# A positive emotion regulation intervention for bipolar I disorder: Treatment development and initial outcomes☆

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## ARTICLE INFO

## ABSTRACT

Objective: Dysfunction in positive affect is a defining symptom of bipolar I disorder (BD), both during and between mood episodes. We hypothesize that helping people with BD learn skills to create balance in their affective experiences by engaging in strategies that increase low activation positive emotion (LAP; e.g., relaxation) could help to improve well-being during periods of symptom remission. We discuss the development and preliminary outcomes of a positive emotion regulation (PER) group treatment for people with BD, designed as a supplement to pharmacological treatment. Method: The Learning Affective Understanding for a Rich Emotional Life (LAUREL) intervention is a group-based intervention covering 10 empirically supported skills designed to increase LAP. Sixteen people with BD enrolled in the LAUREL intervention and twelve completed baseline and post-intervention assessments. Results: Participants who completed the study ($n = 12$) attended the majority of groups (87.96%) and reported practicing skills, on average, 16 times a week. We were unable to detect significant differences in mania symptoms following engagement in this PER intervention. Finally, participants reported increases in several areas associated with well-being post-intervention, including mindfulness, reappraisal, and self-compassion. Conclusion: This study provides a theoretical framework and preliminary support for a PER intervention for BD.

## 1. Introduction

Bipolar I disorder (BD) is a serious mental illness defined by the experience of mania, a mood episode characterized by heightened feelings of euphoria and/or irritability [1]. Other cardinal features of the disorder include high energy, perceived lack of need for sleep, increased goal-directed behavior, and impulsivity. People with BD are also at heightened risk for experiencing depressive episodes. Beyond mood episodes, BD is linked to a range of poor outcomes, including high rates of suicide [2], homelessness [3], divorce [4], and significant comorbidity with other psychiatric disorders, including anxiety [5] and substance use [6].

While mania is often characterized by heightened positive affect,[8] many people with BD also exhibit high levels of positive affect during periods of symptom remission. In addition, extreme valuing of happiness has been found to be associated with and predict a more severe course of symptoms within BD [7]. People with BD also report difficulty controlling their impulsiveness during states of intense positive affect [8]. This affect-related impulsivity, in turn, relates to poorer quality of life, lack of well-being, suicidality, and aggression for those with BD [8–11]. Further, the experience of extreme positive emotions may be a warning sign or trigger for mania [12]. Conversely, evidence shows that positive affect is associated with better functioning in BD [13]. Together, these findings suggest that although certain aspects of positive affect may be disrupted in BD, positive emotions confer benefits for functioning just as they do for those without BD [14,15].

Due to the potentially triggering nature of positive affect, people with BD may attempt to "dampen," or reduce, the experience of positive emotions [16]. Indeed, evidence suggests that those with BD report actively avoiding rewarding activities and dampening the experience of positive emotions more frequently than those without BD [17]. Although this may be intended as a strategy to protect oneself against full symptoms of mania, dampening positive emotions is associated with substantial consequences, including decreases in subjective well-being [17], increased depression symptoms [18], and attenuated attention to positive stimuli [19]. Paradoxically, dampening is also associated with increased symptoms of mania [18]. Thus, people with BD appear to be in a "Goldilocks" situation with positive emotions: too much or too little has negative consequences.

Psychosocial interventions that focus on positive emotion regulation (PER), or the ability to modulate the onset, nature, and course of positive emotions [20], may help people with BD experience positive affect during periods of symptom remission without the risk of future mood episodes. Indeed, Celano and colleagues [21] found improvements in positive affect and optimism in a preliminary study of a 4-week telephone-based intervention incorporating skills to increase positive affect (e.g., gratitude, personal strengths, acts of kindness, and imagining a best possible self) among people recently discharged from psychiatric inpatient care for bipolar depression. Further, Kraiss and colleagues [22] developed and are in the process of evaluating a randomized control trial of a group intervention for people with BD in symptom remission, incorporating similar PER practices (e.g., personal goals, positive emotions, coping with fear of relapse, personal strengths, positive relationships, and compassion). Given that the application of PER interventions in BD is in its infancy relative to other clinical and non-clinical populations [23], additional implementation and outcomes studies are needed.

### 1.1. Theoretical model for a PER intervention for BD

The affective circumplex model posits that moods, emotions, and other feeling states are comprised of two core "affective" properties: valence (feelings ranging from pleasant/positive to unpleasant/negative) and activation (feelings ranging from quiet/still to active/energized) [24–26]. Thus, emotions vary on these two dimensions of affect and can be plotted on a circumplex, with valence serving as the x-axis and activation serving as the y-axis. For example, both excitement

and relaxation are often interpreted as positively-valenced emotions, but they differ in activation. Awareness of both valence and activation can improve one's emotional granularity (i.e., precision and specificity) [27], an aspect of emotional awareness that has been associated with more adaptive coping [28] and the use of more varied emotion regulation strategies [29].

Research suggests that people vary in how much they value positive affective states [30] and that there may be unique benefits to the experience of specific low activation positive emotions (LAP) [31]. For example, gratitude, conceptualized as a positive feeling state in response to another person's kindness, is associated with increased prosocial behavior [32]. In addition, the feeling of compassion towards oneself and others is the foundation and focus of Loving Kindness Meditation, a type of mindfulness meditation that has been shown to reduce negative emotions, stress, and mood symptoms [33]. These findings suggest that emotions characterized as LAP are healthy and adaptive.

Specific to BD, research suggests that high activation positive emotions (HAP) may have costly outcomes. For those with high levels of emotion-related impulsivity, declines in cognitive control have been observed during HAP states [34]. Further, proclivity towards goal-pursuit (which is associated with HAP, such as pride and excitement) is well documented in BD [35]. People with BD show an elevated tendency to continue pursuing reward after initial success [36], high levels of persistence during difficult goal pursuit [35,37] and elevated goal-setting [38]. While this may be adaptive at times, several studies suggest that manic episodes are more likely to occur after life events that involve goal-pursuit [39–41]. Thus, LAP may offer people with BD the opportunity to experience positive emotion potentially without the risk for mania that HAP (and the dampening of such emotions) may confer.

Taken together, the experience of HAP (including emotions tied to extreme goal-pursuit) may be particularly pronounced for those with BD and contribute to a poorer course of the disorder. Alternatively, evidence in healthy people suggests that the experience and valuing of LAP show unique benefits. Improving LAP in conjunction with skills meant to increase the awareness and experience of emotions across the affective circumplex may be particularly beneficial for people with BD by helping to create emotional "balance" (i.e., experiencing emotions in moderation and across the affective circumplex). The purpose of the current study was twofold: (1) describe treatment development of the Learning Affective Understanding for a Rich Emotional Life (LAUREL) group intervention, and (2) demonstrate the implementation of the LAUREL intervention through a proof of concept open trial.

## 2. Method

### 2.1. LAUREL treatment development

The LAUREL intervention was conceptualized as an intervention to help improve emotion dysregulation in BD that continues to occur even during periods of symptom remission. It was modeled after a positive emotion intervention developed for people with schizophrenia [42] as well as other related interventions designed to increase positive emotions for people experiencing health-related stress [43–58]. In an effort to minimize the experience of intense positive emotions, we opted not to include certain skills that may overemphasize positive affect in this population (e.g., identifying personal strengths) and instead incorporated sessions on symptom monitoring and emotion education. Participants engaged in nine weekly 90-minute sessions during which they learned ten empirically supported skills [59]: (1) symptom tracking [60], (2) emotion tracking [61], (3) noting daily positives [62–64], (4) savoring positive events [65], (5) mindfulness [66], (6) positive reappraisal [67–69], (7) gratitude [70,71], (8) small acts of kindness [72–74], (9) self-compassion [75], and (10) setting and working towards attainable goals [76] (see Table 1).

Group sessions incorporated three main components consistent with

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[8] "Mood," "affect," and "emotion" are terms often used interchangeably, but refer to distinct feeling states. Throughout the paper, "mood" refers to a sustained feeling state that persists across contexts and may be accompanied by clinically significant symptoms (i.e., manic or depressive mood episode). "Affect" refers to a potentially momentary feeling state that reflects either valence (pleasantness or unpleasantness) or activation (high or low), or when referring to a variety of emotion labels that all represent or have been combined to reflect similar valence or activation. "Emotion" refers to specific emotion labels that reflect momentary feeling states (e.g., anger, sadness, boredom) and to processes meant to influence these states (e.g., emotion regulation).

**Table 1**
Description of LAUREL group sessions.

| Group session | Content | Skill(s) | Home practice |
|---|---|---|---|
| Week 1: introduction to bipolar disorder | Psychoeducation about the symptoms of mania and depression; Differentiating between warning signs and triggers for mania and depression | (1) Identifying warning signs and triggers for mood symptoms | Complete log identifying personal warning signs, triggers, and coping responses for mania and depression |
| Week 2: emotion education | Introduction to the affective circumplex model of emotion, including differentiating between high activation positive (HAP), low activation positive (LAP), high activation negative (HAN), and low activation negative (LAN) emotions | (2) Emotion tracking | Complete a daily log of emotions experienced |
| Week 3: noticing and savoring positive experiences | Psychoeducation on the ways depression and mania can influence awareness of positive experiences (e.g., dampening or over-amplifying the experience); Savoring exercise with a piece of candy | (3) Identifying positive experiences (4) Savoring positive experiences | Complete a daily log of (a) a positive event, (b) the emotion felt after the event, and (c) method for savoring positive feelings |
| Week 4: mindfulness | Defining mindfulness; Mindfulness practice (e.g., deep breathing, mindful walking/listening exercises) | (5) Mindfulness | Complete a daily log of mindfulness practices; Members received a CD of different mindfulness exercises |
| Week 5: reappraisal | Defining reappraisal as changing one's thoughts related to an event by being mindful of both the positive and negative aspects of the situation; Psychoeducation about how mania and depression can influence appraisals of situations; Discussion of when reappraisal may be helpful | (6) Reappraisal | Complete a log describing events or situations where reappraisal was helpful during the week |
| Week 6: gratitude and small acts of kindness | Psychoeducation about the psychological benefits of gratitude and altruism; Emphasis on small acts of kindness that are small, quick, and free | (7) Gratitude (8) Altruism (small acts of kindness) | Complete a daily log of gratitude practice; Complete a daily log of small acts of kindness |
| Week 7: self-compassion | Psychoeducation about the benefits of self-compassion; Loving kindness meditation practice | (9) Self-compassion | Complete a daily log of self-compassion; Complete self-compassion letter writing exercise |
| Week 8: setting and achieving attainable goals | Discussion of adaptive responses to setting and achieving goals (e.g., savoring the achievement); Psychoeducation about warning signs of mania associated with goal setting (e.g., losing sleep in attempts to accomplish more and more goals); Description of attainable goals (realistic, clear, not too easy and not too hard, and has a clear end point) | (10) Setting and achieving attainable goals | Complete a daily log of setting one small, attainable goal each day and method for savoring the accomplishment of the goal |
| Week 9: feedback and implementation | Review of skills learned during group; Discussion of which skills were most helpful; Discussion of how members would continue to implement skills in their daily lives | N/A | Continue to practice helpful skills after the end of group |

cognitive behavioral therapy (CBT) principles: (1) didactic skill discussion; (2) skill training and practice; and (3) home practice. Therapists first provided a didactic discussion of a skill, including the rationale for incorporating the skill into one's daily life, a summary of the empirical support highlighting the benefits of the skill, and real-world examples of how to use the skill at home. Participants then engaged in interactive skills practice, which focused on building skill mastery and generalization of the skill to contexts outside of the group. Participants were asked to practice the new skill, along with the previously learned skills, between sessions. They were provided with a review sheet that outlined the session content, forms for tracking their home practice and ratings of skill helpfulness, and materials to promote home practice. At the beginning of the next session, participants were encouraged to share their experiences with skill implementation, challenges they faced with home practice, and any noticeable benefits from engagement in LAUREL skills.

### 2.2. LAUREL proof of concept open trial

We recruited a small sample of individuals with bipolar I disorder to demonstrate the implementation of the LAUREL intervention and sought to explore the following questions: (1) Will people with BD engage in a skills-based PER group? (2) Will people with BD practice learned skills between group sessions? (3) Does skill training focused on increasing LAP increase symptoms of mania? (4) Do preliminary results suggest improvement in areas associated with well-being covered in the LAUREL intervention (e.g., savoring, mindfulness, reappraisal, self-compassion)?

### 2.2.1. Participants and procedures

Sixteen people diagnosed with DSM-IV-TR[9] [77] bipolar I disorder between the ages of 18–60 completed informed consent procedures (see Table 2 for sample characteristics). Participants were recruited from the

**Table 2**
Baseline demographic and clinical characteristics of all participants enrolled.

| | Completers (n = 12) | Non-completers (*n* = 4) | Total (n = 16) |
|---|---|---|---|
| Male (%) | 50% | 50% | 50% |
| Age (M, SD) | 45.33 (12.29) | 36.75 (13.67) | 43.19 (12.76) |
| Years of Education (M, SD) | 16.17 (1.64) | 14.75 (2.06) | 15.81 (1.80) |
| Married (%) | 33% | 75% | 44% |
| Caucasian (%) | 83% | 75% | 88% |
| Number of hospitalizations (M, SD) | 2.43 (1.13) | 6.33 (2.31) | 3.60 (2.37) |
| On psychiatric medications (%) | 91.67% | 100% | 94% |
| WTAR | 110.27 (6.03) | 105.75 (8.73) | 109.07 (6.83) |
| YMRS (M, SD) | 2.83 (3.04) | 4.25 (6.65) | 3.19 (4.00) |
| mHRSD (M, SD) | 3.25 (2.86) | 2.75 (4.27) | 3.13 (3.12) |

Note. WTAR = Wechsler Test of Adult Reading; YMRS = Young Mania Rating Scale; mHRSD = Modified Hamilton Rating Scale for Depression; YMRS and mHRSD are reported as total scores.

California Bay Area via Internet advertisements, community flyers, and nonprofit agencies for people with mental illness. Exclusion criteria included: a history of head trauma, stroke, neurological disease, or loss of consciousness for more than 5 min; more than two clinically significant symptoms of depression and/or mania in the past month; active suicidal ideation in the past month or more than two suicide attempts in the past 24 months; psychotic symptoms in the past month; meeting DSM-IV-TR criteria for substance abuse in the past month or dependence in the past six months; full scale IQ below 70, as assessed by the Wechsler Test of Adult Reading (WTAR) [78]; and inability to speak or

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[9] DSM-IV-TR and DSM-5 criteria for Bipolar I Disorder are comparable.

understand English. Participants were also required to be currently under the care of a mental health professional and to provide consent for the research team to contact their provider(s) in the event of symptom exacerbation.

Trained clinical research staff determined preliminary eligibility of participants over the phone. Participants who were eligible after the initial phone screening were invited to an in-person enrollment session to complete informed consent procedures and to confirm study eligibility. Assessments of psychiatric symptoms and psychological well-being were conducted at baseline and post-intervention (within two weeks of the start/end of the intervention). Advanced clinical psychology graduate students with training in individual and group CBT techniques who did not conduct the baseline and post-intervention symptom assessments conducted LAUREL groups. Participants were compensated for their time during assessment interviews but not for the group sessions. Participants enrolled in one of three groups determined by timing of recruitment. Each group consisted of three to six participants.

### 2.2.2. Measures

*2.2.2.1. Diagnostic assessment.* The Structured Clinical Interview for DSM-IV (SCID) [79] was used to assess diagnostic status. SCID interviewers were trained research staff or doctoral level graduate students who received extensive training in this instrument.

*2.2.2.2. Mood symptoms.* The Young Mania Rating Scale (YMRS) [80] is an 11-item clinician-rated measure of mania symptoms with total scores ranging from 0 to 60 and a clinical cutoff score of 20 (Cronbach's $\alpha = 0.73$). The Modified Hamilton Rating Scale for Depression (mHRSD) [81] is a 17-item interview to assess symptoms of current depression with total scores ranging from 0 to 52 (0–7 = no depression, 8–16 = mild depression, 17–23 = moderate depression, ≥24 = severe depression [82]; $\alpha = 0.61$). This modified version correlates highly with the original HRSD ($r = 0.84$).

*2.2.2.3. Engagement and helpfulness of LAUREL skills.* Attendance was collected during each group. Further, each week participants were asked to complete a home practice log of the number of times they practiced each of the LAUREL skills and how helpful they found each skill on a scale from '1' (not at all helpful) to '5' (extremely helpful). Specific skills were added to the log as new skills were introduced.

*2.2.2.4. Components of affective experience and well-being.* Given that we were interested in skills that promote LAP, we chose assessments of beliefs and experiences related to different emotional states, as well as measures of specific skills taught within LAUREL.

The *Affect Valuation Index* (AVI) [83] measures ideal and experienced affect. Participants were asked to rate how often they would *ideally* like to feel an emotion over the course of a week (i.e., ideal) and how they *actually* felt over the course of a week (i.e., experienced). This measure helps differentiate between affective states that people want to experience versus what they actually experience. HAP on the AVI included the emotion terms enthusiastic, excited, strong, and elated ($\alpha$ ideal = 0.66; $\alpha$ actual = 0.70). LAP included the emotion terms calm, rested, relaxed, peaceful, and serene ($\alpha$ ideal = 0.83; $\alpha$ actual = 0.86). High activation negative (HAN) included the emotion terms fearful, hostile, and nervous ($\alpha$ ideal = 0.80; $\alpha$ actual = 0.36). Low activation negative (LAN) included the emotion terms dull, sleepy, and sluggish ($\alpha$ ideal = 0.18; $\alpha$ actual = 0.65). Emotion terms on the AVI were rated on a scale from '1' (never) to '9' (all the time). Subscales for these affect domains were calculated as averages.

The *Savoring Beliefs Inventory* (SBI) [84] measures beliefs about one's capacity to savor positive experiences. The 24 items were rated on a scale from '1' (strongly disagree) to '5' (strongly agree; $\alpha = 0.95$).

The *Five-Facet Mindfulness Questionnaire* [85] assesses mindfulness across 5 domains: observing ($\alpha = 0.88$), describing ($\alpha = 0.91$), acting with awareness ($\alpha = 0.95$), accepting without judgment ($\alpha = 0.95$), and nonreactivity to internal experience ($\alpha = 0.90$). The 39 items were rated on a scale from '1' (never or vary rarely true) to '5' (very often or always true).

The *Emotion Regulation Questionnaire, Self-Efficacy* version (ERQ-SE [86], based on the original ERQ [87]), assesses a person's perceived capability of regulating emotions using cognitive reappraisal ($\alpha = 0.88$) and suppression ($\alpha = 0.56$). The 18 items were rated on a scale from '1' (strongly disagree) to '5' (strongly agree).

The *Self Compassion Scale-Short Form* [88] assesses self-compassion across six components: self-kindness, self-judgment, common humanity, isolation, mindfulness, and over-identification (negative aspects are reversed coded; $\alpha = 0.90$). The 12 items were rated on a scale from '1' (almost never) to '5' (almost always).

### 2.2.3. Data analysis

Descriptive statistics are presented for demographic, clinical, and LAUREL group engagement variables (e.g., attendance, skills practice, skills helpfulness). Liner mixed effect modeling using the lme4 package for R [89] was used to evaluate the main effect of time (baseline/post-intervention) with components of mood symptoms, affective experience, and well-being. All models included a random intercept; however, they did not include random slope due to small sample size and lack of power.

## 3. Results of the LAUREL proof of concept open trial

### 3.1. Engagement in LAUREL intervention

Twelve of the 16 people enrolled in this study completed baseline and post-intervention questionnaires. Of those who completed, attendance was high (87.96%; 6 attended 9 sessions, 3 attended 8 sessions, 2 attended 6 sessions, 1 attended 5 sessions). Of the four people who did not complete post-intervention questionnaires (2 men, 2 women; 3 attended 1 session, 1 attended 3 sessions), three participants cited scheduling conflicts and one cited personal reasons for disengaging from the study.

### 3.2. Engagement in LAUREL skills between group sessions

Mean home practice rates were high (see Table 3). On average, participants used any combination of the ten LAUREL skills 16.37 (SD = 7.63) times per week; however, the amount of practice varied across participants and skills. Participants practiced identifying daily positives, savoring, mindfulness, and setting attainable goals most frequently, and symptom tracking, reappraisal, and small acts of kindness least often. Furthermore, they found the skills helpful, with mean ratings ('5' = extremely helpful) for the ten LAUREL skills ranging from 3.00 (SD = 1.32) to 4.11 (SD = 0.78).

### 3.3. Changes in mood symptoms (see Table 4)

Baseline symptom severity scores (YMRS: M = 3.19, SD = 4.00, Min = 0, Max = 14; mHRSD: M = 3.13, SD = 3.12, Min = 0, Max = 9) suggest that this sample is representative of those with bipolar disorder in a period of symptom remission. Further, the number of lifetime psychiatric hospitalizations (M = 3.60, SD = 2.37) is consistent with the chronic and reoccurring nature of bipolar disorder.

We were unable to detect significant differences in mania symptom severity (YMRS) scores ($\beta = 1.66$, $SE = 1.34$, $t = 1.23$, $p = 0.24$) or depression symptom severity (mHRSD) scores ($\beta = 0.79$, $SE = 0.69$, $t = 1.15$, $p = 0.28$) at post-intervention compared to baseline.

**Table 3**
LAUREL skills practice and helpfulness scores (n = 12).

| Skill | N | Weekly skill practice | Helpfulness | Average weekly practice throughout group |
|-------|---|------------------------|-------------|------------------------------------------|
| | | M (SD) | M (SD) | M (SD) |
| Symptom tracking | 10 | 5.00 (2.16) | 3.44 (0.88) | 2.44 (2.01) |
| Emotion tracking | 10 | 4.80 (2.35) | 3.88 (1.13) | 2.89 (1.92) |
| Daily positives | 9 | 5.00 (2.12) | 4.11 (0.78) | 3.26 (1.26) |
| Savoring | 9 | 5.00 (2.12) | 4.00 (0.71) | 3.09 (1.30) |
| Mindfulness | 10 | 4.90 (2.13) | 4.00 (1.05) | 3.35 (2.31) |
| Reappraisal | 9 | 3.67 (1.94) | 3.00 (1.32) | 2.47 (1.62) |
| Gratitude | 10 | 4.00 (2.06) | 3.80 (1.03) | 2.57 (1.44) |
| Small acts of kindness | 10 | 3.90 (1.79) | 4.00 (0.82) | 2.18 (1.40) |
| Self-compassion | 6 | 3.67 (1.63) | 3.33 (1.37) | 2.76 (1.34) |
| Attainable goals | 10 | 4.90 (2.08) | 3.60 (1.27) | 3.68 (2.02) |
| | | | | Average number of skills practiced each week: 16.37 (7.63) |

Note. *N* = number of participants who turned in the weekly practice log; weekly skill practice = mean number of days the skill was practiced the week after the skill was introduced (max = 7); helpfulness = mean helpfulness rating the week after the skill was introduced (1 = not at all helpful, 5 = very helpful); Average Weekly Practice Throughout the Group = mean number of days the skill was practiced divided by the number of weeks the skill was available to practice (e.g., a skill introduced in session 3 could be practiced for 6 weeks).

**Table 4**
Pre-/Post-intervention emotion experience and well-being measures (n = 12).

| Measures | Baseline score | Post-intervention score | *p* Value |
|----------|----------------|--------------------------|-----------|
| YMRS | 2.83 (3.04) | 4.67 (5.65) | 0.24 |
| mHRSD | 3.00 (2.86) | 3.82 (3.87) | 0.28 |
| Ideal HAP | 3.77 (0.51) | 3.30 (0.57) | 0.01* |
| Actual HAP | 2.69 (0.66) | 2.50 (0.60) | 0.04* |
| Ideal LAP | 4.57 (0.48) | 4.00 (0.78) | 0.13 |
| Actual LAP | 2.90 (0.74) | 2.75 (0.88) | 0.19 |
| Ideal HAN | 1.22 (0.38) | 1.28 (0.42) | 0.63 |
| Actual HAN | 2.06 (0.58) | 1.78 (0.41) | 0.03* |
| Ideal LAN | 1.42 (0.47) | 1.47 (0.64) | 0.95 |
| Actual LAN | 2.25 (0.68) | 2.03 (0.58) | 0.16 |
| SBI Total Score | 27.17 (21.86) | 29.83 (22.37) | 0.43 |
| FFMQ: Observing | 26.00 (6.38) | 27.33 (6.43) | 0.37 |
| FFMQ: Describing | 28.92 (7.82) | 31.00 (7.52) | 0.04* |
| FFMQ: Acting with Awareness | 24.08 (8.24) | 25.58 (7.76) | 0.21 |
| FFMQ: Accepting without Judgment | 24.25 (8.23) | 28.33 (6.39) | 0.07 |
| FFMQ: Nonreactivity to Internal Experience | 17.08 (5.58) | 20.50 (3.06) | 0.04* |
| ERQ-SE: Reappraisal subscale | 23.83 (7.92) | 28.75 (8.13) | 0.04* |
| ERQ-SE: Suppression subscale | 14.67 (4.31) | 13.50 (6.59) | 0.55 |
| SCS-S | 2.52 (0.88) | 2.99 (0.53) | 0.02* |

Note. YMRS = Young Mania Rating Scale; mHRSD = Modified Hamilton Rating Scale for Depression; HAP = High Activation Positive; LAP = Low Activation Positive; HAN = High Activation Negative; LAN = Low Activation Negative; SBI = Savoring Belief's Inventory; FFMQ = 5-Facet Mindfulness Questionnaire; ERQ-SE = Emotion Regulation Questionnaire-Self Efficacy; SCS-S = Self-Compassion Scale-Short.
  * Denotes significance ($p < 0.05$).

### 3.4. Components of affect experience and well-being (see Table 4)

#### 3.4.1. Affect experience

On the AVI, participants reported significant changes in both *ideal* and *actual* HAP from baseline to post-intervention. Participants reported that they *ideally* wanted to experience ($\beta = -0.48$, $SE = 0.17$, $t = -2.80$, $p = 0.01$) and *actually* experienced ($\beta = -0.19$, $SE = 0.08$, $t = -2.34$, $p = 0.04$) significantly less HAP post-intervention

compared to baseline. Further, participants reported experiencing significantly less HAN ($\beta = -0.33$, $SE = 0.14$, $t = -2.45$, $p = 0.03$) post-intervention compared to baseline. We were unable to detect significant differences between all other AVI comparisons.

#### 3.4.2. Well-being measures

We were unable to detect significant differences in mean savoring beliefs scores (SBI) from baseline to post-intervention. Participants reported significant improvements on the mindfulness (FFMQ) subscales of describing ($\beta = 2.07$, $SE = 0.91$, $t = 2.29$, $p = 0.04$) and non-reactivity to internal experience ($\beta = 2.99$, $SE = 1.33$, $t = 2.26$, $p = 0.04$) from baseline to post-intervention. We were unable to detect significant differences in the observing, acting with awareness, and accepting without judgment domains when comparing baseline to post-intervention. Participants reported significantly greater perceived capability of using cognitive reappraisal (ERQ-SE; $\beta = 5.18$, $SE = 2.23$, $t = 2.33$, $p = 0.04$) but not suppression at post-intervention compared to baseline. Participants reported significant improvements in self-compassion (SCS-S) at post-intervention compared to baseline ($\beta = 0.41$, $SE = 0.16$, $t = 2.65$, $p = 0.02$).

## 4. Discussion

In this study, we discussed the development and preliminary outcomes of a PER group treatment for people with BD, designed as a supplement to pharmacological treatment. The majority of participants who were enrolled in our study completed the LAUREL intervention, with those who dropped out citing concerns unrelated to group content. Participants who completed the treatment attended most of the group sessions and reported practicing skills frequently. Of the ten skills introduced during the LAUREL intervention, participants reported practicing identifying daily positives, savoring, mindfulness, and setting attainable goals most often. Together, these findings suggest that the structure and content of the LAUREL intervention was acceptable and the implementation of a PER intervention was feasible in this population, providing support for further investigation of the efficacy of the LAUREL intervention.

We assessed mood symptoms to effectively monitor whether the unique nature of our intervention (i.e., focusing on positive affect) could trigger mania. Overall, we were unable to detect significant differences in mania symptom severity at post-intervention. Further, no participants exhibited mania symptoms at a level concerning to group facilitators or necessitating additional support from participants' treatment providers. However, it is important to note that two participants experienced elevated mania scores (YMRS) at post-intervention (Participant 1: baseline = 4; post-intervention = 12; Participant 2: baseline = 3; post-intervention = 16; clinical cutoff score = 20). It is unclear if increases in mania scores were directly related to engaging in the LAUREL intervention or other factors. Nonetheless, it will be important to monitor and evaluate the potential effect of PER interventions in inducing mania in a larger sample.

In a similar PER group intervention conducted by some of the current study authors [42], a woman with schizoaffective disorder, who was not taking psychiatric medications under the supervision of her medical provider, experienced a manic episode. Her experience demonstrates that certain PER skills may further intensify symptoms if practice is taken to an extreme. Although LAUREL participants were repeatedly reminded about emotional balance when practicing skills, balance becomes more difficult when a person is experiencing psychiatric symptoms. Observations from both studies highlight the importance of PER interventions as a supplement to pharmacological treatments, ongoing monitoring of mood symptoms, collaboration with treatment providers, and the availability of coping responses to re-establish stability. Future iterations of this intervention would likely benefit from incorporating a session on symptom response planning to assist with addressing increases in mood symptoms should they occur.

Further, we were unable to detect decreases in mania (YMRS) and depression (mHSRD) symptoms during the intervention. As previously stated, participants who reported more than two clinically significant mania or depression symptoms were excluded from this study during the prescreening process. Thus, the lack of improvement in mood symptoms may be due to the relatively low level of symptoms at baseline.

Consistent with the target mechanism of the intervention, participants reported that they *ideally* wanted to experience and *actually* experienced significantly less HAP post-intervention as compared to baseline. This is encouraging given that extreme valuing of happiness is associated with and predictive of more severe symptoms in BD [7]. We were unable to detect significant changes in *ideal* or *actual* LAP post-intervention compared to baseline. One important way the LAUREL intervention differs from other PER interventions is its focus on emotion awareness and regulation *more generally* as we did not want participants with BD to unintentionally overvalue or intensify positive emotions to the potential detriment of their well-being. This focus on "balance," instead of LAP emotions more specifically, may have contributed to the lack of improvement in LAP scores post-intervention. Indeed, participants reported experiencing significantly less HAN at post intervention, suggesting that PER skills may help to decrease high activation emotions (both positive and negative), which may ultimately help to foster emotional balance for a population characterized by variations in mood. It is also important to note that this preliminary study may be underpowered to detect significant differences, highlighting the need for additional studies with larger samples.

Prior studies suggest that people with BD experience difficulties with some PER strategies, though use of these skills confers potential benefits [90–94], highlighting the importance of an intervention like LAUREL. In this study, participants reported significant improvements in mindfulness, reappraisal, and self-compassion after participation in LAUREL. Mindfulness was one of the most frequently used and rated as most helpful PER skills in our study, suggesting that the skill is easily implemented in the daily lives of people with BD. Both reappraisal and self-compassion were not used as often as other skills, suggesting that reported changes at post-intervention were not directly related to the frequency of reported skills practice. Together, these data suggest that people with BD report engaging with PER strategies and find these skills helpful even with a small amount of practice.

As with any study, there are important limitations to acknowledge. First, this is a small open trial designed to examine the implementation of a PER intervention in a population characterized by positive affect dysregulation. Results must be interpreted cautiously, keeping this small sample size in mind. Studies with larger sample sizes, comparison conditions, and longer follow-up periods are needed [22] to further examine the efficacy of the LAUREL intervention. Second, the LAUREL intervention supplemented participants' existing treatment plans, which varied based on each participant's unique needs. While the majority of participants were taking psychiatric medications (11/12), we are unable to determine if specific treatment combinations are more or less beneficial. Third, while our sample was representative of the chronic and recurrent nature of BD (i.e., participants in this study reported nearly 4 lifetime psychiatric hospitalizations), participants entered the study during a state of symptom remission. It is unclear whether participants with BD with less stable mood symptoms or currently experiencing mood episodes would benefit in the same manner as those experiencing symptom remission. Fourth, this sample was ethnically homogenous and fairly high functioning. Future studies could profitably explore cultural differences in response to and benefit from the LAUREL intervention, as there are cultural variations in *ideal* and *actual* affect [30]. Finally, scheduling was one of the identified barriers to recruitment and continued engagement in the LAUREL intervention. While individual treatment offers greater flexibility in scheduling, group interventions offer opportunities to normalize challenges and interact with peers that may outweigh the logistical benefits of individual sessions.

Despite limitations, this study offers many strengths. Data from this study demonstrate the implementation of a PER intervention for BD and provide preliminary evidence that people with BD can learn and benefit from PER skills. Given these promising results, future research is needed to examine the efficacy of the LAUREL intervention compared to other psychosocial interventions, and to unpack the specific treatment components that are necessary for improving PER in BD.

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