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Psychometric Evaluation of the Life Problems Inventory, a Measure of Borderline Personality Features in Adolescents

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Abstract

Objective: Dialectical Behavior Therapy (DBT), developed by Marsha Linehan for adults with suicidal behaviors and borderline personality disorder, has been successfully extended to adolescent populations. In addition, recent literature has discussed the wisdom of considering a diagnosis of borderline personality disorder (BPD) in teens under the age of 18. Linehan conceptualizes BPD as a disorder primarily of the emotion regulation system, and in particular, problems with regulation of emotions, impulses, relationships, and self. Thus, her skills training component of Dialectical Behavior Therapy (DBT) consists of modules targeting these problem areas: emotion regulation, distress tolerance, interpersonal effectiveness, and mindfulness. Despite the proliferation of research supporting the efficacy of DBT, no measures specifically address the four core areas targeted in DBT skills training in adolescents. The Life Problems Inventory was developed to assess the four core BPD problem areas as described by Linehan and as targeted in DBT skills training.

Method: The Life Problems Inventory, a 60-item self-report instrument, was developed to assess Emotion Dysregulation, Impulsivity, Interpersonal Chaos, and Confusion about Self. The present study evaluates the psychometric properties of this instrument examining internal consistency, convergent validity, and criterion validity in an adolescent outpatient population (*N* = 195).

Results: The LPI was found to be internally consistent, to demonstrate convergent validity to related constructs, and to distinguish diagnostic samples.

Conclusions: Findings from this work 1) contribute to the self-report assessment of BPD features in adolescents according to Linehan's conceptualization, and 2) demonstrate the psychometric properties of a clinical outcome measure for the skills training component of DBT.

Keywords: Assessment; Adolescent; Borderline personality; Dialectical behavior therapy; Self-report

Objective

Dialectical Behavior Therapy (DBT) [1-3], is a comprehensive psychotherapy Linehan originally developed for women with Borderline Personality Disorder (BPD) who chronically display suicide-related behavior. Numerous randomized trials support its efficacy for reducing hospitalization days, treating suicidal behaviors and non-suicidal self-injury, reducing treatment drop-out, and addressing associated problems [4,5]. DBT has been successfully extended to many other populations with problems of dyregulated emotions and behaviors, including suicidal adolescents [6-8]. For adolescent populations, DBT has shown highly promising results for suicidal behaviors and ideation, non-suicidal self-injury (NSSI), and problems related to emotion regulation [9-14].

In addition, recent literature has discussed the wisdom of considering borderline personality characteristics in teens under the age of 18. Miller, Muehlenkamp, and Jacobson [15], based on a review of the empirical literature, argue that a BPD diagnosis can be assigned to adolescents when criteria are met on the basis of features of the diagnosis in adolescents closely resembling that in adults, stability of these features over time for a subgroup of adolescents, and the potential for obtaining more applicable and effective treatment. In a discussion of history, etiology, treatment, and advocacy for BPD, Gunderson [16] asserts: "Use of the borderline diagnosis clearly should be extended to adolescents; its clinical usage in this group is already extensive, its internal coherence and stability are established, and it predicts adult dysfunction as well as adult borderline personality disorder" (p. 536).

DBT views individuals with BPD as experiencing dysfunction in four central domains: 1) Emotional dysregulation; 2) Interpersonal dysregulation; 3) Behavioral dysregulation; 4) Self/Cognitive dysregulation [1]. In addition to individual therapy, DBT employs skills training to address capability deficits associated with these domains [2]. The corresponding behavioral skills modules are, respectively: Emotion Regulation, Interpersonal Effectiveness, Distress Tolerance, and Mindfulness.

Studies of DBT tend to use two main types of outcome measures: those that measure conditions commonly associated with BPD (e.g., suicidal behavior and NSSI, Axis I disorders, anger, interpersonal functioning, emotion regulation, and global adjustment) and those that measure BPD features directly. Measures of BPD features fall broadly into the categories of diagnostic interviews (e.g., Structured Clinical Interview for DSM-IV Axis II Personality Disorders [SCID-II] [17]; Diagnostic Interview for Borderlines - Revised [DIB-R] [18]; SID-P-IV [19]), or dimensional self-report instruments (e.g., the Millon Adolescent Clinical Inventory [MACI] [20]; the Personality Assessment Inventory [PAI] [21]).

Despite the proliferation of research supporting the efficacy of DBT, and its promising research with adolescents, no outcome measures to date directly assess in youth the four core problem areas of BPD as conceptualized by Linehan [1] and targeted in the DBT skills training modules. The PAI, a 344-item measure of personality and psychopathology, contains a scale that resembles Linehan's core BPD problem areas (Morey, 1991). Its Borderline subscale (BOR) contains 6-item subscales of Affective Instability, Identity Problems, Negative Relationships, and Self-Harm, and appears promising as a self-report measure of DSM IV BPD diagnosis in young adult samples [22,23]. Yet, the PAI was developed as a comprehensive assessment of personality and only briefly measures BPD features, while the LPI aims to comprehensively represent Linehan's conceptualization of BPD characteristics. The PAI-A, though revised for adolescent use, has only five items per scale on the BOR and thus has only moderate internal consistency, and does not broadly sample the content domain of BPD. Relatedly, its Self-Harm scale is narrowly focused and does not cover the range of dysregulated behaviors captured by the Impulsivity scale of the LPI. Further, the LPI also includes suicidal behaviors on the Emotion Dysregulation scale, as suicidal ideation can be related to emotional distress and is not necessarily impulsive. Finally, LPI scale items have already demonstrated sensitivity to treatment effects with teens [14,24].

The LPI

We developed the Life Problems Inventory (LPI) [14], a 60-item, paper-and-pencil self-report questionnaire for adolescents, to assess the four core problem areas of borderline personality disorder identified by Linehan [1]. Items were derived rationally by selecting items from existing measures of borderline personality that reflected each of these four constructs, and assigned to the conceptually relevant scales. Sources for these items included the Millon Adolescent Clinical Inventory (MACI) [20], the BPD module of the Structured Clinical Interview for DSM-IV Axis II Personality Disorders (SCID-II) [17], and the Diagnostic Interview for Borderlines - Revised (DIB-R) [18]. Additional items were written by the scale authors to improve content validity of the scales in reflecting Linehan's four problem areas, resulting in 15 items per scale. Note that in empirical scale development, the developer generally takes a theoretical approach to the scale's underlying structure, letting inter-item correlations dictate the subscales, following a factor-analytic procedure [25]. In rational scale development, one assigns items to scales based on a priori notions of the construct's underlying structure as well as semantic/conceptual similarity [26]. Methods such as internal consistency analysis and item-total correlations are then used to verify coherence of constructs. As the purpose was to construct a measure to reflect Linehan's [1] conceptualization of BPD and its underlying problem areas, a rational approach was employed.

The LPI asks adolescent examinees to rate each item on a Likert-type scale; items are summed to produce four scale scores and a total score. The Confusion about Self scale 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." The Impulsivity scale 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." The Emotional Dysregulation scale measures high sensitivity, high reactivity of emotional responses, slow return to baseline mood, episodic depression and suicidal ideation, irritability, anxiety, and problems with anger and other emotions. A sample item is: "Once I get upset, it takes me a long time to calm down." The Interpersonal Chaos scale assesses problems with chaotic, intense, and difficult relationships. A sample item is: "Relationships with people I care about have a lot of ups and downs."

The present study reports the psychometric properties of the LPI within an adolescent psychiatric outpatient sample. Regarding reliability, we expected the four LPI scales to be internally consistent, as each subscale measures a unitary construct. Regarding validity, we expected the LPI would be moderately correlated with depression, demonstrating convergent validity; the LPI is intended to measure emotional dysregulation, which often presents with hopelessness and depression [27,28]. We also expected LPI scores to correlate moderately with suicidal ideation and suicide-related behaviors, as suicidal thinking and behavior are highly prevalent among individuals with BPD [27]. We expected it to correlate highly with total number of borderline symptoms and BPD diagnosis, demonstrating convergent validity. In addition, we expected it to be moderately correlated with general symptom severity, given the suffering associated with BPD features [1].

We expected the LPI to have criterion validity in that scores would discriminate between groups of adolescent patients based on the presence of borderline features, such that LPI scores from a group of patients with BPD features should be higher than those from a group of patients who present for psychiatric treatment without BPD features. Moreover, we expected LPI scores from both these psychiatric groups to be higher than those of a demographically similar non-psychiatric adolescent sample.

Method

Participants

The sample was comprised of three groups:

Group (1): Patients with BPD features (BPD): This psychiatric group (N=65) was obtained by using archival data from an urban medical center child and adolescent psychiatry department outpatient setting. Participants were screened by psychologists in this outpatient clinic, and met criteria for a minimum three features of borderline personality disorder as specified by DSM-IV, according to the SCID-II. Sixty-five per cent of this group met full diagnostic criteria (five of nine symptoms) for BPD ($N = 42$). Eighteen per cent ($N = 12$) met three of the nine criteria, and seventeen per cent ($N = 11$) met four of the nine criteria. The majority of this group (81.3%; $N = 52$) had suicide-related behavior according to the Lifetime Para suicide Count (LPC; [29]), and 53.4% of this group ($N = 31$) were deemed at risk for suicide by scoring at or above the cutoff of 31 on the Suicide Ideation Questionnaire – Junior Edition (SIQ-JR; [30]). The majority of this group (83.1%; $N = 54$) met criteria for a depressive disorder. The mean age of this group was 15.6 ($SD = 1.4$).

Group (2): Non-BPD psychiatric patients (Non-BPD): This psychiatric group (N=130) was obtained from the same child psychiatry outpatient setting mentioned above. These participants were screened by psychologists, and had two or fewer BPD features. In this group, 25.4% ($N = 33$) had suicide-related behavior according to the LPC, and 19.7% ($N = 23$) were deemed at risk for suicide by scoring at or above the cutoff of 31 on the SIQ-JR [30]. As in the BPD group, the majority of this Non-BPD psychiatric group (73.8%; $N = 96$) met criteria for a depressive disorder. The mean age of this group was 14.8 ($SD = 1.8$).

These two psychiatric patient groups differed significantly at the $p < 0.01$ level on the basis of presence of suicide-related behavior χ^2 (1, $N = 195$) = 54.37, $p = 0.00$; and suicidal ideation χ^2 (1, $N = 195$) = 20.75, $p =$

0.00. There were no differences with regard to diagnosis of a depressive disorder χ^2 (1, N = 195) = 2.08, p = 0.15.

Group (3): Non-psychiatric adolescent patient group (Adolescent medicine): The third group (N = 42) was comprised of participants from the department of pediatrics from the same urban medical center mentioned above. These participants were seeking routine, non-mental health-related outpatient medical services at the medical center. The intent was to obtain a demographically-matched, non-psychiatric sample for the purpose of examining criterion validity of the LPI. Since all participants were coming from the same catchment area, it was expected that the three groups would have similar compositions in terms of socioeconomic status and ethnicity. The assessment information from this group was not from archival data. The mean age of this group was 17.7 (SD = 1.9).

Table 1 lists the percentages and number of subjects in the three medical center groups on the basis of gender, and the ethnic composition of the combined groups. Note that while SES was not assessed, it can be assumed from the location of recruitment that the groups were similarly comprised of adolescents from predominantly working class families.

In all three groups, the majority of subjects were of ethnic minority background, and predominantly Hispanic. Global Chi-Square analyses were conducted to determine the significance of difference between the three groups with regard to ethnicity and gender. There were no significant differences among the three groups in ethnicity: χ^2 (8, N = 237) = 10.50, p = 0.23. The differences between the groups with regard to gender were significant, with more females in the BPD group: χ^2 (8, N = 237) = 25.74, p = 0.00.

The three groups differed significantly at the p < 0.01 with regard to age, as the subjects in the Adolescent Medicine group (M = 17.7, SD = 1.9) were older than subjects in the BPD group (M = 15.6, SD = 1.4), t (105) = -6.67, p = 0.00, and subjects in the Non-BPD group (M = 14.8, SD = 1.8), t (170) = -9.12, p = 0.00. Subjects in the BPD group (M = 15.6, SD = 1.4) were older than subjects in the Non-BPD group (M = 14.8, SD = 1.8), t (193) = 3.08, p = 0.00.

In addition to BPD and depressive disorders, many of the participants in the two psychiatric groups warranted diagnoses for other comorbid Axis I disorders. Table 2 indicates the global Axis I diagnoses in each of the two psychiatric groups, summarized on the basis of DSM-IV diagnostic category, as well as Chi-Square values to determine significance of difference between the groups. Table 2 indicates that the

Global Axis 1 Disorder	BPD %	BPD (N)	Non-BPD %	Non-BPD (N)	Chi-Square
Learning Disorder	3.1	(2)	3.8	(5)	0.07
Disruptive Disorder	21.5	(14)	23.1	(30)	0.06
Mood Disorder	87.7	(57)	74.6	(97)	4.46*
Anxiety Disorder	49.2	(32)	32.3	(42)	5.27*
Substance Related Disorder	9.2	(6)	6.2	(8)	0.62
Eating Disorder	4.6	(3)	2.3	(3)	0.77
V-Code	0.0	(0)	2.7	(3)	1.58

Note: *p < 0.05

Table 2: Comparison between psychiatric groups by global DSM-IV axis I disorder and results of Chi-Square tests of significance of difference (df = 1).

two psychiatric groups were similar on the basis of all DSM-IV Axis I global diagnostic categories, except with regard to Mood Disorders and Anxiety Disorders. At the p < 0.05 level, there were significantly more participants in the BPD group who warranted these categorical diagnoses than were in the Non-BPD group.

Materials

LPI

The 60-item Life Problems Inventory (LPI; [14]) assesses the four core problem areas in BPD as described by Linehan [1,2]: confusion about self, interpersonal chaos, impulsivity, and emotional dysregulation (Table 4 for items and scale assignments). The instructions state: "Below is a list of problems adolescents sometimes have. Please read each one, and then write in the number that describes the way you are MOST OF THE TIME." Respondents fill out a Likert scale with the following anchor points: 1 – not at all like me, 2 – a little bit like me, 3 – somewhat like me, 4 – quite a bit like me, and 5 – extremely like me. Thus, total scores on the LPI can range from 60 – 300, with scale scores (15 items each) ranging from 15 – 75.

SCID-II (BPD module): The Structured Clinical Interview for DSM-IV Personality Disorders (SCID-II; First, [17]) is a clinician-administered semi-structured interview for diagnosing the 11 Axis II personality disorders of the DSM-IV, and is considered a "gold-standard" diagnostic instrument. The SCID-II is a reliable and valid measure [31,32]. It is used in the present study to discriminate the 2 psychiatric groups on the number of features of BPD as per DSM-IV criteria. The BPD module of the SCID-II is also used as a measure against which to compare LPI scores for convergent validity.

LPC: The Lifetime Para suicide Count (LPC; [29]) is an interview used to assess both suicide attempts and non-suicidal self-injurious (NSSI) behavior. It begins with questions about the first and most recent instance of self-harm behavior and associated suicidal intent. The second part of the interview elicits more detail, asking specifically about whether patients have engaged in 12 different types of self-harm behavior, its intent, and resultant medical treatment [33]. The LPC provides information regarding presence and severity of self-harm behaviors.

No data regarding test-retest or inter-rater reliability of the LPC with adolescents or adults are available [33]. With regard to concurrent validity, adolescents in an outpatient psychiatric setting with anxiety disorder, major depression, borderline personality disorder, and/or three or more Axis I psychiatric diagnoses had more suicidal behaviors than adolescents without these disorders [34].

BDI: The Beck Depression Inventory (BDI; [35]) is a commonly used 21 item self-report inventory that evaluates the level of depression

Gender Comparisons Across Groups						
Demographic	BPD		Non-BPD		Adolescent Med	
	%	(n)	%	(n)	%	(n)
N		(65)		(130)		(42)
Male	9.2	(6)	45.4	(59)	31.0	(13)
Female	90.8	(59)	54.6	(71)	69.0	(29)
Ethnic Composition Of Medical Center Groups Combined (N = 237)	%			(n)		
Hispanic	65.8			(156)		
Black	23.2			(55)		
White	5.5			(13)		
Other	4.2			(10)		
Asian	1.3			(3)		

Table 1: Gender and ethnicity.

in adolescents (aged 13 and older) and adults and has well-established psychometric properties [36].

SIQ-JR: The Suicide Ideation Questionnaire – Junior (SIQ-JR; [30]) is a 15-item self-report measure to assess adolescents' current thoughts about suicide. The psychometric properties of the SIQ-JR are well established [37].

SCL-90-R: The Symptom Checklist-90 Revised (SCL-90-R; [38]) Revised was used to assess global symptomatology of participants, as clients with BPD typically report high levels of misery and distress. The SCL-90-R is a 90-item self-report inventory that assesses nine dimensions of symptomatology: Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, and Psychoticism. The inventory also yields three global indices of distress: Global Severity Index, Positive Symptom Total, and Positive Symptom Distress Index. The Global Severity Index uses information on numbers of symptoms and intensity of distress and is considered to be the best single indicator of distress. Psychometric data are sound and have been published elsewhere [39].

Procedure

Participants ($N = 195$) presented to the adolescent psychiatry outpatient clinic with depressive or suicidal features. The intake consisted of a clinical interview, a semi-structured interview (SCID-II), and questionnaires filled out on-site (BDI, SCL-90-R, LPC, SIQ-JR, and LPI).

Non-psychiatric subjects were recruited from the Department of Pediatrics from the same medical center. Adolescents who arrived at this clinic to obtain non-psychiatric, routine medical treatment were each given a flier regarding the study. Adolescents who reported to this clinic for services other than routine, non-psychiatric medical treatment (e.g., patients from the medical center's obesity clinic) were excluded. Subjects provided informed consent and assent to participate in the study, and parents/guardians of subjects under 18 years of age provided parental consent. Upon receipt of completed consent/assent form(s), the investigators provided each participant with the assessment materials (LPI, BDI, and a brief demographic questionnaire) in an envelope, along with instructions for completing each instrument.

Results

Internal consistency

Using LPI data from the two combined psychiatric groups (BPD group and Non-BPD group; $N = 195$), alphas were calculated to determine the internal consistency of the four LPI subscales and the LPI total score. Table 3 lists these alpha values. The alpha values for the four subscales and the LPI Total Score were all in the good to excellent range, ranging from 0.82 (Impulsivity) to 0.96 (LPI Total Score).

Item-total correlations were calculated to assess each LPI item's relationship to its subscale (Table 4). For rare instances in which items correlated more highly with another scale, we elected to retain the item in its current scale, because of face validity, and the fact that these items were still significantly correlated with the scales on which we placed them, and the differences in correlations were slight.

	LPI Total Score	LPI Confusion About Self	LPI Impulsivity	LPI Emotion Dysregulation	LPI Interpersonal Chaos
Alpha	0.96	0.86	0.82	0.92	0.89

Table 3: Alpha values for LPI Subscales and total score in combined psychiatric groups (N = 195).

All items on the Confusion About Self subscale correlated more highly with the total score of this subscale than with that of the three other subscales, with a range of 0.50 to 0.78. At the $p < 0.01$ level, the item-total correlations between all 15 Confusion about Self items and the Confusion about Self subscale score were significant.

Thirteen of the 15 items on the Impulsivity subscale correlated more highly with the total score of this subscale than with that of the three other subscales. The two exceptions were Item 22 ("I have deliberately hurt myself without meaning to kill myself (such as cutting or scratching myself"), which correlated most highly (0.60) with the Emotion Dysregulation subscale total, and Item 30 ("I've eaten so much food that I was in a lot of pain or had to throw up"), which correlated most highly (0.32) with the Confusion About Self subscale total. At the $p < 0.01$ level, the item-total correlations between all 15 Impulsivity items and the Impulsivity subscale score were significant.

Fourteen of the 15 items on the Emotion Dysregulation subscale correlated more highly with the total score of this subscale than with that of the other 3 subscales. The one exception was Item 43 ("I often feel very anxious or worried about things"), which correlated most highly (0.67) with the Confusion about Self subscale score. At the $p < 0.01$ level, the item-total correlations between all 15 Emotion Dysregulation items and the Emotion Dysregulation subscale score were significant.

Fourteen of the 15 items on the Interpersonal Chaos subscale correlated more highly with the total score of this subscale than with that of the other 3 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 (0.58) with the Emotion Dysregulation subscale score At the $p < 0.01$ level, the item-total correlations between all 15 Interpersonal Chaos items and the Interpersonal Chaos subscale score were significant.

Convergent validity

In the combined psychiatric sample, the four LPI subscales and LPI total scores were correlated with scores on the following measures: BDI; SIQ-JR; SCL-90-R; LPC; SCID-II.

Table 5 displays these correlations.

Significant correlations at the $p < 0.01$ level were found between the LPI Total Score and all other related measures, with Pearson coefficients reflecting moderate relationships. Also, significant relationships were found between the four LPI subscales and all other related measures. Moderate to high correlations were found between each of the four subscales with one another, ranging from 0.57 (Confusion about Self with Impulsivity) to 0.81 (Emotion Dysregulation with Interpersonal Chaos). High correlations were found between the LPI total score and each subscale, ranging from 0.84 (Impulsivity) to 0.93 (Emotion Dysregulation).

Table 5 shows that when disregarding the 0.86 correlation between number of borderline features and presence of borderline diagnosis, both obtained from the SCID-II, the LPI total score had higher correlations with both number of borderline features (0.55) and presence of borderline diagnosis (0.50) than any other measure used in this study had with these two constructs. Of the four subscales, the Interpersonal Chaos scale was found to have the highest correlations with both number of borderline features (0.56) and presence of borderline diagnosis (0.52). The Emotion Dysregulation scale also correlated more highly with both number of borderline features (0.55) and presence of borderline diagnosis (0.50) than with any other measure used in this study.

Item	Scale	Item-Total Correlation
1. I am not sure who I am or what I want in life.	CS	0.66*
2. I usually act quickly, without thinking.	IM	0.62*
3. I sometimes get so upset that I want to hurt myself seriously.	ED	0.67*
4. I worry a lot about being left alone.	IC	0.61*
5. I sometimes go into a daze and lose awareness of things going on around me.	CS	0.67*
6. Sometimes I plan to go to class, but will change my mind if something better comes along.	IM	0.61*
7. Killing me may be the easiest way of solving my problems.	ED	0.64*
8. I often feel sad and unloved.	IC	0.67*
9. I sometimes feel very unhappy with who I am.	CS	0.66*
10. If I want to do something, I just do it without thinking of what might happen.	IM	0.67*
11. More and more I often think of ending my own life.	ED	0.62*
12. Relationships with people I care about have a lot of ups and downs.	IC	0.71*
13. Other kids my age seem surer than I am of who they are and what they want.	CS	0.72*
14. I often have too much to drink or get really drunk.	IM	0.40*
15. When I don't get my way, I quickly lose my temper.	ED	0.74*
16. I hate to spend time alone.	IC	0.50*
17. I feel lonely and empty most of the time.	CS	0.71*
18. I often get high on street drugs like marijuana or other drugs.	IM	0.17*
19. Even little things get me really depressed.	ED	0.70*
20. I will sometimes do almost anything to avoid feeling alone.	IC	0.67*
21. I feel pretty lost and don't know where I'm going in life.	CS	0.78*
22. I have deliberately hurt myself without meaning to kill myself (such as cutting or scratching myself).	IM	0.59*
23. When things don't go my way, I give up and feel hopeless.	ED	0.76*
24. I feel very depressed when I'm alone.	IC	0.68*
25. I'm not that mature for my age, and I don't know what I want to do in life.	CS	0.50*
26. I have made at least one suicide attempt.	IM	0.58*
27. Once I get upset, it takes me a long time to calm down.	ED	0.77*
28. I feel very nervous, angry, or empty when I'm alone.	IC	0.70*
29. I often feel empty or bored.	CS	0.45*
30. I've eaten so much food that I was in a lot of pain or had to throw up.	IM	0.29*
31. I feel angry a lot of the time.	ED	0.78*
32. I often fear I will be abandoned by people I feel close to.	IC	0.71*
33. I often feel like I'm not real, as if I'm physically separated from my feelings.	CS	0.69*
34. I've spent money on things I didn't need or couldn't afford.	IM	0.49*
35. I often get furious at people.	ED	0.79*
36. I often fear I will totally fall apart if someone important abandons or rejects me.	IC	0.70*
37. I'm so different at different times that I sometimes don't know who I really am.	CS	0.66*
38. I've lost my temper and really yelled or screamed at someone.	IM	0.73*
39. I get into arguments very easily.	ED	0.73*
40. Many of my relationships have been full of intense arguments.	IC	0.67*
41. I'm often confused about my goals.	CS	0.72
42. I've threatened to physically hurt someone (such as hit or punch them).	IM	0.71*
43. I often feel very anxious or worried about things.	ED	0.66*
44. I have had lots of breakups with people I've been close to.	IC	0.66*
45. I often change my mind about the kind of friends I want.	CS	0.53*
46. I've physically hurt or attacked someone (such as slapped, punched, gotten into fistfights).	IM	0.69*
47. I get very moody, where I change quickly from feeling OK to feeling really bad or angry.	ED	0.78
48. In close relationships, I often think the other person is perfect sometimes, but I think they're terrible at other times.	IC	0.69*
49. I'm often not sure what I really believe in.	CS	0.70*
50. I have damaged property (such as smashing dishes or breaking things).	IM	0.63
51. Sometimes I get so angry that I lose control.	ED	0.72*
52. My relationships with others are often very strong or intense, but they don't go that smoothly.	IC	0.70*
53. Sometimes it seems as if things around me are not real, as though I'm in a dream.	CS	0.68*
54. I've done something against the law (like shoplifting, selling drugs, etc.).	IM	0.44*
55. Even little things get me really angry.	ED	0.78*
56. Sometimes I beg someone to try to stop them from leaving me.	IC	0.58*
57. I often have trouble keeping my attention on what I need to do (like homework or solving a problem).	CS	0.66*
58. I've had sex with people I hardly knew, or had unsafe sex.	IM	0.33*
59. I get so angry that I hit people or throw things.	ED	0.68*
60. I often don't get along with authority figures (such as parents or teachers).	IC	0.52*

CS = Confusion about Self; IM = Impulsivity; ED = Emotion Dysregulation; IC = Interpersonal Chaos
Note: *p < 0.01.

Table 4: Item-total correlations (Pearson r values) for LPI Scales – Entire sample (N = 237).

	LPI Total Score	LPI Conf. About Self	LPI Impul	LPI Emot. Dysreg	LPI Inter. Chaos	BDI	SIQ-JR	SCL-90-R	LPC (pres.)	LPC (sever.)	SCID-II (# of features)	SCID-II (pres. of dx**)
LPI Total Score	1.0	0.85*	0.84*	0.93*	0.91*	0.57*	0.59*	0.61*	0.50*	0.33*	0.55*	0.50*
LPI Conf. About Self	--	1.0	0.57*	0.70*	0.71*	0.60*	0.56*	0.60*	0.32*	0.21*	0.35*	0.31*
LPI Impulsivity	--	--	1.0	0.78*	0.70*	0.32*	0.41*	0.37*	0.57*	0.33*	0.51*	0.45*
LPI Emot. Dysreg.	--	--	--	1.0	0.81*	0.52*	0.59*	0.57*	0.48*	0.34*	0.55*	0.50*
LPI Inter. Chaos	--	--	--	--	1.0	0.53*	0.51*	0.57*	0.45*	0.29*	0.56*	0.52*
BDI	--	--	--	--	--	1.0	0.69*	0.71*	0.38*	0.21*	0.41*	0.39*
SIQ-JR	--	--	--	--	--	--	1.0	0.66*	0.38*	0.26*	0.42*	0.35*
SCL-90-R	--	--	--	--	--	--	--	1.0	0.29*	0.15	0.36*	0.30*
LPC (pres.)	--	--	--	--	--	--	--	--	1.0	0.51*	0.53*	0.45*
LPC (sever.)	--	--	--	--	--	--	--	--	--	1.0	0.30*	0.25*
SCID-II (# of features)	--	--	--	--	--	--	--	--	--	--	1.0	0.86*
SCID-II (pres. of dx)	--	--	--	--	--	--	--	--	--	--	--	1.0

*$p < 0.01$
**Point-biserial correlations

Table 5: Correlations between LPI and related measures-psychiatric sample combined (N=195).

	(BPD vs. Non-BPD)	(Non-BPD vs. Adol. Med.)	(BPD vs. Adol. Med.)
	t (df)	t (df)	t (df)
LPI Total Score	8.92** (193)	3.87** (170)	9.93** (105)
LPI Confusion About Self	4.78** (193)	3.21** (170)	6.72** (105)
LPI Impulsivity	8.31** (193)	2.65** (170)	8.99** (105)
LPI Emotion Dysregulation	9.11** (193)	4.84** (170)	11.48** (105)
LPI Interpersonal Chaos	8.96** (193)	2.46* (170)	7.78** (105)

*$p < 0.05$
**$p < 0.01$

Table 6: Results of post-hoc t-tests comparing between-group differences of LPI scores in medical center sample (N = 237).

	BPD (N = 65)		Non-BPD (N = 130)		Adol. Med. (N = 42)	
	Mean	(SD)	Mean	(SD)	Mean	Mean
LPI Total Score	171.8$_a$	(45.4)	116.0$_b$	(39.0)	89.8$_c$	(35.3)
LPI Confusion About Self	41.9$_a$	(14.5)	31.6$_b$	(13.9)	24.0$_c$	(11.5)
LPI Impulsivity	37.9$_a$	(9.7)	26.1$_b$	(9.1)	22.0$_c$	(7.4)
LPI Emotion Dysregulation	48.9$_a$	(14.4)	30.7$_b$	(12.5)	20.7$_c$	(8.4)
LPI Interpersonal Chaos	43.3$_a$	(14.2)	27.6$_b$	(9.9)	23.1$_b$	(11.1)

Note: Means in the same row with different subscript letters are significantly different at the p < 0.01 level

Table 7: LPI means and standard deviations of three medical center groups.

The correlation between the Impulsivity scale and number of borderline features was found to be 0.51, which was higher than any other correlation between a non-LPI measure and this construct except for presence of suicide-related behavior as per the LPC (0.53). The correlation between the Impulsivity scale and presence of borderline diagnosis was found to be 0.45, which was also the correlation between presence of suicide-related behavior as per the LPC and presence of borderline diagnosis, and higher than any other correlation between a non-LPI measure and this construct. Thus, convergent validity of the LPI was strongly supported.

Criterion validity

LPI Total Scores and scores from the four subscales were compared among the three medical center groups (BPD group; Non-BPD group; Adolescent Medicine group; $N = 237$) using a one-way analysis of variance (ANOVA). LPI Total Scores differed between the three groups at the $p < 0.01$ level, $F (2, 234) = 63.13$, $p = 0.00$. All four LPI subscales differed significantly among the 3 groups at the $p < 0.01$ level: $F (2, 234) = 23.37$, $p = 0.00$ (Confusion about Self); $F (2, 234) = 50.60$, $p = 0.00$ (Impulsivity); $F (2, 234) = 75.01$, $p = 0.00$ (Emotion Dysregulation); and $F (2, 234) = 53.02$, $p = 0.00$ (Interpersonal Chaos).

Post-hoc t-tests were conducted to determine the significance of between-group differences in LPI subscales and total score. Table 6 lists the t-values for the following between-group comparisons: BPD group versus Non-BPD group; Non-BPD group versus Adolescent Medicine group; BPD group versus Adolescent Medicine group. Table 6 indicates that with regard to the four LPI subscales and Total Score, all between-group differences were significant at the $p < 0.01$ level, except for the difference in Interpersonal Chaos between the Non-BPD group and the Adolescent Medicine group. This difference was significant at the $p < 0.05$ level. Participants in the BPD group scored significantly higher than those subjects in the Non-BPD Psychiatric group on all four LPI subscales and LPI Total Score. Non-BPD psychiatric subjects scored significantly higher than those participants in the Adolescent Medicine group on LPI Total Score, Confusion about Self, Impulsivity, and Emotion Dysregulation. BPD subjects scored significantly higher than Adolescent Medicine participants on all four subscales and LPI Total Score. Based on the means and standard deviations of the BPD and the normative, Adolescent Medicine groups, we suggest a cut-off of 126 and higher on the LPI total score to distinguish those adolescents with features of borderline personality from normal controls. Table 7 lists and compares the mean LPI subscale scores and LPI Total Scores among the three groups.

	BPD vs. Non-BPD	Non-BPD vs. Adol. Med.	BPD vs. Adol. Med.
LPI Total Score	28.87**	5.67**	33.87**
LPI Confusion About Self	8.04**	3.62*	15.54**
LPI Impulsivity	23.34**	2.35	26.77**
LPI Emotion Dysregulation	28.37**	8.59**	44.84**
LPI Interpersonal Chaos	31.85**	5.01**	21.82**

*p < 0.05
**p < 0.01

Table 8: Results of ANCOVAS (F-values) to compare LPI scores between groups with age and gender as covariates (df = 3).

Because the three groups differed on the basis of both age and gender, between-group LPI means were compared using Analysis of Covariance (ANCOVA) with age and gender as covariates. Table 8 lists the results of the ANCOVAS between the three groups.

Table 8 shows that when age and gender are factored as covariates, participants in the BPD group still scored significantly higher at the p < 0.01 level than Non-BPD psychiatric participants on all four LPI subscales and LPI Total Score. Differences between the Non-BPD group and the Adolescent Medicine group were significant at the p < 0.01 level on the basis of LPI Total Score, Emotion Dysregulation, and Interpersonal Chaos, and at the p < 0.05 level on the basis of Confusion About Self. On all four LPI subscales and LPI Total Score, subjects in the BPD group scored significantly higher at the p < 0.01 level than those participants in the Adolescent Medicine group.

Discussion

The results of the present study support the reliability and validity of the LPI. The following sections summarize the psychometric properties, offer interpretations, and point out limitations and directions for future research.

Reliability

All four LPI scales were found to be internally consistent. Combined with the strong internal consistency of the Total LPI score, these results suggest that the LPI measures highly related but distinct constructs. Further, the fact that nearly all items correlated most with the scale to which they were assigned, and the generally high item-total correlations between items and their subscales support the rationally-based decisions regarding scale assignment.

Subjects who scored highly on Emotion Dysregulation scored highly on Impulsivity, Confusion about Self, and Interpersonal Chaos. These relationships are consistent with Linehan's [1] conceptualization of BPD, in that emotional dysregulation leads to problems with interpersonal dysregulation, self dysregulation, behavioral dysregulation, and cognitive dysregulation.

Convergent/discriminant validity

Results suggest that the LPI subscales and Total Score have good convergent validity with moderate correlations with scores on measures of depression, suicidal ideation, global symptomatology, and presence and severity of suicide-related behavior.

We found moderate correlations between LPI scores and both number of BPD features and BPD diagnosis. However, of all the measures administered, the LPI scales were the most highly correlated with both number of BPD features and presence of BPD diagnosis as per the SCID-II. The LPI Impulsivity scale was also more highly correlated with presence of BPD diagnosis than any other non-LPI assessment used in this study, except for the LPC which was equally correlated with this construct. These moderate correlations might have

been attenuated due to the use of different methods between the LPI, a self-report, paper-pencil questionnaire, and the SCID-II, an interview.

Criterion validity

Results of the present study suggest that the LPI discriminated three groups in a medical center sample: 1) Psychiatric group of individuals with BPD features; 2) Psychiatric group of individuals without BPD features; 3) A similar group of non-psychiatric adolescents seeking routine medical treatment. As expected, subjects in the BPD group scored significantly higher than subjects in both the Non-BPD group and the Non-psychiatric adolescent group on all four LPI subscales and Total Score. With regard to LPI Total Score, and the Emotion Dysregulation and Interpersonal Chaos subscales, participants in the Non-BPD psychiatric group also scored significantly higher than those subjects in the Non-psychiatric adolescent group. Differences in the Confusion about Self and Impulsivity subscales were not significant between these two groups. These results cannot be attributed to between-group differences in age and gender, and suggest that in a medical center outpatient sample, the LPI can discriminate individuals with BPD features from non-BPD psychiatric and non-psychiatric patients. Note that the presence of three BPD features was used as the cutoff for inclusion in the BPD group, rather than full diagnostic criteria (i.e., 5 or more features). This decision was made in keeping with research suggesting the clinical validity and utility of including sub threshold BPD cases with three or more diagnostic criteria in BPD research groups [40]. The decision further had the advantage of boosting power in the BPD group.

Directions for future research

All three groups from the medical center sample were urban, mixed minority samples, predominantly Hispanic. Thus, these data are suggestive of the scale's reliability and validity in young urban minority individuals. Future research is required to investigate LPI reliability and validity in other samples in terms of age range and ethic composition. In addition, investigation of the scale's relationship with social desirability should be conducted. In general, more research is needed to assess the LPI's discriminant validity; LPI scores could be correlated with measures of constructs unrelated to BPD, in keeping with the multi-trait, multi-method procedure advocated by Campbell and Fiske [41].

Relatedly, the 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 [42] to rule out method variance in the interpretation of its validity. As Linehan [1] purports that emotional dysregulation is the central problem of BPD, LPI scores could be correlated with scores on a specific measure of emotional dysregulation to further investigate convergent validity. Future studies could also investigate the validity of each LPI subscale independently by examining relationships with constructs expected to correlate with each subscale. Such research would help to

better discriminate the four LPI subscales as measurements of related yet distinct constructs. Similarly, additional research might examine the LPI's sensitivity as an outcome measure for DBT skills training, particularly whether LPI subscales change differentially in response to participation in specific DBT skills training modules.

Finally, future research with larger samples might establish normative data and clinical cut-off scores or ranges for psychiatric and non-psychiatric samples. Means and standard deviations from the samples included herein can be used for such reference in the meantime.

Conclusions

The LPI is the only self-report inventory designed to directly measure Linehan's four problem domains of BPD. Therefore, it could be used as a screening tool, or as an outcome measure of treatment targets addressed in the skills training modules. Moreover, the LPI could be used to assess mediators of change in features such as suicidality, self-injury, and hospitalization days. In sum, the LPI is a promising new instrument to measure features of BPD or outcome in DBT. The LPI herein has demonstrated promising internal consistency and validity, and has appeared in prior research to be sensitive to treatment in both adolescent [14] and adult populations [43]. Finally, use of the LPI can help evaluate the efficacy of DBT with regard to mediating its stated treatment targets.

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