

University of Nevada, Reno

**An Experimental Analysis of Acceptance vs. Change Skills for Emotions in Adults  
with Stress- and Trauma-related Problems**

A dissertation submitted in partial fulfillment of the requirements for the degree of  
Doctor of Philosophy in Psychology

by

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## Abstract

Although the vast majority of adults have experienced a traumatic event, only a minority meets criteria for posttraumatic stress disorder (PTSD), while many still develop clinically significant distress and impaired functioning. Yet, current PTSD-focused interventions have left a gap for individuals who do not recover after treatment and/or who present with other forms of distress. Emotion regulation is a possible transdiagnostic mechanism of change that may promote and maintain some of the varied problems related to trauma-exposure. Because large-scale treatment trials are expensive and inefficient means to identify mechanisms of change and related, potentially useful treatment components, the present study utilized an analog treatment design (skill psychoeducation) in a randomized experimental design to identify potential mediators (acceptance vs. change of emotions) of change. Subjects were randomized to receive 1 of 3 brief web-based trainings: 1) skill training on accepting emotions, 2) skill training on changing emotions, or 3) stress psychoeducation (control). Participants completed measures of emotion regulation, mindfulness, and affect intensity 24 hours pre- and immediately post-training. Results showed that participants in all conditions demonstrated significant decreases in emotion regulation problems over time; yet, these improvements did not vary by condition. Participants in the Change condition with higher PTSD symptoms were significantly more likely to have greater increases in positive affect compared to those with low PTSD symptoms. Although the three conditions did not show different outcomes, the significant changes in measures related to emotion regulation highlight that treatment components specific to emotion regulation may contribute to treatment development and suggest further research in clinical settings.

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An experimental analysis of acceptance vs. change skills for emotions in adults  
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Almost all people in the United States will experience a traumatic event during their lifetimes (89.7%; Kilpatrick et al., 2013), with experiencing multiple events being more common than not. A traumatic event is defined as being exposed to “actual or threatened death, serious injury, or sexual violence” (p. 271, American Psychiatric Association, 2013), and can include physical or sexual assault, military combat, accident or fire, natural or manmade disasters, and motor vehicle collisions. The empirical literature has consistently demonstrated that exposure to potentially traumatic events is associated with a wide range of adverse outcomes, including posttraumatic stress disorder (PTSD), mood disorders, anxiety disorders, substance use, and attempted suicide (e.g., Iverson et al., 2013; Kessler, Chiu, Demler, Merikangas, & Walters, 2005; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Scott et al., 2013). These long-term consequences affect mental health, physical health, and other domains of functioning and quality of life.

Exposure to potentially traumatic events is most commonly associated with PTSD. Although exposure to a potentially traumatic event is common, only a minority of people who experience traumatic events will meet full diagnostic criteria for PTSD with a lifetime prevalence ranging from 8.3% to 9.4% (e.g., Kilpatrick et al., 2013). The development of PTSD is associated with closer proximity to and higher intensity of an event, demonstrating a dose-response relationship (Breslau, 2009).

Though the majority of individuals exposed to trauma will not meet diagnostic criteria for PTSD, a significant number of this group will report significant levels of

psychological distress (Brancu et al., 2016; McLaughlin et al., 2015; Zlotnick, Franklin, & Zimmerman, 2002). Although generally less impaired than those with the full syndrome, individuals with subthreshold PTSD symptoms still exhibit problematic and clinically meaningful distress (e.g., Breslau, Lucia, & Davis, 2004). These people endorse impaired functioning, suicidality, hopelessness, and/or comorbid psychiatric conditions (e.g., Brancu et al., 2016; McLaughlin et al., 2015; Zlotnick, Franklin, & Zimmerman, 2002), often severity levels between individuals with symptoms meeting a full PTSD diagnosis and those with no PTSD symptoms (e.g., Brancu et al., 2016; Cukor, Wyka, Jayasinghe, & Difede, 2010; Stein, Walker, Hazen, & Forde, 1997). Regardless of meeting diagnostic criteria for PTSD, exposure to traumatic events can result in other forms of posttraumatic stress that constitute clinically relevant distress.

Exposure to potentially traumatic events can result in a myriad of diagnostic symptoms, comorbidity with other diagnoses, and problems in many domains of functioning. These may include mood disorders, anxiety disorders, substance use disorders, affective dysregulation, impaired interpersonal relationships, dissociation, self-harm behaviors, and suicidality (e.g., Courtois, 2008; Iverson et al., 2013; Polusny & Follette, 1995; Schnurr & Green, 2004; Scott et al., 2013). Trauma exposure is associated with poor physical health in both men and women, including heart disease, chronic bronchitis, hepatitis, diabetes, and asthma (Schnurr, Green, & Kaltman, 2007). Trauma-related distress is related with lower levels of educational attainment, lower lifetime financial earnings, and marital difficulties (Kessler, 2000). Broadly, survivors endorse higher levels of distress and an overall lower quality of health and life. Problems related to trauma exposure are numerous and varied in their topography. While there are



established efficacious treatments (Foa, Keane, Friedman, & Cohen, 2009), they may not fit all individuals and trauma-related difficulties.

### **Clinical Interventions for PTSD**

Prolonged Exposure (PE; Foa, Hembree, & Rothbaum, 2007) and Cognitive Processing Therapy (CPT; Resick & Shnicke, 1996) are two of the most widely studied treatments for PTSD and are recognized as gold-standard treatments for PTSD (Institute of Medicine, 2008). While both of these treatments have demonstrated efficacy for PTSD, they are theorized to facilitate recovery through different mechanisms of change (Resick, Nishith, Weaver, Astin, & Feuer, 2002). PE is posited to work through a habituation process that occurs during repeated imaginal and in vivo exposures as key components of the treatment (Foa & Kozak, 1986; Rauch & Foa, 2006). In contrast, CPT is proposed to work by directly targeting maladaptive thoughts that developed in response to the traumatic event (Resick et al., 2002). Both treatments contain common factors and methods that likely overlap; however, the primary focus of each treatment differs, leading to different main processes of change (Gallagher & Resick, 2013).

For individuals who do complete treatment, there remains a portion with clinically relevant difficulties. Approximately 40% maintain their PTSD diagnoses, and among those who no longer meet diagnostic criteria, the majority still suffer from significant lingering symptoms (see Bradley, Greene, Russ, Dutra, & Westen, 2005 for a meta-analysis). Positive treatment effects are also diminished by the presence of comorbid disorders (Foa et al., 2007), and depression and anxiety symptoms can also interfere with successful resolution of PTSD symptoms during and after treatment (Shalev et al., 1998). Additionally problematic is that real-world practice indicates substantial dropout from

exposure therapies above and beyond what has been found in randomized controlled trials (Najavits, 2015). There is room for innovative, alternative treatment avenues, especially ones that focus on different underlying mechanisms, to address such gaps in effective treatment delivery.

### **Emotion Regulation and Trauma**

For treatment to influence the broad range of problems that take varied topographical forms, it is important to assess other possible underlying mechanisms that may contribute to the development and maintenance of these symptoms. Emotion regulation may be one such mechanism, and is the process that occurs when an individual attempts to change, manage or control an emotional experience, including thoughts, physiological arousal, and overt behaviors. This is a highly adaptive process that aids in self-management and functioning in a social environment, while allowing the individual to continue to act in the service of long term goals.

Emotion dysregulation occurs when emotional arousal interferes with effective self-management. Some individuals demonstrate increased emotional reactivity and deficits in the ability to regulate intense and shifting emotional states. This can lead to individuals being unable to manage themselves in the service of their long-term goals and values (Fruzzetti et al., 2009). The lack of sufficient regulation strategies can lead to the development of maladaptive coping behaviors, such as dissociation, self-harm, and substance abuse, problematic social behaviors (e.g., verbal aggression, social withdrawal) in an effort to avoid or escape the painful negative emotional experience.

Chronic or severe emotion dysregulation appears to increase risk for a wide range of psychopathology. Specifically, deficits in emotion regulation may be a factor in the

development and maintenance of mood, anxiety, substance use, eating disorders, and psychotic disorders (e.g., Bradley et al., 2011; Cisler, Olatunji, Fender, & Forsyth, 2010; Dutcher, Vujanovic, Paulus, & Bartlett, 2017; Kring, 2008), as well as BPD (Fruzzetti, Shenk, & Hoffman, 2005; Linehan, 1993). For example, in adolescents evaluated over a 7-month period, emotion dysregulation predicted increases in anxiety, aggressive behavior, and eating pathology but not in depression (McLaughlin et al., 2011). In contrast, none of the four types of psychopathology predicted increases in emotion dysregulation (McLaughlin et al., 2011). Theoretically, the resulting form of psychopathology would differ based upon the type and form of regulation difficulty, such as with attention, reactivity, or interpretation (Neasciu, Bohus, & Linehan, 2014).

For survivors of trauma, dysregulation can occur when emotional arousal associated with their traumatic experience, such as feeling in danger, interferes with their self-management or goals. Empirical findings support that difficulties with emotion regulation are associated with posttraumatic stress symptom severity (Bradley et al., 2011; Ehring & Quack, 2010; Lilly & Lim, 2013; Tull, Barrett, McMillan, & Roemer, 2007; Weiss, Tull, Davis, et al., 2012; Weiss, Tull, Viana, Anestis, & Gratz, 2012). For example, trauma survivors who exhibited symptoms suggestive of a PTSD diagnosis reported greater difficulties with emotion regulation than those reporting symptoms at a subthreshold PTSD level (Tull et al., 2007). Individuals with early-onset and chronic interpersonal trauma demonstrated higher scores on PTSD symptom severity and emotion dysregulation compared to those who had experienced single-event and/or late-onset traumas (Ehring & Quack, 2010). Emotion dysregulation was associated with symptoms of PTSD, depression, and somatization in women survivors of interpersonal violence

(Lilly & Lim, 2013). In women with histories of childhood abuse, emotion regulation and interpersonal problems predicted functional impairment, equal to that of PTSD severity (Cloitre, Miranda, Stovall-McClough, & Han, 2005). Above and beyond the effects of childhood trauma, emotion dysregulation predicted posttraumatic stress symptoms, depression, alcohol and drug abuse, adaptive functioning, and history of suicide (Bradley et al., 2011). Emotion regulation is a transdiagnostic underlying maintaining mechanism of many of the problems seen in survivors of trauma and, therefore, may be an efficient way to understand and clarify the range of problems associated with trauma.

Many cognitive-behavioral interventions incorporate emotion regulation techniques to help effectively manage cognitive processes, physiological arousal, attention, awareness, and facial expressions and body posture. These have been applied to a range of disorders such as depression (Segal et al., 2002), generalized anxiety disorder (Mennin, 2006; Salters-Pedeneault, Roemer, Tull, Rucker, & Mennin, 2006), substance use (Marlatt, 1994), and BPD (Linehan, 1993). For individuals with PTSD related to child abuse, enhancing emotion regulation abilities appears to have a significant role in improving treatment outcome (Cloitre, Koenen, Cohen, & Han, 2002; Cloitre, Stovall-McClough, Miranda, & Chemtob, 2004). Moreover, a comprehensive DBT group program focused on emotion regulation was effective for women survivors of intimate partner violence with multiple transdiagnostic problems (Iverson, Shenk, & Fruzzetti, 2009). Preliminary data suggests that emotion regulation may be a mediating factor in such treatments (see Gratz, Weiss, & Tull, 2015 for a review). Emotion regulation is changeable via intervention; thus, improving emotion regulation may be a feasible way to help alleviate such problems.

## **Dialectical Behavior Therapy**

Dialectical behavior therapy (DBT) is built on a model that suggests that emotion regulation deficits contribute to, and maintain problematic behaviors (Linehan, 1993). DBT is an empirically supported treatment for BPD and suicide (see Neacsiu & Linehan, 2014 for a review), and data have shown that emotion dysregulation is a mediator of DBT treatment outcome in individuals with BPD (Wilks, Korslund, Harned, & Linehan, 2016). DBT demonstrates promise in augmenting PTSD treatment, at least when PTSD co-occurs with BPD. A pilot study found that integrating PE with DBT may lead to greater improvements than DBT alone for women with BPD, PTSD, and self-harm (Harned, Korslund, & Linehan, 2014). Harned, Jackson, Comtois, and Linehan (2010) evaluated using DBT to reduce suicidal and non-suicidal self-injury behaviors that are frequently used as exclusion criteria for PTSD treatment. After receiving DBT, the majority of BPD clients with PTSD would have been appropriate candidates for PTSD treatment. Another emerging program combines principles of DBT and integrates methods of trauma focused cognitive-behavioral therapy with favorable results (Bohus et al., 2013).

The DBT treatment package includes skills that are grouped into four modules: 1) mindfulness; 2) emotion regulation; 3) interpersonal effectiveness; and 4) distress tolerance (Linehan, 2014). Research suggests that DBT skills training decreases emotional difficulties and is effective and feasible to implement with a range of disorders, such as with depressed and anxious individuals (Neacsiu et al., 2014). For example, skills training alone outperformed treatment as usual for treatment resistant depression (Harley, Sprich, Safren, Jacobo, & Fava, 2008) and decreased depression, anxiety, and anger in individuals with BPD (Soler et al., 2009). For these reasons, and due to the overall

effectiveness of skills-alone programs (e.g., McMMain, Guimond, Barnhart, Habinski, & Streiner, 2017), DBT skills appear to be effective in decreasing emotion dysregulation for a range of psychological problems that can present in trauma-exposed individuals.

DBT skills training may offer an efficient and effective intervention for trauma-related problems that targets reducing emotion dysregulation. Identification of effective components of DBT (or, which components might be more important for which patients) may aid in more effective treatment refinement for trauma-related problems, which can substantially impact the health of affected individuals and have a broader impact on future treatment development. However, to date, research on DBT skills trainings has employed the entire package of DBT skills. Less is known about the efficacy of particular skills and their effectiveness in treating a variety of problems. Evaluating specific treatment components and their influence on the proposed mechanism of change may aid in better developing and refining treatments. The DBT emotion regulation skills module specifically includes strategies for: 1) allowing and accepting emotions; and for 2) changing negative emotions and the tendency to respond in a dysregulated manner. In particular, emotion regulation skills might be a key component in targeting emotion dysregulation to alleviate the vast array of problems related to trauma exposure, consistent with the impact of DBT skills overall in alleviating a variety of difficulties.

### **Internet Delivery**

Web-based dissemination of mental health information offers advantages to traditional face-to-face delivery. Programs can potentially reach a large population at relatively low cost, can reduce logistical barriers to accessing care, can address barriers such as stigma, and can easily be updated, refined, and expanded to accommodate new

findings (Amstadter, Broman-Fulks, Zinzow, Ruggiero, & Cercone, 2009). Results for internet dissemination are generally promising. Online programs are also an effective and viable form of treatment for trauma-related problems (Paul, Hassija, & Clapp, 2012). Utilizing web-based delivery may offer some advantages to reaching populations of trauma-exposed individuals who may not otherwise seek skills, including individuals who demonstrate mild or moderate difficulties and who may not think their symptoms warrant any clinical intervention. Moreover, using the internet to evaluate treatment components might increase ecological validity, achieved through possibly reaching underserved people, as well as through collecting a more ethnically, racially, geographically, and problem diverse sample.

### **Present Study**

The comparative effectiveness of specific emotion regulation-related skills, such as those that focus primarily on acceptance of emotions, versus those that focus on effectively changing negative emotions, is unclear. The current study proposes to examine the effects of two brief skill trainings that target different emotion regulation processes (acceptance of emotions, change of emotions) hypothesized to reduce trauma-related problems, compared to an active control (psychoeducation on stress).

The specific aims of this study are to:

- 1a. Examine the efficacy of both types of emotion skill trainings (acceptance/allowing and change) compared to the control condition on improving emotion regulation, mindfulness, and affect intensity (psychological outcomes).
- 1b. Compare acceptance vs. change skills on these same psychological outcomes.

2. Test whether there is an interaction between training condition and baseline PTSD symptom severity on changes in psychological outcomes.
3. Evaluate separately and compare the feasibility and acceptability of the two skill programs, as indicated by attrition rates, and participant rated measures of acceptability and satisfaction.
4. Evaluate differences in emotion regulation knowledge across training conditions as a manipulation check.

## **Method**

### **Setting**

Web-based delivery of the trainings is more time and cost effective compared to in-person group training, providing a larger sample size that is needed for power. Moreover, this helps to minimize any therapist or group effects, providing a more direct comparison of the skills trainings.

### **Participants**

Subjects were 159 people recruited via Prolific, an online crowdsourcing platform for social science survey completion. Three participants were removed for taking too long ( $>2SD$ ) on the training portion of the study ( $M = 51.61$  minutes;  $SD = 27.26$ ), which resulted in a final sample of 156. Sample characteristics are described in Table 1. Forty-four participants (28.2%) identified having seen a therapist in the past 6 months. Of those who did see a therapist in the past 6 months, participants averaged attending 7.18 sessions ( $SD = 5.50$ ).

The sample endorsed distress at levels higher than a normative sample. Thirty-two percent ( $n = 50$ ) of participants met symptom cutoff for a provisional PTSD diagnosis



(using the Posttraumatic Stress Disorders Checklist-5 cutoff of 33+; Wortmann et al., 2016). Categorizing participants into “severe” or “extremely severe” symptom range (using the Depression, Anxiety and Stress Scale; Lovibond & Lovibond, 1996), 43.6% ( $n = 68$ ) fell into these categories for depression, 42.3% ( $n = 66$ ) for anxiety, and 34.0% ( $n = 53$ ) for stress. Sixty-one percent ( $n = 95$ ) of participants met these levels of significant distress across one or more of these measures for PTSD, depression, anxiety, or stress symptoms.

Table 1. *Participant Characteristics*

Measure	Total ( $N = 156$ )	Acceptance Condition ( $n = 53$ )	Change Condition ( $n = 51$ )	Stress Condition ( $n = 52$ )
	$n$ (%)	$n$ (%)	$n$ (%)	$n$ (%)
Age in years, $M \pm SD$	$31.46 \pm 8.89$	$32.85 \pm 9.47$	$29.20 \pm 8.12$	$32.19 \pm 8.75$
Gender				
Male	53 (34.0)	18 (34.0)	21 (41.2)	14 (26.9)
Female	98 (62.8)	34 (64.2)	28 (54.9)	36 (69.2)
Other	5 (0.3)	1 (1.9)	2 (4.0)	2 (3.8)
Race/Ethnicity				
White	123 (78.8)	41 (77.4)	40 (78.4)	42 (80.8)
Latinx	12 (7.7)	6 (11.3)	2 (3.9)	4 (7.7)
Black	6 (3.8)	1 (1.9)	2 (3.9)	3 (5.8)
Asian	8 (5.1)	1 (1.9)	6 (11.8)	1 (1.9)
Mixed race/Other	6 (3.8)	4 (7.5)	1 (2.0)	1 (1.9)

	Total ( <i>N</i> = 156)	Acceptance Condition ( <i>n</i> = 53)	Change Condition ( <i>n</i> = 51)	Stress Condition ( <i>n</i> = 52)
Measure	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
<b>Sexual Orientation</b>				
Heterosexual	111 (71.2)	36 (67.9)	39 (76.5)	36 (69.2)
Gay/Lesbian	15 (9.6)	8 (15.1)	4 (7.8)	3 (5.8)
Pansexual/Bisexual	24 (15.4)	7 (13.2)	6 (11.8)	11 (21.2)
Other/Not sure	6 (3.8)	2 (3.8)	2 (4.0)	2 (3.8)
<b>Relationship Status</b>				
Single	97 (62.2)	32 (61.5)	39 (76.5)	26 (50.0)
Single living w/ partner	20 (12.9)	4 (7.7)	7 (13.7)	9 (17.3)
Married	36 (23.1)	15 (28.8)	5 (9.8)	16 (30.8)
Divorced	2 (1.3)	1 (1.9)	0 (0.0)	1 (1.9)
<b>Income</b>				
\$0 - \$25,000	35 (22.4)	14 (26.4)	11 (21.6)	15 (28.8)
\$25,000 - \$50,000	45 (28.8)	17 (32.1)	18 (35.3)	10 (19.2)
\$50,000 - \$100,000	46 (29.5)	21 (39.6)	13 (25.5)	17 (32.7)
\$100,000+	20 (12.8)	5 (9.4)	5 (9.8)	10 (19.2)
<b>Education</b>				
No high school degree	1 (0.6)	1 (1.9)	0 (0.0)	0 (0.0)
High school degree	21 (13.5)	4 (7.5)	6 (7.8)	11 (17.3)
Some college	52 (33.3)	17 (32.0)	22 (43.1)	13 (25.0)
4 year degree	67 (42.9)	25 (47.2)	19 (37.3)	23 (44.2)
Graduate degree	15 (9.6)	6 (11.3)	4 (7.8)	5 (9.6)

	Total ( <i>N</i> = 156)	Acceptance Condition ( <i>n</i> = 53)	Change Condition ( <i>n</i> = 51)	Stress Condition ( <i>n</i> = 52)
Measure	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Employment Status				
Full-time	56 (35.9)	20 (37.7)	16 (31.4)	20 (38.5)
Part-time	31 (19.9)	9 (17.0)	11 (21.6)	11 (21.2)
Student	26 (16.7)	7 (13.2)	12 (23.5)	7 (13.5)
Unemployed	30 (19.2)	12 (22.6)	11 (21.6)	7 (13.5)
Disabled	11 (7.1)	5 (9.4)	1 (2.0)	5 (9.6)
Other	2 (1.3)	0 (0.0)	0 (0.0)	2 (3.8)

Note. Data are given as a number (valid percentage), except where indicated otherwise.

\* Indicates a significant difference between groups at the  $p < .05$  level.

**Sample size and power.** Prior to conducting the study, a power analysis using G\*Power (Faul, Erdfelder, Lang, & Buchner, 2007) showed that 53 participants per condition (or a total of 159 for the three conditions) provided 80% power to detect a medium effect size ( $d = 0.5$ ) for primary outcomes (e.g., difficulties in emotion regulation). Prior studies of skills trainings for emotion dysregulation (Neacsiu et al., 2014) found the effect size of skills groups to be large (Cohen's  $d = 0.8$  or above on most outcomes). However, these few studies have consisted of multiple weekly groups for skills training, and accordingly for this study we expected a smaller, moderate, effect size. For a final sample of 159 participants, we assumed 90% participant retention for those who initiated the trainings, leading to a target of 177 (59 participants per group) to be recruited.

**Condition randomization.** The first 30 participants were randomly assigned to the three training conditions. High-medium-low scores on the PCL-5 were determined according to the mean and standard deviation of scores of the first 30 participants. Subsequent participants were blocked according to these high-medium-low scores on the PCL-5, and then block randomized into each condition, to ensure even distribution across conditions.

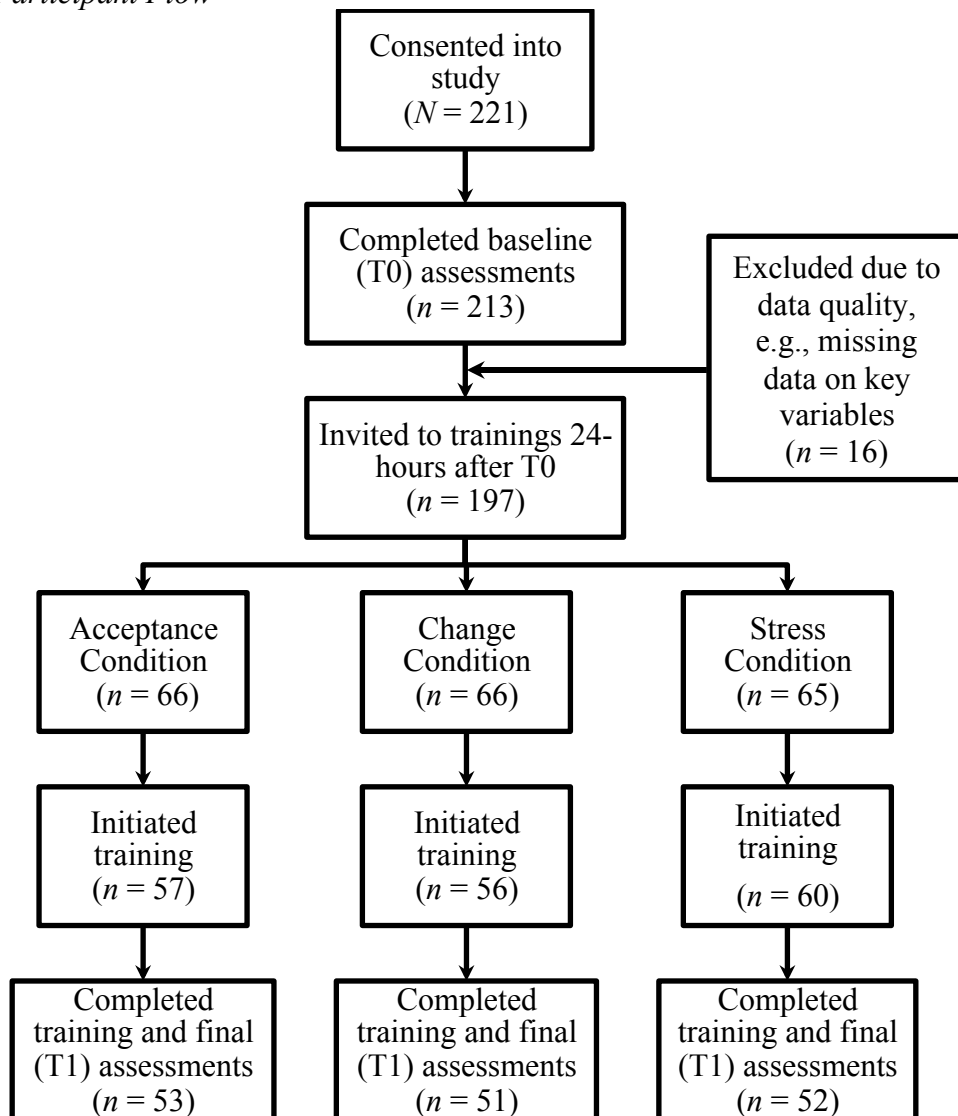
### **Procedure**

This study was approved by the University of Nevada Institutional Review Board. Subjects were 221 people recruited via Prolific. Inclusion criteria for participation in this study were: 1) 18+ years of age; and 2) fluent in English. All individuals who self-selected into the study based upon the recruitment materials were invited to participate. Recruitment materials described the study as a 40-minute web-based skills training that focused on reducing feelings of overwhelm and difficulties with emotions related to stressful life experiences. Participants were paid \$1.73 for completing the baseline assessments and \$5.00 for completing the training and post assessments, corresponding to Prolific's hourly rate of \$6.50.

Participants accessed the study housed by Qualtrics and, after consenting, completed the baseline assessment. Measures assessed emotion regulation, current affect, mindfulness, and trauma-related psychological distress (i.e., exposure to traumatic events and PTSD symptoms, anxiety, depression, and BPD symptoms). Once participants completed the baseline assessments (T0), participants were block randomized to receive 1 of 3 brief interventions (see the Trainings section for more details): 1) acceptance of emotions skills, 2) change of emotions skills, or 3) psychoeducation on stress (control).

Twenty-four hours later, participants were invited via email to start the training and were asked to complete the training within 72 hours of receiving the training link. Each condition consisted of a 40-minute online training. Participants then completed measures of emotion regulation, current affect, and mindfulness as well as questions pertaining to the acceptability of the training programs. Figure 1 depicts participant flow through the study.

Figure 1. *Participant Flow*



## **Trainings**

The three study conditions were: 1) skills training focused on acceptance of emotions; 2) skills training focused on change of emotions; and 3) stress psychoeducation control group. In each condition, participants were guided through a 40-minute long web-based training. Content for the conditions was developed by the author, with input and review from DBT skill experts. To increase consistency and reduce non-specific effects, all three web-based video programs were roughly consistent in length (range from 38-40 minutes), formatting, and number of interactional tasks, and were taught by the same two presenters. The two emotion regulation skill trainings focused on emotion regulation skill development and generalization with an emphasis on practicing new skills and activities in daily life.

**Acceptance of emotions skills condition.** Skills focused on 1) accurately identifying and naming emotions and learning the difference between primary “justified” and secondary “un-justified” emotions, 2) observing and describing emotions, and 3) allowing their present emotions to come and go with body awareness to help allow emotions without attempting to escape them (by practicing emotion surfing exercise, body scan). Examples for specific emotions focused on fear, shame, and anger.

**Change of emotions skills condition.** Skills focused on actively changing emotions, through 1) changing body chemistry (by changing one’s body temperature, intense exercise, paced breathing, and progressive muscle relaxation), 2) distraction using the five senses, and 3) opposite action to current emotion (Linehan, 2015). Opposite action included practicing engaging in body language (completely different from that which would facilitate acceptance) that is directly opposite to a felt emotion urge in an

active effort to change the current emotion. Examples focused on the emotions of fear, shame, and anger. Imaginal exercises to create competing, positive emotional experiences, and other aspects of “opposite action” to the urges of negative emotions, were taught.

**Stress psychoeducation control condition.** The control condition provided standard information/psychoeducation on stress and stress management that was gathered from information provided by the National Institute of Mental Health, Centers for Disease Control and Prevention, and a general psychology textbook *Understanding Psychology* (Feldman, 2012). Participants received information on stress, including the nature of stressors (eustress vs. distress), different types of stressors (i.e., cataclysmic events, personal stressors, background stressors, and potentially traumatic events), how responses vary across individuals, and biological factors that affect stress and how to minimize stress (e.g., sleep, eating healthy, minimizing drugs and alcohol, and getting exercise).

## **Measures**

**Demographics.** Questions asked age, gender, race and ethnicity, sexual orientation, marital status, educational status, annual income, and whether or not they had attended therapy within the prior 6 months.

**Life Events Checklist (LEC;** Weathers et al., 2013). The LEC is a self-report measure that screens for exposure to 17 different traumatic events across the lifetime. Follow-up questions assess for an index trauma.

**PTSD Checklist–DSM-5 (PCL-5;** Weathers et al., 2013). The PCL-5 is comprised of 20-items that assess DSM-5 symptom clusters (i.e., reexperiencing,

avoidance, negative alterations in cognitions and mood, and hyperarousal) associated with PTSD. The PCL-5 measures symptoms in relation to the participant's most distressing event identified on the LEC (see above) during the past month. Items are scored on a 5-point scale from 0 (*not at all*) to 4 (*extremely*) and summed for a total symptom severity score (range = 0 - 80). The current sample had good internal consistency (Cronbach's  $\alpha = .96$ ).

**Depression and Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995).**

The DASS-21 is a 21-item self-report instrument designed to measure symptoms common to depression, anxiety, and stress. The depression subscale assesses dysphoria, hopelessness, and anhedonia. The anxiety subscale assesses autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The stress subscale is sensitive to levels of chronic non-specific arousal, including difficulty relaxing, nervousness, agitation, irritability, and impatience. Participants rate how much each statement applied to them over the past week on a 4-point scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*). Items are summed separately for each subscale and multiplied by two (all subscale ranges = 0 - 42). The current sample had adequate reliability for depression ( $\alpha = .92$ ), anxiety ( $\alpha = .82$ ), and stress ( $\alpha = .85$ ) subscales.

**Borderline Symptom List (BSL-23; Bohus et al., 2009).** The BSL-23 contains 23-items that assess typical symptomatology for borderline personality disorder. Respondents endorse how much they have suffered from each problem over the last week from 0 (*not at all*) to 4 (*very strong*). The internal consistency is high ( $\alpha = .94 - .97$ ; Bohus et al., 2009). In addition, the BSL-23 includes 11 items that assess the occurrence



of self-harm and impulsive risky behavior (e.g., “I had episodes of binge eating,” “I had uncontrollable sexual encounters of which I was later ashamed or which made me angry”) over the past week. There was good internal consistency in the current sample ( $\alpha = .96$ ).

**Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004).** The DERS is a 36-item self-report measure of emotion regulation, including the lack of awareness and clarity surrounding emotional responses, non-acceptance of emotions, difficulty controlling impulsive behaviors when experiencing negative emotions, and limited access to emotion regulation strategies. Items are rated on a 5-point Likert scale ranging from 1 (*almost always*) to 5 (*almost never*) and summed for a total score (range = 36 - 180). There was good internal consistency in the current sample ( $\alpha = .81$ ).

**Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2008).** The FFMQ is a 39-item self-report measure of the ability to focus one’s attention in a nonjudgmental or accepting way on experiences occurring in the present moment. FFMQ is thus considered to measure five facets of mindfulness: non-reactivity to inner experience, observing and noticing, acting with awareness, describing, and non-judging of experience. Items are measured using a 5-point Likert scale ranging from 1 (*never or very rarely true*) to 5 (*very often or always true*) and summed to yield a total score (range = 39 - 195), reflecting a global measure of mindfulness. In the current sample, there was good internal consistency ( $\alpha = .92$ ).

**Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988).** The PANAS is designed to measure emotional responding and comprises two mood scales, one that measures positive affect and the other which measures negative

affect. Participants respond to a 20-items on a 5-point scale from 1 (*very slightly or not at all*) to 5 (*extremely*). Each subscale is scored separately (range = 10 - 50). Internal consistency was good for positive affect ( $\alpha = .91$ ) and for negative affect ( $\alpha = .88$ ).

**DBT Ways of Coping Checklist** (DBT-WCCL; Neacsiu, Rizvi, Vitaliano, Lynch, & Linehan, 2010). The DBT-WCCL is a 59-item self-report measure for coping styles that align with DBT specific skills. For this study, only questions relevant to acceptance of emotions and change of emotions were retained and adapted to evaluate what skills participants learned about in the training, and summed for a total score with higher scores indicating more skill knowledge (range = 0 - 10).

**Satisfaction.** Four questions asked about satisfaction with the training program: 1) The duration of the training was appropriate; 2) The language and examples used were clear; 3) I would recommend this training to others; and, 4) I enjoyed the content of the training. Items were rated from 1 (*disagree*) to 5 (*agree*).

Table 2 outlines assessments and times of administration.

Table 2. *Measures and Times of Administration*

Measure	Administration Time Points	
	Baseline (T0)	Post-training (T1)
Emotional Processes		
Difficulties in Emotion Regulation Scale (DERS)	X	X
Five Facet Mindfulness Questionnaire (FFMQ)	X	X
Positive and Negative Affect Schedule (PANAS)	X	X

Measure	Administration Time Points	
	Baseline (T0)	Post-training (T1)
Psychological Distress		
Life Events Checklist (LEC)	X	
PTSD Checklist (PCL-5)	X	
Depression and Anxiety Stress Scale (DASS-21)	X	
Borderline Symptom Severity Checklist (BSL-23)	X	
Knowledge Check and Acceptability		
DBT-Revised Ways of Coping (DBT-WCCL)		X
Training Satisfaction		X

## Data Analysis

**Preliminary analyses.** Initial exploratory data analyses were conducted to note data patterns and to examine underlying distributional assumptions. Normality of dependent variables was assessed by examining means, standard deviations, skewness and kurtosis. Data were required to have skewness between -1 and 1, and kurtosis between -3 and 3 to meet criteria for normality.

**Completers vs. non-completers.** Participants were considered completers if they finished their randomized training and final assessments, as all individuals who completed the trainings also finished the final assessments. A series of chi-square and t-tests was conducted to identify differences at baseline of participants who did and did not complete the trainings.

**Baseline differences and randomization.** Chi-square tests and one-way analysis of variances (ANOVAs) were conducted to evaluate differences between conditions on any demographic or baseline distress measure.

**Changes on outcome measures.** Repeated measures multivariate analysis of variances (MANOVAs) were conducted to examine condition effects and changes over time on the various outcome measures. Multiple linear regressions were conducted to evaluate trauma-related distress, condition, and the interaction on each of the outcome measure change scores. Lastly, one-way ANOVAs were used to evaluate differences between conditions on satisfaction questions and skill knowledge. Post-hoc Tukey tests were used to examine differences between active conditions.

## Results

**Completers vs. non-completers.** Sixty-five participants fell into the non-completer status and 156 into the completer status (see definitions above). Non-completers were included in all analyses where they had responded to relevant variables. Individuals who completed the trainings had significantly higher baseline scores on the PCL-5  $t(210) = 2.03, p = .044$ , DASS-anxiety  $t(215) = 2.34, p = .020$ , and DASS-stress  $t(215) = 2.30, p = .022$ , compared to those who did not complete, and thus reported more distress overall. All other dependent measures were not significantly different between completers and non-completers, all  $ps > .082$ . There was no differential dropout between the three conditions,  $\chi^2(2,173) = 1.39, p = .499$ .

**Baseline differences and characterization of the sample.** Randomization was successful with regard to balancing the scores on the PCL-5, with no significant differences among the three groups,  $F(2, 153) = .008, p = .99$ . Table 3 shows descriptive

data for measures of psychological distress at baseline. Chi-square tests or ANOVAs revealed no significant differences between conditions on any demographic or baseline distress measure at baseline, all  $ps > .105$ .

Table 3. Means and Standard Deviations of Baseline Psychological Distress Measures

	Total ( $N = 156$ )	Acceptance Condition ( $n = 53$ )	Change Condition ( $n = 51$ )	Stress Condition ( $n = 52$ )
Measure	$M (SD)$	$M (SD)$	$M (SD)$	$M (SD)$
PTSD (PCL-5)	25.55 (19.77)	25.86 (18.64)	25.59 (21.21)	25.09 (19.17)
Depression (DASS-D)	33.07 (11.95)	35.62 (12.27)	30.87 (10.37)	32.61 (12.78)
Anxiety (DASS-A)	28.26 (9.52)	29.17 (9.69)	26.94 (9.28)	28.62 (9.62)
Stress (DASS-S)	33.75 (9.89)	35.92 (8.93)	32.78 (10.21)	32.49 (10.32)
Borderline (BSL-23)	27.88 (21.23)	28.70 (20.37)	28.11 (21.54)	28.23 (22.78)

*Note.* PCL-5 = Posttraumatic Stress Disorder Checklist – DSM-5 Version; DASS-D = Depression and Anxiety Stress Scale – Depression subscale; DASS-A = Depression and Anxiety Stress Scale – Anxiety subscale; DASS-S = Depression and Anxiety Stress Scale – Stress subscale; BSL-23 = Borderline Symptom Checklist – 23 Item.

Tables 4 and 5 show frequencies for lifetime exposure to a variety of potentially traumatic events and self-harm behaviors, respectively. Nearly all participants endorsed experiencing or witnessing at least one potentially traumatic event on the LEC, with only 5.8% ( $n = 9$ ) never having experienced or witnessed a potentially traumatic experience. The mean number of types of traumatic events endorsed on the LEC was 4.70 events ( $SD$

= 3.00; IQR = 2.25 – 6.00). A little less than half of participants (42.3%;  $n = 66$ ) endorsed engaging in one or more dangerous-to-self behaviors in the week prior to the study.

Table 4. *Types of Potentially Traumatic Events Endorsed on the Life Events Checklist<sup>a</sup> (N = 156)*

Potentially Traumatic Event	<i>n</i> (%)
Natural disaster	61 (39.1)
Fire or explosion	48 (30.8)
Transportation accident	96 (61.5)
Serious accident at work, home, or during recreational activity	47 (30.1)
Exposure to toxic substance	5 (3.2)
Physical assault	90 (57.7)
Assault with a weapon	31 (19.9)
Sexual assault	45 (28.8)
Other unwanted or uncomfortable sexual experience	82 (52.6)
Combat or exposure to a war-zone	2 (1.3)
Captivity	4 (2.6)
Life-threatening illness or injury	59 (37.8)
Severe human suffering	27 (17.3)
Sudden, violent death	23 (14.7)
Sudden, unexpected death of someone close to you	21 (13.5)
Serious injury, harm, or death you caused to someone else	7 (4.5)
Other	86 (55.1)

*Note.* Data are cumulative percentages, as participants were able to endorse experiencing multiple types of potentially traumatic events.

<sup>a</sup> Participants were coded as a positive response if they endorsed either “Happened to me” or “Witnessed it.”

Table 5. *Risky or Dangerous-to-self Behaviors Endorsed in the Past Week on the Borderline Symptom List (N = 156)*

Risky Behavior	<i>n</i> (%)
Self-cutting, burning, strangling, headbanging	7 (4.5)
Told others intent to kill oneself	6 (3.8)
Tried to commit suicide	2 (1.3)
Episodes of binge eating	52 (33.3)
Induced vomiting	6 (3.8)
High-risk behavior (e.g., driving too fast, balancing on bridges)	8 (5.1)
Got drunk	50 (32.1)
Took drugs	27 (17.3)
Took medication not as prescribed	11 (7.1)
Outbreaks of uncontrolled anger or physically attacked others	14 (9.0)
Uncontrollable sexual encounters which led to shame or anger	5 (3.2)

*Note.* Data are cumulative percentages, as participants were able to endorse engaging in multiple types of behaviors.

**Hypothesis 1a.** *Participants who are in either active condition (acceptance of emotions, change of emotions) will report significantly lower emotion dysregulation, mindfulness, and affect intensity at T1 (following their self-directed learning video and*

*practice) than participants who are randomized to the control condition (after controlling for T0 [baseline]scores).*

A between-group comparison utilizing a repeated measures MANOVA was conducted to test the effect of the skills training conditions on emotion dysregulation (DERS), mindfulness (FFMQ), and affect intensity (Positive and Negative) from T0 to T1. Prior to conducting the MANOVA, assumptions of normality and heterogeneity of variance, and multicollinearity, were tested and satisfied. Lastly, assumptions of homogeneity were tested and satisfied based upon Levine's test.

The analysis revealed that on there was a main effect for Time,  $F(4, 150) = 101.43, p < .001$ , Wilks'  $\Lambda = .27$ , partial  $\eta^2 = .73$ , but no main effect for Condition,  $F(8, 300) = 0.44, p = .898$ , Wilks'  $\Lambda = .98$ , partial  $\eta^2 = .01$ . There was no significant effect for the two-way interaction,  $F(8, 300) = 0.84, p = .568$ , Wilks'  $\Lambda = .96$ , partial  $\eta^2 = .02$ , indicating that changes on outcome measures were not significantly different between conditions.

Planned comparison univariate tests for the effect of Time and conditions on specific outcome measures are presented in Table 6. Consistent with the MANOVA results, although there were main effects for Time on the DERS, FFMQ, and Negative Emotions, there were no significant Time x Condition interaction effects, and thus no differential outcomes for the two "active" conditions compared with the control condition.



Table 6. *Univariate tests for Time by Conditions on Outcome Measures (n = 156)*

Measure	<i>df</i>	<i>F</i>	<i>p</i>	Partial $\eta^2$
DERS				
Time	1, 153	5.86	.017	.037
Time*Condition	2, 153	0.35	.705	.005
FFMQ				
Time	1, 153	8.81	.003	.054
Time*Condition	2, 153	1.27	.284	.016
Positive				
Time	1, 153	0.04	.837	.000
Time*Condition	2, 153	1.20	.305	.015
Negative				
Time	1, 153	346.24	.000	.694
Time*Condition	2, 153	0.10	.910	.001

*Note.* DERS = Difficulties in Emotion Regulation Scale; FFMQ = Five Factor Mindfulness Questionnaire; Positive = Positive affect subscale on the Positive and Negative Affect Schedule; Negative = Negative affect subscale on the Positive and Negative Affect Schedule.

**Hypothesis 1b.** *Participants in the active conditions (acceptance of emotions condition, change of emotions) will report significantly more improved emotion dysregulation, mindfulness, and affect intensity at T1 compared to T0 scores.*

A repeated measures MANOVA was conducted to test the effect of the two skills training conditions on DERS, FFMQ, Positive, and Negative from T0 to T1. There was a main effect for Time,  $F(4, 99) = 66.16, p < .001$ , Wilks'  $\Lambda = .27$ , partial  $\eta^2 = .73$ , but no

main effect for Condition,  $F(4, 99) = 0.75, p = .563$ , Wilks'  $\Lambda = .97$ , partial  $\eta^2 = .03$ .

There was no significant effect for the two-way interaction,  $F(4, 99) = 0.94, p = .447$ , Wilks'  $\Lambda = .96$ , partial  $\eta^2 = .04$ , indicating that changes on outcome measures were not significantly different between the two active conditions.

Planned comparison univariate tests are presented in Table 7 for the effect of Time and Active Conditions on outcome measures. Only Negative affect changed significantly in the predicted direction from T0 to T1.

Table 7. *Univariate Tests for Time by Active Conditions on Outcome Measures (n = 104)*

Measure	$F(1, 102)$	$p$	Partial $\eta^2$
DERS			
Time	3.44	.067	.033
Time*Condition	0.65	.422	.006
FFMQ			
Time	2.42	.123	.023
Time*Condition	0.26	.613	.003
Positive			
Time	0.003	.954	.000
Time*Condition	2.34	.129	.022
Negative			
Time	234.18	.000	.697
Time*Condition	0.002	.969	.000

*Note.* DERS = Difficulties in Emotion Regulation Scale; FFMQ = Five Factor Mindfulness Questionnaire; Positive = Positive affect subscale on the Positive and Negative Affect Schedule; Negative = Negative affect subscale on the Positive and Negative Affect Schedule.

**Hypothesis 2.** *There will be an interaction effect between PTSD symptoms and training condition (acceptance of emotions, change of emotions, control) on changes in emotion dysregulation, mindfulness, and affect intensity.*

Multiple linear regressions were conducted to evaluate the main effect of PTSD symptoms (PCL-5), the main effect of condition, and the interaction on each of the outcome measure change scores. The PCL-5 scores were centered and condition was dummy coded into Change condition vs. all else and Acceptance condition vs. all else. Change score variables were created for each outcome measure, and standardized so that all positive slopes indicate improvements over time.

As Table 8 shows, the overall models for Positive affect and Negative affect were significant,  $ps < .016$ . Analyses indicated that 15% of the variance in Positive affect and 9% of the variance in Negative affect were explained by their respective models. The interaction between PCL and Change condition showed that individuals with high PCL scores showed significantly greater improvements in Positive affect change compared to those with low PCL scores,  $b = 0.24$ ,  $p = .044$ . No other predictors were significant across all models, all  $ps > .076$ .

Table 8. *Linear Regressions of PTSD Symptoms by Condition on Outcome Measure Change Scores (N = 156)*

Measure				Overall Model		
	$\beta$	$t$	$p$	$F (df)$	$p$	$R^2$
DERS Change Score				0.66 (5, 149)	.655	.02
PCL-5	-.09	-0.62	.534			
Acceptance	-.11	-.70	.483			
Change	-.11	-.70	.483			
PCL-5*Acceptance	.01	0.07	.942			
PCL-5*Change	.18	1.05	.296			
FFMQ Change Score				1.34 (5, 146)	.251	.04
PCL-5	.07	0.52	.603			
Acceptance	-.17	-1.05	.295			
Change	-.14	-.94	.351			
PCL-5*Acceptance	-.04	-0.24	.811			
PCL-5*Change	.09	0.56	.575			
Positive Change Score				4.93 (5, 145)	.000	.15
PCL-5	.17	1.27	.206			
Acceptance	.23	1.53	.128			
Change	-.21	-1.48	.142			
PCL-5*Acceptance	-.10	-0.64	.524			
PCL-5*Change	.32	2.03	.044			

Measure				Overall Model		
	$\beta$	$t$	$p$	$F (df)$	$p$	$R^2$
Negative Change Score				2.92 (5, 145)	.015	.09
PCL-5	.25	1.78	.077			
Acceptance	-.01	-.03	.975			
Change	.01	.04	.965			
PCL-5*Acceptance	.07	0.40	.690			
PCL-5*Change	.06	0.36	.717			

*Note.* DERS = Difficulties in Emotion Regulation Scale; FFMQ = Five Factor Mindfulness Questionnaire; Positive = Positive affect subscale on the Positive and Negative Affect Schedule; Negative = Negative affect subscale on the Positive and Negative Affect Schedule; PCL-5 = Posttraumatic Stress Disorder Checklist – DSM-5 Version.

**Hypothesis 3.** *The online trainings will be feasible and acceptable to participants, including a 90% training completion rate, once the participant starts their training.*

Of the 173 participants who started their randomized training program, 156 fully completed their program, for a 91.9% completion rate. Three participants completed the program in time periods greater than two standard deviations from the mean time of completion. These conservatively were considered non-completers based on the assumption that they likely turned on the video and left it playing. Categorizing these individuals as non-completers resulted in a 90.2% completion rate.

Acceptability was assessed further by comparing satisfaction question across conditions as presented in Table 9. On average, participants generally endorsed that the

trainings were acceptable, rating most aspects of the program above 4 on a 5-point scale ( $M_{\text{Grand}} = 4.17$ ,  $SD = 0.74$ ). A one-way ANOVA yielded significant differences between conditions on the question “I would recommend to others”,  $F(2, 153) = 3.38$ ,  $p = .036$ . No other differences between questions were found, all  $F$ s  $< 1.37$ , all  $p$ s  $> .252$ . A Tukey post hoc test for the question “I would recommend to others” revealed that the Change condition was significantly higher than the Stress condition,  $p = .028$ . There were no statistically significant differences between the Acceptance condition and either the Change,  $p = .334$ , or Stress condition,  $p = .456$ . Overall, the Change condition was rated as the most acceptable, followed by the Acceptance and Stress conditions, which were similar to each other.

Table 9. *Satisfaction Questions and Ratings of Training Conditions*

Question	Acceptance Condition ( $n = 53$ )	Change Condition ( $n = 51$ )	Stress Condition ( $n = 52$ )
	$M (SD)$	$M (SD)$	$M (SD)$
Duration was appropriate	3.60 (1.35)	3.86 (1.02)	3.67 (1.15)
Language and examples were clear	4.58 (0.63)	4.69 (0.55)	4.58 (0.72)
Would recommend to others*	4.17 (1.01)	4.45 (0.70)	3.96 (1.05)
Enjoyed the content of the training	4.06 (1.08)	4.37 (0.77)	4.12 (1.00)
Mean score across all questions	4.10 (0.81)	4.34 (0.59)	4.08 (0.79)

*Note.* Strongly disagree = 1 to Strongly agree = 5.

\* $p < .05$ .

**Hypothesis 4.** *Participants who receive either active condition (acceptance of emotions, change of emotions) will report significantly more emotion regulation skill knowledge compared to participants who are in the control condition at T1.*

A one-way ANOVA yielded significant overall differences between conditions on skill knowledge,  $F(2, 153) = 3.41, p = .036$ . A Tukey post hoc test revealed that skill knowledge was significantly higher in the Change condition compared to the Stress condition,  $p = .027$ . There were no statistically significant differences between the Acceptance condition and either the Change,  $p = .448$ , or Stress condition,  $p = .335$ , on skill knowledge.

**Post hoc analyses.** To aid in understanding how higher levels of PTSD symptoms impacted changes on outcome measures, a repeated measures MANOVA was run with participants who met the provisional PTSD cutoff of 33+ on the PCL-5. The analysis revealed that on there was a main effect for Time,  $F(2, 44) = 38.65, p < .001$ , and for Condition,  $F(4, 88) = 2.06, p = .048$ . There was no significant effect for the two-way interaction,  $F(4, 88) = 0.39, p = .926$ , indicating that changes on outcome measures were not significantly different between conditions.

Comparison univariate tests for the main effects of Time and Condition found main effects for Time on Positive affect,  $F(1, 47) = 6.46, p = .014$ , and Negative affect,  $F(1, 47) = 156.65, p < .001$ , but not DERS nor FFMQ, all  $F_s < 3.47$ , all  $p_s > .068$ . There was a main effect of Condition for Positive affect,  $F(2, 47) = 5.97, p = .005$ , but no other outcome measures, all  $F_s < .78$ ,  $p_s > .466$ . There were no significant Time x Condition interaction effects, all  $F_s < .67$ , all  $p_s > .518$ . A Tukey post hoc test revealed that Positive affect change was significantly greater in the Change condition compared to the

Acceptance condition,  $p = .044$ . There were no statistically significant differences between the Stress condition and either the Change,  $p = .075$ , or Acceptance condition,  $p = .418$ , on Positive emotions. For individuals who met the cutoff for provisional PTSD, those in the Change condition had significantly greater improvements in positive affect compared to the Acceptance condition.

### **Discussion**

In this study, we sought to examine whether two brief, self-paced and web-based training programs on emotion regulation skills would have a greater impact on reducing problems with emotion regulation, increasing mindfulness, and reducing affect intensity, compared to an active control condition. Specifically, we created a program focused on how to allow, or the acceptance of, emotions to reduce suffering and a program focused on how to change or reduce painful emotions, and compared them to a program on reducing stress with a standard psychoeducational curriculum. Results suggest that a self-paced, web-based training program can be effective in helping people improve on a variety of measures related to emotion regulation. However, improvements did not vary across conditions, suggesting that the approaches were equally, albeit moderately, effective. We will now consider what we might conclude from these data more specifically.

First, results demonstrated that these three 40-minute web-based trainings were feasible and acceptable for participants. In fact, almost all participants (more than 90%) completed the training program to which they were randomized. And, participants rated them highly (mean scores of greater than four out of five for all three conditions) on clarity of the presentations and enjoyment of the content, as well as stating that they



would recommend the program to others. However, the control condition was slightly less likely for participants to endorse willingness to recommend to others, suggesting that the active conditions might, in fact, have more utility in principle even though they did not show better outcomes.

Interestingly, participants were somewhat less positive about the length of the programs (averaging less than four out of five for all three conditions;  $M = 3.76$ ,  $SD = 1.17$ ). Unfortunately, we do not know if they would have preferred *more* training, or *less*. This, of course, also raises the question of the length of the training sessions, and whether they were anything close to an optimum “dose” or length. Because we wanted to control for length/dose, all three conditions were organized in essentially the same format and the same length. Perhaps a greater number but briefer training programs might be more effective, or a longer, more in-depth program would be. Future studies need to look not just at content differences but also at training methods as important variables in attention, interest, learning, and outcome.

There were some reductions in emotion regulation difficulties, increases in mindfulness, and reductions in negative affect after engaging with the trainings, although the three conditions did not differ from each other. There is the possibility that the control condition functioned as a form of brief intervention that was as helpful as the “active” conditions. For example, the stress psychoeducation condition may have provided beneficial information on stress for individuals ready to benefit from it. This aligns with some findings that psychoeducation alone may be beneficial in reducing symptoms of distress, notably a small meta-analysis found a small effect size ( $d = .2$ ) for brief passive

psychoeducation for depression and psychological distress (Donker, Griffiths, Cuijpers, & Christensen, 2009). Present findings are consistent with those.

An alternative explanation may be that simply having participants focus on their distress and emotions, through psychoeducation and validation of their distress and experiences, may help to improve affect intensity in the short run. Avoidance of situations and emotions is a common reaction to trauma and acknowledging one's own current emotions may function as a form of emotional acceptance (and/or exposure), if only immediately. One logical question, however, remains unanswered with present data: How long do these effects last? Are they brief or long-lasting, both in general and for each condition equally?

This phenomenon may also explain the finding that there was an interaction effect between PTSD symptom scores and condition on Positive affect: in the Change condition, participants with higher PTSD symptom scores were more likely to show greater change in Positive affect than those with lower PTSD symptom scores. While the content of the Acceptance condition was intentionally designed to acknowledge one's current emotions and facilitate more comfort with them, the Stress condition content may have also promoted this awareness. Similarly, the psychoeducational training may have also functioned as a form of distraction from momentary worries or concerns, which may have resulted in similar changes over a short period of time on difficulties in emotion regulation, mindfulness, and negative affect compared to the active skills conditions. Addressing these questions likely would require a larger sample size to detect differences between active conditions (Mohr et al., 2009).

Lastly, non-specific factors, such as validation and instilling hope that their negative emotions *can* be reduced, may have been equally present across all three conditions, contributing to finding no significant differences among them. These immediate non-specific factors could have been more immediately impactful than the actual content of these trainings, particularly having been delivered in a brief format.

Interestingly, findings demonstrated a significant change across all conditions for reducing negative emotion, but not for improving or increasing positive emotions. As stated above, the greater changes in negative compared to positive affect may have originated from the content of the trainings and an emphasis in the curriculum on reducing negative emotions as opposed to building positive experiences. However, individuals in the Change condition with higher baseline PTSD symptom scores, showed greater increases in positive affect. This suggests that for more distressed individuals something about the change-oriented skills condition might be more beneficial in increasing positive emotions, at least in the short-term.

There are also some aspects of the study design, in particular, that may have affected the findings. Recruitment utilized Prolific, a crowdsourcing community. Although recruitment was based upon a perceived participant desire for ways to better handle emotions, this population may be differently motivated than those recruited via other means, such as from a community mental health clinic. In particular, while a large portion of the current sample (61%) endorsed high severity symptom levels of depression, anxiety, stress, and possible PTSD, it is likely that in total this current sample has a lower level of distress than a population seeking clinical services. This lower

distress may have decreased engagement with the programs, which was perhaps even more critical to participants given the brief nature of the training programs.

Thus, we conducted a post-hoc analysis looking at the subset of the sample with probable PTSD (using the recommended cutoff score on the PCL-5) to see if this alternative hypothesis might account for finding no differences in outcome across conditions. We found that there was only a significant difference between the Change and Acceptance conditions on increase in Positive emotion, with Change demonstrating greater increases. This may be attributable to the Change condition training being more focused on active skill strategies (“active” even being one of the items in the Positive scale) to change painful emotions, which may have felt empowering for participants. This is in contrast to a more passive “allowance” of emotions and internal experiences that the Acceptance of emotions training focused on. Future research would benefit in exploring how, for individuals with trauma-related distress, practicing change skills may be especially helpful early in treatment to engage and empower individuals. In addition, attention to how the skills are framed could prove beneficial (e.g., framing both sets of skills as active ways to reduce misery and suffering).

Some strengths to this study originate from the delivery format of the interventions. Because the skills trainings were delivered online by the same presenters and utilizing the same formats, the study eliminated variance due to different presenters (or “therapist” effects), and possible confounds due to length or format. While it was difficult to ascertain how engaged participants were with the web-based video training programs, prior studies have found that DBT skills can be effectively delivered through brief video programs disseminated in a research laboratory (Waltz et al., 2009) and in an

8-session online format (Wilks et al., 2017). Attrition was minimal in the current study, with about 90% of those who initiated a training completing the study. Yet, due to the recruitment methods, attrition may be different within a treatment-seeking clinical sample, with likely different motivation for participation. Rates of attrition for self-guided web-based interventions for psychological disorders have been found to range from 2% to 83% (Melville, Casey, & Kavanagh, 2009), so there are no specific gold standards. A meta-analysis focused on web-based interventions for depression found that nearly 70% of participants dropped out before completing a minimum of 75% of the treatment (Karyotaki et al., 2015). Web-based delivery of mental health interventions demonstrate a wide range of attrition and, if these trainings would be useful for clinical populations, it is important to evaluate general acceptability not just by self-report but also by including dropout as an outcome, in a highly distressed treatment-seeking sample. In fact, analyses showed that the impact of the video training programs was more substantial in the more distressed subsample on affect intensity, suggesting its applicability to populations that need intervention. The data also suggest such interventions are very acceptable, yielding few dropouts in this study. Moreover, the fact that individuals who completed the trainings were more distressed than those who did not complete them, offers some evidence that the program is more appealing to those who might need it most. This provides good reasons for continuing to examine these kinds of interventions.

Of course, there are additional limitations present. For example, a large majority of participants identified as White (79%) and Heterosexual (71%) limiting generalization of findings to more diverse populations, which may be especially salient when targeting

stress reduction due to possible additional impacts of minority stress. This study exclusively utilized self-report data and future studies may benefit from objective measures. Additionally, this study utilized data from 24 hours prior to initiating a training and then immediately post training. Because skills knowledge was significantly greater in the active conditions compared to the control condition, there is the possibility and hope that individuals in the active conditions would practice the emotion regulation skills taught, which could lead to improvements on the emotion regulation measures over a greater follow-up period. A future study that evaluates the type of training (e.g., skills vs. psychoeducation) prospectively on future action, such as evaluating the skill behaviors in real life and in ongoing skills practice, may be beneficial.

Overall, this study investigated both whether this type of intervention (web-based video programs) is a viable means of intervention, and whether different approaches to skill training (vs. an expected “inactive” control) might prove differentially useful. This study provides initial evidence that brief emotion regulation skills and psychoeducation, in a web-based delivery format, will likely have a positive impact on reducing negative affect, and may have salutary effects on problems regulating emotion, and some aspects of mindfulness. For individuals with trauma-related distress, Change skills may be particularly helpful in increasing positive affect. Present results provide motivation and direction for future studies both to continue to develop brief, web-based interventions and to evaluate the delivery of emotion regulation skills in individuals with trauma-related distress, including PTSD.

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