with the new factor, namely "Interpersonal Relationships," which was in line with the Big-Six Personality model in China, reflecting the humanistic ethic spirit of Chinese culture (19–21). Since the five-factor model of the PID-5-BF was developed from studies with Western samples, maybe cultural variations underlie different factor structure findings in the Western and Eastern cultures. This reveals discrepancies in how people in Western and Eastern cultures grasp personality constructs and appraise items of the PID-5-BF (17). For instance, the Big-Five Model did not yield a well-fit model in some Asian countries (22–24). Likewise, the Openness dimension of the NEO Personality Inventory was replicated poorly in a study with 24 different Asian cultures, including Iran (25). Eastern cultures (e.g., China and Iran) have a collectivistic culture where group harmony is valued over personal desires and ambitions, and people tend to conform to social expectations (For more information, see 26, 27). Given the role of cultural differences in differing factor structure findings in the literature (e.g., PID-5-BF and NEO), the results from studies on the psychometrics of PID-5-BF in Western countries cannot be generalized to the Iranian population, and a separate study is needed to examine the factor structure, reliability, and validities of the PID-5-BF with Iranian sample.

In the present study, we aimed to examine the psychometric properties of the PID-5-BF with student and clinical samples. More specifically, we examined the internal consistency, factor structure, and discriminant validity of the PID-5-BF. Concerning the factor structure of the PID-5-BF, based on few previous studies (e.g., 2, 13, 14), we expect to replicate the five-factor model solution. Next, to examine the reliability of the Persian PID-5-BF scores, reliability indices, including Chronbach's α and mean inter-item correlation values, will be calculated. Also, to test the validity of the PID-5-BF, we administered NEO-FFI along with the PID-5-BF that have been considered in prior psychometric studies of PID-5 (e.g., 28, 29). Specifically, it is hypothesized that Negative Affectivity and Detachment would be positively related to Neuroticism; and Antagonism, Disinhibition, and Detachment negatively associated with Agreeableness and Conscientiousness (e.g., 28, 29). Finally, discriminant validity is investigated through Student's t-test to examine the ability of the PID-5-BF to score differently in the clinical and student samples.
Methods

Participants

The present study included clinical and student samples. The clinical sample consisted of 150 outpatient and inpatient (58.7% men), aged 23–60 ($M_{\text{age}} = 43.81, SD = 8.69$), who were referred to four psychiatric hospitals in Tehran city. Based on the Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5), the patients were diagnosed with Schizophrenia Spectrum Disorders (32%), Bipolar Disorders (25.3%), Substance-Related Disorders (36.7%), and forensic patients (6%).

Our student sample included a total of 378 students of national universities in Tehran (aged 18–40, $M_{\text{age}} = 23.61, SD = 5.39, 55.6 \%$ females), recruited through a cluster sampling method. First, we chose three universities randomly, and then, several faculties were chosen from the selected universities. Finally, students in these faculties were asked to complete the measures.

Procedure

The present study was a part of another research, which was evaluated and approved by the ethics committee of the University of Social Welfare and Rehabilitation Sciences our study (code number = IR.USWR.REC.1397.48). Before conducting the study, research assistants explained the study aims to the participants and assured confidentiality to all participants in each sample; then, informed consent was obtained. Finally, participants were asked to complete PID-5-BF and NEO-FFI under the supervision of a specially trained research assistant (master-level student). Inclusion criteria included being an undergraduate or graduate student (for the community sample only) and interest and willingness to participating in the study. Exclusion criteria consisted of a lack of physical or mental ability to participate in the study.

Measures

Personality Inventory for DSM-5–Brief Form (PID-5-BF)

Krueger et al. (30) developed the PID-5-BF by extracting 25 items from the 220-item PID-5. PID-5-BF represents 21 of the 25 trait facets (facets not included: Restricted Affectivity, Rigid Perfectionism, Submissiveness, and Suspiciousness). Items of PID-5-BF are rated on a 4-point scale (0 = very false or often false to 3 = very true or often true), with higher scores representing greater dysfunction. Each of the five higher-order domains is represented by five items (Negative Affect: Items 8, 9, 10, 11, and 15; Detachment: Items 4, 13, 14, 16, and 18; Antagonism: Items 17, 19, 20, 22, and 25; Disinhibition: Items 1, 2, 3, 5, and 6; and Psychoticism: Items 7, 12, 21, 23, and 24). Cronbach's alpha and MICs for the PID-5-BF and its factors can be retrieved from Table 1.
Table 1
Mean, standard deviation, Skewness, Kurtosis, internal consistency, and MIC of Measures for the Community (n = 378) and the Clinical (n = 150) Samples.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Community</th>
<th>Clinical</th>
<th>Community</th>
<th>Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>Skew</td>
<td>Kurt</td>
</tr>
<tr>
<td><strong>Difference</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>T-values</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PID-5-BF: Negative Affectivity</td>
<td>6.52</td>
<td>3.11</td>
<td>-0.003</td>
<td>-0.265</td>
</tr>
<tr>
<td>Detachment</td>
<td>4.89</td>
<td>2.82</td>
<td>0.185</td>
<td>-0.420</td>
</tr>
<tr>
<td>Antagonism</td>
<td>4.47</td>
<td>2.71</td>
<td>0.207</td>
<td>-0.707</td>
</tr>
<tr>
<td>Disinhibition</td>
<td>5.05</td>
<td>2.85</td>
<td>0.151</td>
<td>-0.392</td>
</tr>
<tr>
<td>Psychoticism</td>
<td>5.39</td>
<td>3.10</td>
<td>0.056</td>
<td>-0.580</td>
</tr>
</tbody>
</table>

Note. PID-BF = Personality Inventory for DSM-5-Brief Form; NEO-FFI = NEO Five-Factor Inventory; SD = Standard deviation; MIC = mean interitem correlation; Skew = Skewness; Kurt = Kurtosis; *p < .01

Persian PID-5-BF: At first, two translators fluent in English and Persian were invited to translate the original version of the Personality Inventory for DSM-5–Brief Form (PID-5-BF) from American English to Persian. Then, after matching together the Persian translations, they were provided to another translator to back translate. Repeated revisions were done to ensure translation accuracy. To examine the content validity of the PID-5-BF, we asked three specialists in clinical psychology and two specialists in psychiatry to review the translated version. Also, to determine face validity, a group of students was asked to complete the measure and report any concerns, questions, or misunderstandings about the accuracy of the sentences, response format, and/or sentence structure of the items. Based on the students’ feedback, we revised the problematical statements to make them more straightforward and transparent.

NEO Five-Factor Inventory (NEO-FFI)

NEO-FFI is a 60-itemed and short-form version of the NEO Personality Inventory-Revised (NEO-PI-R). NEO-FFI provides a compact measure of the five basic personality traits (Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness), with 12 items for each factor. Items are measured on a Likert-based scale ranging from 0 ("Strongly Disagree") to 4 ("Strongly Agree") (31). A study in an Iranian sample yielded internal consistencies of .83, .80, 60, and .58 have for Conscientiousness, Neuroticism, Agreeableness, and Extraversion, respectively. But, the Openness subscale had poor internal consistency (α = .39) (32). Also, Azkhosh & Asgari, (33) reported relatively high Cronbach's alpha coefficients for Neuroticism, Extraversion, and Conscientiousness, but inadequate coefficients were found for Openness and Agreeableness subscales. Cronbach's alpha and MICs for the NEO-FFI factors can be retrieved from Table 1.

Data Analyses

In the current research study, SPSS 18.0 (34) was used to perform descriptive characteristics of the population and descriptive statistics of measures. We used the frequency table and box plots to identify outlier data, and missing values were handled using the series mean method. Next, CFAs were conducted through Lisrel 8.80 using the maximum likelihood estimator (35) to evaluate the five-factor model of the PID-5-BF. Fit indices included the comparative fit index (CFI), Tucker–Lewis index (TLI), and root mean square error of approximation (RMSEA). We considered a CFI and TLI equal to .90 and higher values as an adequate fit and values higher than .95 as...
an excellent fit. Further, an RMSEA equal to .08 or lower was considered an adequate fit, and values equal to .05 or lower were considered an excellent fit (36).

The five-factor model was specified with the 25 items as observed variables and the five factors as latent and correlated constructs.

Next, Cronbach's $\alpha$ and mean inter-item correlation (MIC) values were assessed to examine the internal consistency of the PID-5-BF. Cronbach's alpha reliability coefficient ranges from 0 to 1, with higher values indicating greater internal consistency. MIC values in the range of .15 to .50 are considered adequate (37).

To examine PID-5-BF's convergent validity, Pearson correlation coefficients were examined between PID-5-BF dimensions and NEO-FFI subscales. Finally, we used Student's $t$-test to explore the discriminant validity of the PID-5-BF to see if it differentiates the student sample from the clinical one.

**Results**

**Descriptive Statistics**

Descriptive information for measures used in the present study is presented for the student and clinical samples in Table 1.

**Confirmatory Factor Analysis**

CFAs were conducted to examine the five-factor model of the PID-5-BF with items loading on Negative Affect, Detachment, Antagonism, Disinhibition, and Psychoticism (each factor included 5 items) in the student and clinical samples. The results of the CFAs yielded adequate fitness for the five-factor model of PID-5-BF in both the student ($CFI = .91, TLI = .90, RMSEA = .061$) and clinical ($\chi^2 = 398.53, .001 > p, df = 300, CFI = .92, TLI = .90, RMSEA = .056$) samples.

**Internal consistency and correlations between the PID-5-BF scores**

The Cronbach's alphas were ranged from .57 to .65 for the subscales in the student sample. In the clinical sample, $\alpha$ ranged from .48 to .67 (see Table 1). Moreover, when relying on the MIC as an index of internal consistency, the PID-5-BF subscales indicate acceptable internal consistency in both groups (Table 1). Significant zero-order correlations were also found between PID-5-BF factor scores in both the student and clinical samples (Table 1).

**Discriminant Validity**

The results of the Students $t$-test indicated that the PID-5-BF could score differently in the clinical and a student sample ($p < .001$) (Table 1).

**Convergent Validity**

The correlations between PID-5-BF dimensions and NEO-FFI subscales were investigated to examine the measure's convergent validity. In the student sample, Antagonism and Disinhibition were negatively associated with Agreeableness; and Disinhibition was negatively correlated with Conscientiousness. Also, a non-significant relationship was found between Negative Affectivity, Detachment, and Antagonism with Openness. Negative Affectivity, Detachment, Antagonism, and Psychoticism were negatively related to Extraversion. Further, our results showed a negative correlation between PID-5-BF scales and Neuroticism.

On the other hand, correlations between PID-5-BF scales with Neuroticism were significantly positive; we also found positive correlations between PID-5-BF subscales and Agreeableness and Conscientiousness (see Table 2 for full results).
Table 2
Pearson correlation between PID-5-BF and NEO-FFI in the community (n = 378) and the clinical (n = 150) samples.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Community</th>
<th>Clinical</th>
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<tbody>
<tr>
<td></td>
<td>NEG</td>
<td>DET</td>
</tr>
<tr>
<td>PID-BF</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NEG</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>DET</td>
<td>.249**</td>
<td>1</td>
</tr>
<tr>
<td>ANT</td>
<td>.319**</td>
<td>.451**</td>
</tr>
<tr>
<td>DIS</td>
<td>.363**</td>
<td>.338**</td>
</tr>
<tr>
<td>PSY</td>
<td>.419**</td>
<td>.365**</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>-.019</td>
<td>-.084</td>
</tr>
<tr>
<td>Extraversion</td>
<td>-.026</td>
<td>-.051</td>
</tr>
<tr>
<td>Openness</td>
<td>-.003</td>
<td>-.016</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>-.060</td>
<td>-.082</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>-.012</td>
<td>-.050</td>
</tr>
</tbody>
</table>

Note. PID-BF = Personality Inventory for DSM-5-Brief Form; NEG = Negative Affect; DET = Detachment; ANT = Antagonism; DIS = Disinhibition; PSY = Psychoticism; NEO-FFI = NEO Five-Factor Inventory; *p < .01; **p < .05.

Discussion

This study aimed to examine the psychometric properties and factor structure of PID-5-BF in student and clinical samples in Iran. We hypothesized that the results would replicate the five-factor model of the PID-5-BF in both samples. We also expected to find associations between dimensions of PID-5-BF (e.g., Negative Affectivity, Detachment, and Disinhibition) and corresponding dimensions of NEO-FFI (e.g., Neuroticism, Agreeableness, and Conscientiousness).

In general, our results supported the PID-5-BF as a brief screening measure for assessing maladaptive personality traits that are proposed in the DSM-5 Section III; however, since for the clinical sample, the results did not yield the hypothesized correlation between PID-5-BF dimensions and the external criterion measure, it should be used carefully in the clinical samples. Our results supported the five-factor structure of the PID-5-BF in both the student and clinical samples. This is consistent with previous studies that have supported the five-factor structure of PID-5 (e.g., 3, 38) and PID-5-BF (e.g., 2, 13, 14). We believe our results provide robust support for the five-factor structure of the PID-5-BF by yielding acceptable model fitness for the five factors with the use of CFAs. Also, consistent with the previous studies (e.g., 14, 17), our results indicated that the PID-5-BF was able to score differently in the clinical and student sample (p < .001), indicating the measure’s adequate discriminate validity.

Additionally, we found mixed results regarding the reliability of the PID-5-BF scales. MIC values were in the adequate range for all PID-5-BF scales in both the student and clinical samples based on the conventional standards (37), but Cronbach’s alpha values of PID-5-BF dimension were not in acceptable range in both groups. Notwithstanding, since Cronbach’s alpha is a function of the number of items of the measure, it is not a clear index of internal consistency, but the degree of interitem correlation is not relevant to the number of items and provides a direct indication of the internal consistency (37, 39, 40). Thus, in the current study, when relying on MIC values, which is the straightforward measure of the internal consistency, the PID-5-BF scales enjoyed adequate internal consistency in both groups (37).

Concerning the convergent validity of the PID-5-BF that we assessed by examining its associations with NEO-FFI, in our student sample, as we hypothesized, Antagonism and Disinhibition were negatively associated with Agreeableness; and Disinhibition was negatively correlated with Conscientiousness. We also found a non-significant relationship between Negative Affectivity, Detachment, and Antagonism with Openness. Negative Affectivity, Detachment, Antagonism, and Psychoticism were negatively related to Extraversion;
these results are consistent with previous studies (e.g., 28, 29). However, our results concerning the negative correlation between PID-5-BF scales with Neuroticism was not consistent with the previous studies (e.g., 28, 29). On the other hand, the convergent validity in the clinical group was somehow controversial. While the correlations between PID-5-BF scales with Neuroticism were significantly positive, which is in line with the previous studies (e.g., 28, 29), we found positive correlations between PID-5-BF subscales with Agreeableness and Conscientiousness, which are not in line with the literature.

The controversial results concerning the convergent validity of the PID-5-BF in the clinical sample might stem from the fact that the Iranian version of the NEO-FFI does not enjoy good psychometric properties, so this might have had a critical role in the poor convergent validity of the PID-5-BF in the clinical sample (32, 33). Further, based on our probing, no study has examined the psychometrics of the NEO-FFI in the Iranian clinical samples, and almost all of the studies have been conducted with community samples. We included NEO-FFI in the current study because we found no other related and valid related measures to examine the convergent validity of the PID-5-BF.

One of the limitations of the current study was that the clinical sample included patients diagnosed with Schizophrenia Spectrum Disorders and Bipolar Disorders. However, the PID-5-BF has been designed to assess patients with personality disorders. Thus, we recommend future studies on the psychometrics of the PID-5-BF to include patients with personality disorders. Moreover, it is also recommended to validate measures related to PID-5-BF to be used as the external criterion measure for examining the convergent validity of the PID-5-BF. We also suggest examining the item-level structure of the PID-5-BF based on item response theory (IRT) in Iranian samples. Finally, while NEO-FFI is a commonly used measure for examining the convergent validity of the PID-5-BF, its psychometrics have not been reported as adequate in Iranian samples. Thus, we suggest future studies to study the psychometrics of NEO-FFI with modification based on the cultural context to measure the factors adequately.

**Declarations**

**Funding/Support:** This study was supported financially.

**Conflicts of interest**

There was no conflict of interest in this study.

**Ethics approval and consent to participate**

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Written informed consent was obtained from all individual participants included in the study. The study was approved by the Ethics Committee of University of Social Welfare and Rehabilitation Sciences (code number = IR.USWR.REC.1397.48).

**Authors' Contribution**

MEA and AE contributed equally to the manuscript development and preparation.

**Data Availability Statement**

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

**Consent to Publish**

Not applicable

**Acknowledgments**

We acknowledge all individuals who participated in our research.

**References**


