

# Reliability and Validity of the Life Problems Inventory, A Self-Report Measure of Borderline Personality Features, in a College Student Sample

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## Abstract

Rathus, Wagner, and Miller recently reported on the development and psychometric evaluation of the Life problems Inventory (LPI), a self report tool to measure Linehan's conceptualization of borderline personality disorder (BPD) as a disorder primarily of the emotion regulation system, and in particular, problems with regulation of emotions, impulses, relationships, and self. Thus, the LPI maps onto the content of her skills training component of Dialectical Behavior Therapy (DBT), with scales assessing problems addressed in DBT skills modules targeting emotion regulation, distress tolerance, interpersonal effectiveness, and mindfulness. The present study furthers the investigation of the LPI's psychometrics by examining internal consistency, test-retest reliability, convergent validity with depression, suicidality and mindfulness, and discriminant validity with social desirability in an adolescent/young adult, non-clinical, suburban college student sample ( $N = 99$ ). The LPI was found to be internally consistent, stable over a two-week retest interval, and related in expected ways with clinical constructs. We discuss implications for further development and application of the LPI and its utility in a college population.

**Keywords:** Borderline personality; Measurement; College students; Life problems

Linehan [1-3] developed Dialectical Behavior Therapy as a comprehensive treatment to address the problems of women with BPD and chronic suicide-related behavior. Its success in reducing suicidal and non-suicidal self-injurious behavior (NSSI), reducing hospitalizations, and retaining patients in therapy has made it a standard treatment modality for this population, and numerous randomized clinical trials support its effectiveness [4-6]. In addition to these stability and safety-related variables, DBT has also resulted in increases in quality of life measures such as depression, hopelessness, suicidal ideation, social adjustment, and anger [7]. Further, DBT appears promising for adolescents [8-13] and for patients with BPD and other co-morbid problems such as substance abuse [14] and eating disorders [15].

Currently used widely in outpatient and inpatient settings [10,16], DBT integrates traditional cognitive-behavioral approaches with Eastern acceptance and meditation practices [17]. DBT views individuals with BPD as experiencing core problems of emotional dysregulation that contribute to dysfunction across domains of interpersonal functioning, behavioral regulation/impulsivity, and self/cognitive regulation [1]. Therefore, in addition to individual therapy, a central modality of DBT is skills training in Emotion Regulation, Interpersonal Effectiveness, Distress Tolerance, and Mindfulness, to address capability deficits associated with these areas [2,3].

Despite the many replications and extensions of DBT efficacy studies for patients with problems of regulation of emotions and behaviors, none of the many standardized measures of BPD directly and comprehensively assesses the four core problem areas of borderline personality conceptualized by Linehan [1,3] and targeted in DBT skills training. The Life Problems Inventory [18], a 60-item, paper-and-pencil self-report questionnaire, was developed for this purpose. Items were derived rationally by selecting items from existing measures of borderline personality and generating several additional items that reflected confusion about self, impulsivity, emotional dysregulation, and interpersonal chaos, and assigned to the conceptually relevant scales [18].

In an initial psychometric evaluation of the LPI, Rathus et al. [18]

found the LPI to be internally consistent and to demonstrate convergent and criterion validity in an urban adolescent hospital-based outpatient population. The LPI subscales and Total Score showed convergent validity with structured interview-based BPD diagnosis, and with measures of depression, suicidal ideation, global symptomatology, and presence and severity of suicide-related behavior. Regarding criterion validity, the LPI discriminated individuals with BPD features from demographically similar, non-BPD psychiatric and non-psychiatric medical patients.

The present study sought to extend these findings to an older adolescent/young adult, non-clinical college student sample. Evaluating reliability and validity information on a scale assessing BPD features in this population is useful because of the elevated depression scores noted in college students [19]; BPD features and its associated impairments in this group [20], documented high rates of suicidal ideation and attempts [21,22], and self-injurious behavior [23-25]. Additionally, DBT is growing in its application in college counseling settings [26,27].

Regarding the LPI's utility for assessing DBT treatment outcome, Gunderson and colleagues have suggested that measuring change in borderline features is critical above and beyond changes in mood, as the presence of BPD reduces remission rates of major depressive disorder (MDD), and BPD improvements often must occur before changes in major depressive disorder are observed [28]. Thus, in addition to repeating internal consistency analysis and convergent validity to measures of depression and suicidal ideation in a new population, the

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present study examines the scale's test-retest reliability, convergent validity with a measure of mindfulness, and discriminant validity with a measure of social desirability.

We expected the four LPI scales to be internally consistent, as each subscale measures a unitary construct, and we expected it would be stable over a two-week interval, demonstrating high test-retest reliability.

We expected the LPI would be moderately correlated with depression, demonstrating convergent validity; the LPI is intended to measure BPD features, which often present with misery, hopelessness, or full diagnoses of depression [28-30]. We also expected LPI scores to correlate moderately with suicidal ideation, as suicidal thoughts are highly prevalent among individuals with BPD features [29].

Moreover, we expected the LPI to be inversely correlated with mindfulness. Mindfulness is taught in DBT to address BPD-associated problems of self dysregulation, emotional dysregulation, and impulsivity. Therefore, we would expect individuals who score high on the LPI to score lower on a mindfulness measure, which measures the ability to attend to present moment experiences without judgment, and to note urges and impulses without acting – skills antithetical to borderline criteria [31].

With regard to discriminant validity, we expected LPI scores to be unrelated to social desirability. Since self-report measures are often subject to response biases, it is useful to ascertain the degree to which a new measure is free of the tendency to present oneself in a socially desirable light. Thus the present study reports on a non-clinical sample of college undergraduates.

## Method

### Participants

Participants ( $N = 99$ ) were selected from a northeastern undergraduate suburban college student population. The mean age of this sample was 20.5 ( $SD = 3.4$ ). 72.7% of this sample was female ( $N = 72$ ) and 27.3% was male ( $N = 27$ ). With regard to ethnicity, 63.6% of this sample was Caucasian ( $N = 63$ ); 19.2% African-American ( $N = 19$ ); 8.1% Hispanic ( $N = 8$ ); 5.1% Asian ( $N = 5$ ); 1.0% Native American ( $N = 1$ ); and 3.0% Other ( $N = 3$ ). Based on the known makeup of this private college population, it is assumed that most participants in this sample came from middle- to upper-middle class income levels. At the time of the study, 14% of the sample were receiving mental health treatment ( $N = 14$ ); 85% were not ( $N = 85$ ).

### Measures

#### LPI

Rathus and Miller [13] developed the 60-item Life Problems Inventory (LPI) to assess four of the core problem areas in borderline personality disorder as defined by Linehan [1,2]: confusion about self, interpersonal chaos, impulsivity, and emotional dysregulation. Scales were derived using a rational approach by selecting and developing items that reflected each of these four constructs and assigning them to a priori scales. Details on the scale and its development, its psychometric properties, and all items, are reported in Rathus et al. [18], and a copy of the instrument is provided in Appendix A.

The LPI provides adolescent/young adult examinees with instructions to rate each item on a Likert scale ranging from 1 (not at all like me) to 5 (extremely like me) that describes how they are "most of the time." Items are summed to produce four subscale scores (15 items

per scale) and a total score. Confusion about Self assesses problems regarding confusion about identity, goals, and cognitive experiences. A sample item is: "I'm not sure I know who I am or what I want in life." Impulsivity assesses impulsive behaviors, including risky and life-threatening behaviors such as substance abuse and suicide-related behaviors. A sample item is: "I usually act quickly, without thinking." Emotional Dysregulation measures high sensitivity, high reactivity, slow return to baseline mood, episodic depression and suicidal ideation, and problems with anger and other emotions. A sample item is: "Once I get upset, it takes me a long time to calm down." Interpersonal Chaos assesses problems with chaotic, difficult relationships, frequent break-ups or conflict, difficulty letting go of relationships, and intense efforts to avoid abandonment. A sample item is: "Relationships with people I care about have a lot of ups and downs."

#### BDI

The Beck Depression Inventory (BDI) [32] is a commonly used 21 item self-report inventory that evaluates the level of depression in adolescents (aged 13 and older) and adults and has well-established psychometric properties [33].

#### SIQ-JR

The Suicide Ideation Questionnaire – Junior (SIQ-JR) [34] is a 15-item self-report measure to assess adolescents' current thoughts about suicide. The psychometric properties of the SIQ-JR are well established [35]. The internal consistency coefficient in the standardization sample using Cronbach's (1951) alpha was .94. Construct validity was established through moderate relationships with affective constructs such as anxiety and depression, with correlations ranging from 0.54 to 0.66. Mazza [35] reported a correlation of 0.68 between the SIQ-JR and a clinical interview measure of suicidal behavior.

#### KIMS

The Kentucky Inventory for Mindfulness Skills (KIMS) [36] is a 39-item self-report inventory for the assessment of mindfulness skills. These items are meant to measure four different mindfulness skills: 1) Observing; 2) Describing; 3) Acting with awareness; 4) Accepting (or allowing) without judgment. Higher scores indicate a greater degree of mindfulness.

Baer et al. [36] found that mean interrater agreement on assignment of items to skill categories ranged from 64% to 100%, with a mean of 86%. Internal consistency was determined to be adequate to good, with Cronbach's alpha coefficients of 0.91, 0.84, 0.83, and 0.87 for Observe, Describe, Act With Awareness, and Accept Without Judgment, respectively [36]. Test-retest reliabilities for Observe, Describe, Act With Awareness, and Accept Without Judgment scores were 0.65, 0.81, 0.86, and 0.83, respectively, indicating adequate to good test-retest reliability [36].

#### M-C SDS

The Marlowe Crowne Scale of Social Desirability (M-C SDS; [37]) measures personal attitudes and traits regarding social desirability, with good internal consistency and test-retest reliability [37]. The M-C SDS has also demonstrated good construct validity [37].

## Procedures

The investigator recruited subjects by attending undergraduate introductory classes in psychology, and invited students to participate in a study on the development of a self-report assessment instrument.

|       |                 |                          |                 |                           |                         |
|-------|-----------------|--------------------------|-----------------|---------------------------|-------------------------|
|       | LPI Total Score | LPI Confusion About Self | LPI Impulsivity | LPI Emotion Dysregulation | LPI Interpersonal Chaos |
| Alpha | 0.95            | 0.89                     | 0.84            | 0.90                      | 0.90                    |

**Table 1:** Alpha values for LPI subscales and total score in college student sample (N = 99).

Instructors awarded extra credit to those who participated.

Each participant in the student sample provided informed consent to participate. Each subject completed the LPI, and provided information regarding gender, age, ethnicity, and whether or not he or she was in psychiatric treatment at the time of participation. In addition, participants completed the following measures: 1) BDI; 2) SIQ-JR; 3) KIMS; 4) M-C SDS. Each participant also provided numerical identification by including the last four digits of her or his social security number.

After a two-week interval, the participants in the college student sample completed the LPI for a second time. Each subject provided the last four digits of his or her social security number along with his or her completed LPI, and returned these items to the investigator.

## Results

### Internal consistency

Using LPI data from the college sample (N = 99), Cronbach's alphas were calculated to determine the internal consistency of the four LPI subscales and the LPI total score given at Time 1. Table 1 list these alpha values.

The alpha values for the four subscales and the LPI Total Score were all in the good to excellent range. They were 0.89 (Confusion about Self), 0.84 (Impulsivity), 0.90 (Emotion Dysregulation), and 0.90 (Interpersonal Chaos). The alpha value of the LPI Total Score was 0.95.

Item-total correlations were calculated to assess each LPI item's relationship with its subscale. Table 2 shows these correlations.

Table 2 indicates that all items on the Confusion About Self subscale correlated more highly with the total score of this subscale than with those of the three other subscales. These correlations ranged from 0.38 to 0.76.

Eleven of the 15 items on the Impulsivity subscale correlated more highly with the total score of this subscale than with those of the three other subscales. Three of the four exceptions correlated most highly with the Emotion Dysregulation subscale score, and were Item 22 ("I have deliberately hurt myself without meaning to kill myself (such as cutting or scratching myself)"); Item 26 ("I have made at least one suicide attempt."); and Item 38 ("I've lost my temper and really yelled or screamed at someone."). Item 30 ("I've eaten so much food that I was in a lot of pain or had to throw up.") correlated most highly (0.30) with the Confusion About Self subscale score. The item-total correlations between the 15 Impulsivity items and the Impulsivity subscale score ranged from 0.42 to 0.76. At the  $p < 0.01$  level, the item-total correlations between all 15 Impulsivity items and the Impulsivity subscale score were significant.

Thirteen of the 15 items on the Emotion Dysregulation subscale correlated more highly with the total score of this subscale than with the three other subscales. Exceptions were Item 19 ("Even little things get me really depressed."), which correlated most highly (0.61) with the Interpersonal Chaos subscale score; and Item 59 ("I get so angry that I hit people or throw things."), which correlated most highly (0.58) with the Impulsivity subscale score. Item-total correlations between the 15 Emotion Dysregulation items and the Emotion Dysregulation subscale score ranged from 0.51 to 0.80.

| LPI Subscale          | LPI Item Number | Conf. About Self | Impulsivity | Emotion Dysregulation | Interpersonal Chaos |
|-----------------------|-----------------|------------------|-------------|-----------------------|---------------------|
| Confusion About Self  | 1               | 0.70*            | 0.38*       | 0.44*                 | 0.53*               |
|                       | 5               | 0.56*            | 0.36*       | 0.23                  | 0.31*               |
|                       | 9               | 0.58*            | 0.24        | 0.41*                 | 0.40*               |
|                       | 13              | 0.64*            | 0.27*       | 0.39*                 | 0.36*               |
|                       | 17              | 0.66*            | 0.43*       | 0.52*                 | 0.62*               |
|                       | 21              | 0.76*            | 0.36*       | 0.56*                 | 0.56*               |
|                       | 25              | 0.64*            | 0.47*       | 0.59*                 | 0.48*               |
|                       | 29              | 0.69*            | 0.41*       | 0.44*                 | 0.66*               |
|                       | 33              | 0.38*            | 0.09        | 0.24                  | 0.29*               |
|                       | 37              | 0.65*            | 0.35*       | 0.61*                 | 0.44*               |
|                       | 41              | 0.76*            | 0.34*       | 0.52*                 | 0.48*               |
|                       | 45              | 0.52*            | 0.20        | 0.38*                 | 0.38*               |
|                       | 49              | 0.65*            | 0.27*       | 0.50*                 | 0.63*               |
|                       | 53              | 0.57*            | 0.21        | 0.30*                 | 0.42*               |
|                       | 57              | 0.65*            | 0.37*       | 0.38*                 | 0.43*               |
| Emotion Dysregulation | 3               | 0.53*            | 0.42*       | 0.62*                 | 0.47*               |
|                       | 7               | 0.37*            | 0.36*       | 0.51*                 | 0.26*               |
|                       | 11              | 0.46*            | 0.33*       | 0.51*                 | 0.29*               |
|                       | 15              | 0.35*            | 0.50*       | 0.64*                 | 0.47*               |
|                       | 19              | 0.60*            | 0.29*       | 0.57*                 | 0.6*                |
|                       | 23              | 0.57*            | 0.36*       | 0.58*                 | 0.58*               |
|                       | 27              | 0.32*            | 0.30*       | 0.54*                 | 0.38*               |
|                       | 31              | 0.49*            | 0.52*       | 0.80*                 | 0.59*               |
|                       | 35              | 0.40*            | 0.53*       | 0.79*                 | 0.44*               |
|                       | 39              | 0.42*            | 0.53*       | 0.73*                 | 0.58*               |
|                       | 43              | 0.54*            | 0.40*       | 0.67*                 | 0.53*               |
|                       | 47              | 0.62*            | 0.49*       | 0.71*                 | 0.42*               |
|                       | 51              | 0.44*            | 0.66*       | 0.76*                 | 0.52*               |
|                       | 55              | 0.45*            | 0.41*       | 0.74*                 | 0.54*               |
|                       | 59              | 0.31*            | 0.58*       | 0.52*                 | 0.30*               |
| Interpersonal Chaos   | 4               | 0.34*            | 0.05        | 0.23                  | 0.55*               |
|                       | 8               | 0.63*            | 0.34*       | 0.56*                 | 0.64*               |
|                       | 12              | 0.51*            | 0.35*       | 0.42*                 | 0.65*               |
|                       | 16              | 0.34*            | 0.23        | 0.35*                 | 0.61*               |
|                       | 20              | 0.51*            | 0.32*       | 0.52*                 | 0.66*               |
|                       | 24              | 0.53*            | 0.24        | 0.43*                 | 0.77*               |
|                       | 28              | 0.63*            | 0.38*       | 0.56*                 | 0.78*               |
|                       | 32              | 0.48*            | 0.17        | 0.40*                 | 0.68*               |
|                       | 36              | 0.56*            | 0.28*       | 0.48*                 | 0.78*               |
|                       | 40              | 0.38*            | 0.54*       | 0.56*                 | 0.61*               |
|                       | 44              | 0.58*            | 0.46*       | 0.45*                 | 0.64*               |
|                       | 48              | 0.59*            | 0.35*       | 0.55*                 | 0.70*               |
|                       | 52              | 0.5*             | 0.43*       | 0.49*                 | 0.69*               |
|                       | 56              | 0.38*            | 0.31*       | 0.50*                 | 0.63*               |
|                       | 60              | 0.29*            | 0.53*       | 0.49*                 | 0.38*               |

Note: \* $p < 0.01$ , representing the significance of the item's correlation with the scale. Numbers in bold type represent highest subscale correlation coefficient for each item.

**Table 2:** Item-total correlations (Pearson r values) for LPI subscales – college student sample (N = 99).

Fourteen of the 15 items on the Interpersonal Chaos subscale correlated more highly with the total score of this subscale than with those of the three other subscales. The one exception was Item 60 (“I often don’t get along with authority figures (such as parents or teachers).”), which correlated most highly (0.53) with the Impulsivity subscale score. The item-total correlations between the 15 Interpersonal Chaos items and the Interpersonal Chaos subscale score ranged from 0.38 to 0.78. At the  $p < 0.01$  level, the item-total correlations between all 15 Interpersonal Chaos items and the Interpersonal Chaos subscale score were significant.

**Test-retest reliability**

LPI Total and subscale scores at initial testing were correlated with LPI Total and subscale scores after the two-week interval. Pearson coefficients were calculated to determine their stability. Table 3 lists these Pearson coefficients.

Table 3 indicates that the correlations between the initial test scores and the retest scores after 2-weeks interval for all four LPI subscales and LPI Total Score were all significant at the  $p < 0.01$  level, and ranged from 0.88 (Impulsivity) to 0.91 (Interpersonal Chaos and LPI Total Score), indicating strong test-re-test reliability.

**Convergent and discriminant validity.**

In order to determine convergent validity, LPI subscale and Total Scores at Time 1 were correlated with scores on the BDI, SIQ-JR, and the KIMS.

In order to determine discriminant validity, LPI subscale and Total Scores were correlated with scores on the MC-SDS. Pearson coefficients were calculated to determine the strength of these relationships. Table 4 lists these correlations.

Table 4 shows significantly high correlations at the  $p < 0.01$  level between the LPI Total Score and all four LPI subscales, ranging from 0.78 (Impulsivity) to 0.89 (Emotion Dysregulation), suggesting consistency of scales with the overall LPI score and reflected in the overall LPI Cronbach’s alpha of 0.95. At the  $p < 0.01$  level, LPI Total Scores were moderately correlated with scores on both the BDI (0.64) and the SIQ-JR (0.63), indicating relationships with depression and suicidal ideation, as expected. LPI Total Scores were also moderately inversely correlated, at the  $p < 0.01$  level, with scores on the KIMS

(-0.31), indicating, as expected, that higher BPD symptomatology was related to lower levels of mindfulness. And, at the  $p < 0.01$  level, a moderate inverse correlation was found between LPI Total Score and scores on the MC-SDS (-0.53), indicating that those who endorsed a socially desirable response style endorsed a lower amount of problems related to the core problem areas of BPD.

At the  $p < 0.01$  level, all four LPI subscales were found to be moderately correlated with one another, with Pearson correlations ranging from 0.50 to 0.74, indicating distinct but significantly related constructs. Moderate correlations were found between all four LPI subscales and both the BDI and the SIQ-JR. Subscale correlations with the BDI ranged from 0.36 (Impulsivity) to 0.63 (Emotion Dysregulation). Subscale correlations with the SIQ-JR ranged from 0.49 (Interpersonal Chaos) to 0.66 (Emotion Dysregulation).

Moderate correlations at the  $p < 0.01$  level were found between two of the four LPI subscales and the KIMS in the inverse direction. These two subscales were Confusion About Self (-0.33) and Impulsivity (-0.28). Moderate inverse correlations with the KIMS were found at the  $p < 0.05$  level for the remaining two LPI subscales: Emotion Dysregulation (-0.21) and Interpersonal Chaos (-0.25).

At the  $p < 0.01$  level, all four subscales were found to be moderately correlated with the MC-SDS in the inverse direction. Correlations ranged from -0.40 (Confusion About Self) to -0.52 (Emotion Dysregulation).

Table 4 shows that at the  $p < 0.01$  level, moderate correlations in the inverse direction were also found between the three other self-report measures (BDI; SIQ-JR; KIMS) and the MC-SDS. Correlations ranged from -0.26 (SIQ-JR) to -0.40 (BDI).

**LPI descriptive data**

The LPI total score ranges from 60 – 300, and subscale scores range from 15 – 75. Means and standard deviations were calculated for the LPI Total Score and all four subscales in the college student sample ( $N = 99$ ). Table 5 lists these descriptives. Note the comparisons of the mean total LPI score in this non-clinical sample, 106.3 (SD = 30) to the Rathus et al. (2015) BPD sample (mean = 171.8, SD = 45.4), the psychiatric non-BPD sample (mean = 116.0, SD = 39.0), and the adolescent medicine non-psychiatric sample (mean = 89.8, SD = 35.5). LPI total and scale scores for the present college sample and for the Rathus et al. [18]

|           | LPI Total Score | LPI Confusion About Self | LPI Impulsivity | LPI Emotion Dysregulation | LPI Interpersonal Chaos |
|-----------|-----------------|--------------------------|-----------------|---------------------------|-------------------------|
| Pearson r | 0.91*           | 0.90*                    | 0.88*           | 0.89*                     | 0.91*                   |

\* $p < 0.01$

**Table 3:** Correlation coefficients (Pearson r values) for 2-week interval test-retest reliability of LPI subscales and total score in college student sample ( $N = 99$ ).

|                      | LPI Total Score | LPI Conf. Score | LPI Impul. | LPI Emot. Dysreg. | LPI Inter. Chaos | BDI    | SIQ-JR | MC-SDS  | KIMS    |
|----------------------|-----------------|-----------------|------------|-------------------|------------------|--------|--------|---------|---------|
| LPI Total Score      | 1.0             | 0.86**          | 0.78**     | 0.89**            | 0.87**           | 0.64** | 0.63** | -0.53** | -0.31** |
| LPI Conf. About Self | --              | 1.0             | 0.51**     | 0.69**            | 0.74**           | 0.62** | 0.54** | -0.40** | -0.33** |
| LPI Impul.           | --              | --              | 1.0        | 0.67**            | 0.50**           | 0.36** | 0.45** | -0.45** | -0.28** |
| LPI Emot. Dysreg.    | --              | --              | --         | 1.0               | 0.70**           | 0.63** | 0.66** | -0.52** | -0.21*  |
| LPI Inter. Chaos     | --              | --              | --         | --                | 1.0              | 0.55** | 0.49** | -0.44** | -0.25*  |
| BDI                  | --              | --              | --         | --                | --               | 1.0    | 0.62** | -0.40** | -0.27** |
| SIQ-JR               | --              | --              | --         | --                | --               | --     | 1.0    | -0.26** | -0.26** |
| MC-SDS               | --              | --              | --         | --                | --               | --     | --     | 1.0     | 0.34**  |
| KIMS                 | --              | --              | --         | --                | --               | --     | --     | --      | 1.0     |

\* $p < 0.05$

\*\* $p < 0.01$

**Table 4:** Correlations (Pearson r values) between LPI and self-report measures in college student sample ( $N = 99$ ).



|                           | Mean  | SD   |
|---------------------------|-------|------|
| LPI Total Score           | 106.3 | 30.0 |
| LPI Confusion About Self  | 27.4  | 9.6  |
| LPI Impulsivity           | 26.7  | 9.3  |
| LPI Emotion Dysregulation | 24.8  | 9.3  |
| LPI Interpersonal Chaos   | 27.4  | 10.5 |

**Table 5:** Means and standard deviations of LPI subscales and total score - College student sample (N = 99).

|                       | Present Study                 | Adolescent Samples (Rathus et al 2015) |   |                                     |
|-----------------------|-------------------------------|--|---|-------------------------------------|
|                       | College<br>(N = 99) Mean (SD) | BPD<br>(N = 65)<br>Mean (SD)           | Psych Non-BPD<br>(N = 130)<br>Mean (SD) | Adol. Med.<br>(N = 42)<br>Mean (SD) |
| LPI Total             | 106.3 (30.0)                  | 171.8 (45.4)                           | 116.0 (39.0)                            | 89.8 (35.3)                         |
| Confusion Self        | 27.4 (9.6)                    | 41.9 (14.5)                            | 31.6 (13.9)                             | 24.0 (11.5)                         |
| Impulsivity           | 26.7 (9.3)                    | 37.9 (9.7)                             | 26.1 (9.1)                              | 22.0 (7.4)                          |
| Emotion Dysregulation | 24.8 (9.3)                    | 48.9 (14.4)                            | 30.7 (12.5)                             | 20.7 (8.4)                          |
| Interpersonal Chaos   | 27.4 (10.5)                   | 43.3 (14.2)                            | 27.6 (9.9)                              | 23.1 (11.1)                         |

**Table 6:** LPI means and standard deviations in present college sample compared with three medical center adolescent groups in Rathus et al. (2015).

adolescent psychiatric BPD, adolescent psychiatric non-BPD, and non-psychiatric adolescent medicine samples are listed in Table 6. LPI total mean scores in the college sample in the present study fall between the psychiatric, non-BPD adolescent sample and the adolescent medicine non-clinical sample in Rathus et al. [18].

## Discussion

The results of the present study support the internal consistency, test-re-test reliability, and validity of the LPI in a non-patient, college student sample. The following sections summarize and discuss these findings.

### Reliability

As in Rathus et al. [18], all four LPI scales were found to be internally consistent. Combined with the strong internal consistency of the Total LPI, these results suggest that the LPI measures highly related but distinct constructs in a college student sample. Further, given that nearly all items correlated most highly with the scale to which they were assigned, and the moderately high item-total correlations between items and their subscales, these findings support the rationally-based decisions regarding scale assignment.

As expected, LPI scores were found to be stable in college students over a two-week interval. Since BPD is assumed to be a stable, trait-like condition, scores on a measure meant to assess these features should remain relatively stable over time without treatment. This stability makes changes following intervention more interpretable. Coupled with the findings of Rathus and Miller [13], which demonstrated that the LPI scales are sensitive to the effects of treatment, the results of the present study suggest that the LPI can be useful to assess baseline functioning and DBT treatment outcome.

### Convergent/discriminant validity

Results of the present study suggest that the LPI subscales and Total Score have good convergent validity. As expected, the four subscale scores and Total Score were moderately correlated with scores on measures of depression and suicidal ideation, extending findings from Rathus et al. [18] to college students. In addition, as predicted, the LPI Total Score and its subscales were inversely correlated with scores on the KIMS, a measure of mindfulness skills. These results were expected, as the mindfulness scale measures the ability to focus on the present

without judgment, and to observe urges and impulses without acting on them. Acquisition of these skills is indeed central to the aims of DBT skills training and designed to treat the cognitive and self dysregulation and impulsivity characteristic of BPD. In fact, research has found the *absence* of mindfulness to be a core feature of BPD [31]. And, an additional study similarly reported significant inverse associations between mindfulness and LPI scores in a psychiatric patient sample using the Adolescent Mindfulness Questionnaire [38]. Collectively, these findings support the centrality of mindfulness training in DBT.

Our results do not support the discriminant validity of the LPI from a measure of social desirability. In the college student sample, all four subscales and the LPI Total Score were moderately correlated in the inverse direction with the MC-SDS, a measure for social desirability. These findings suggest that the LPI is sensitive to response bias, specifically, the tendency to present oneself in a socially desirable light. It makes sense that students concerned with favorable appearances might be reluctant to admit to some of the areas assessed including self-injury, impulsive behaviors, relationship problems, or dysregulated mood. This finding may be specific to a college sample, as items on the LPI were derived from scales designed to assess pathology in clinical settings, not normative samples. Also, this finding may be related in part to the fact that there are no reverse-scored items in the LPI, a development strategy designed to ease administration and scoring, but potentially at the cost of increased response bias. Note that scores on the BDI and the SIQ-JR were also inversely related, and scores on the Kentucky Inventory of Mindfulness Skills positively related, to social desirability scores. The present study's findings suggest that in college students, the LPI performed similarly to other self-report clinical measures in its sensitivity to a socially desirable response bias.

### Limitations and directions for future research

The external validity of the present study is limited, as data were collected from a largely White, suburban college sample. However, taken together with a psychometric evaluation with inner-city, mostly Hispanic psychiatric and non-psychiatric adolescents [18], findings point to the scale's reliability and validity in both suburban, predominantly White and urban, predominantly non-White young individuals. Selection bias might have occurred as well, since volunteers for this study were self-selected and might have systematically differed from college students who were not enrolled in psychology classes or who opted not to participate.

A limitation regarding the utility of the SIQ-JR as an appropriate comparison measure for the LPI lies in the fact that the SIQ-JR was developed for a sample younger than the participants in the present study. The age range of the development sample was 11.5 – 14 years [33]. However, as it performed in a way that was consistent with the present study's hypothesis (i.e., correlated with the LPI), the SIQ-JR's utility did not seem to be compromised.

As mentioned earlier, LPI scores correlated moderately with social desirability in the inverse direction, suggesting that LPI scores are subject to response bias. However, this limitation is common to self-report assessment instruments; and, while users must keep this in mind, because of their ease of administration and cost effectiveness, they still contribute in a valuable way to an assessment package.

Future research is required to investigate reliability and validity of the LPI in adult non-student samples. In addition, investigation of the scale's relationship with social desirability in a psychiatric sample should be conducted; the relationship might not manifest in the same fashion in a psychiatric clinic setting, where participants are acknowledging psychological distress and actively seeking treatment. In general, more research is needed to assess the LPI's discriminant validity. Beyond the Marlowe-Crowne Scale of Social Desirability, LPI scores should be correlated with measures of constructs unrelated to BPD to establish its uniqueness to the measurement of BPD over other constructs. Relatedly, measures used to validate the LPI in the present study were all paper-and-pencil or interview self-report measures. Studies might investigate the validity of the LPI by comparing it to results of analog, observation, or performance-based methods of assessment of BPD features [39] to rule out method variance as being responsible for the correlations. Assessing discriminant validity and investigating relationships with non-paper-and-pencil measures would be in keeping with the traditional multitrait, multimethod approach to determining construct validity. Further validation with measures of other BPD-related constructs would be beneficial as well, such as a specific measure of emotional dysregulation.

Future research might establish norms on varied and larger samples, and suggest cut-offs for clinical and subclinical scores on the LPI. Clinicians and researchers can refer to the means and standard deviations herein as well as in the three samples investigated in Rathus et al. [18] for general guidelines and ranges for clinical (urban psychiatric adolescent samples) and normative (urban medical non-psychiatric adolescent sample and suburban college older adolescent/young adult sample) scores (Table 6). In Rathus et al. [18], we suggest scores of 126 and above to identify BPD features in an adolescent sample.

Finally, we chose a student sample in part to evaluate the LPI's psychometrics in a non-patient sample, to extend findings of Rathus et al. [18] from a psychiatric sample. This sample indeed extends the external validity to an older, suburban, mostly white college student sample. Yet, considering the burgeoning rates of non-suicidal self-injurious behavior in community samples and within the college demographic [25,40], the degree to which one can consider a college sample normative remains questionable. Indeed, scores on the LPI in this "normative" sample fell in between Rathus et al.'s [18] normative adolescent and psychiatric (but non-BPD) samples (Table 6).

Whitlock and colleagues [25] reported a self-injury prevalence rate of 17% in a representative study of two universities, and community sample prevalence estimates for adolescents and young adults range from 4% to 38% [41-43]. Further, 30% - 40% of college respondents report initiating the behavior at age 17 or older [25]. A follow-up

criterion validity study might compare LPI scores in college students who report having engaged in self-injury versus those who have not; these likely constitute different populations, with the former tending to have more frequent and more negative emotions [44] and thus likely higher LPI scores. With high rates and recent onset of self-harm behaviors in this population, the LPI might prove a useful screening tool to identify which of these young adults might benefit from DBT.

## Conclusions

The LPI was developed to comprehensively assess Linehan's four problem domains of BPD: confusion about self, impulsivity, emotional dysregulation, and interpersonal chaos. It can be used for screening and for outcome of DBT treatment targets addressed explicitly in the skills training modules. Moreover, the LPI could be used to throughout treatment to assess mediators of change in mood regulation, suicidality, and self-injury. The LPI is internally consistent, stable across time, and has demonstrated construct validity. It has also been shown to be sensitive to changes with treatment in both adolescent [13] and adult populations [45]. The college sample used herein was a non-clinical sample, yet the rates of non-suicidal self-injury or other features of BPD within these participants are not known. The brevity and ease of administration of the self-report Life Problems Inventory make it a feasible measure for broad screening in college and other settings to determine possible need for treatment. In sum, the LPI is a promising instrument to measure core features of BPD and to assess treatment outcome of DBT skills training in Mindfulness, Distress Tolerance, Emotion Regulation, and Interpersonal Effectiveness.

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