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How Dialectical Behaviour Therapy changes emotion dysregulation in borderline personality disorder

**Abstract**

This article will describe theory and application of emotion regulation skills developed within the context of Dialectical Behavior Therapy (DBT). We first present a model of emotion and emotion dysregulation and describe then how we define and teach these concepts to individuals with difficult-to-manage disorders of emotion regulation. We argue that Borderline Personality Disorder is an exemplar of pervasive dysregulation across both negative and positive emotions. The model of emotion generation and points of regulation includes five areas of potential intervention: vulnerability to cues, emotion cues, emotion response tendencies, emotion responses, and emotion after-effects. Each point of intervention is linked to corresponding regulation processes and specific DBT skills. We then describe the research that we believe is needed now to evaluate these skills independent of their context within DBT.

DBT is a comprehensive cognitive behavioral treatment developed originally for suicidal individuals meeting criteria for Borderline Personality Disorder (BPD), expanded to treat BPD patients generally or with substance dependence and since expanded to treat other personality disorders as well as other mental disorders whose criterion behaviors are functionally related to problems in emotion regulation. The data for the efficacy of DBT in treating disorders characterized by pervasive and difficult to manage emotion dysregulation is extensive, including eight randomized clinical trials conducted across five independent research teams (Koons et al., 2001); (Linehan, Armstrong, Suarez, Allmon, & Heard, 1991); (Linehan et al., 1999); (Linehan et al., 2002); (Linehan et al., 2005); (Lynch, Morse, Mendelson, & Robins, 2003); (Verheul et al., 2003); (Telch, Agras, & Linehan, 2001); (Safer, Telch, & Agras, 2001); (Lynch, Chapman, Rosenthal, Kuo, & Linehan, 2004); (van den Bosch, Verheul, Schippers, & van den Brink, 2002)
Emotion and Emotion Dysregulation

DBT Model of Emotion.

Drawing on many others, primarily Ekman (Ekman & Davidson, 2004; 1994), we view emotions as complex, brief, involuntary, patterned, full-system responses to internal and external stimuli. Similar to others, we emphasize the importance of the evolutionary adaptive value of emotions in understanding them today (Tooby & Cosmides, 1990) cited in (1994; 1994) p15). Although we view emotional responses as systemic, they can for the sake of discussion be viewed as consisting of a number of transacting components or subsystems. Admitting that there are any number of ways to divide up a complex system, we find the following five subsystems of practical use in both understanding and learning to regulate emotions: 1) emotional vulnerability to cues, 2) internal and/or external events that serve as emotional cues, including attention to and appraisals of the cues, 3) emotional response tendencies, including physiological responses, cognitive processing, experiential responses and action urges, 4) non-verbal and verbal expressive responses and actions, and 5) after-effects of the initial emotional “firing” including secondary emotions (see Figure 1).

Figure 1. DBT-Model of emotion generation and points of regulation.
(adapted from Gross, 1998)

Similar to Scherers’ conception of emotion, emotions are viewed as “a sequence of interrelated, synchronized changes in the states of all organismic subsystems (information processing/cognition, support/ANS, execution/motivation, action/SNS, monitoring/subjective feeling).” (Ekman et al., 2004; 1994; Ekman et al., 2004; p.27). Although one might ordinarily think of emotions as responses to internal and/or external events, i.e., as events separate from the events that prepare and cue the individual to respond emotionally, our view is that it is useful to consider emotional cues and the state of the individual (both biological and psychological) as occurring as part of a discrete emotional system occurring across segments of time. From this dialectical point of view, emotions are transactional events where both context and
response are integral parts of the emotional system, i.e., the emotional response of the person is not separated from the emotionally evocative cue of the context and both are seen to reciprocally influence each other. Similarly, we find it useful to consider the patterned actions associated with emotional responses to be part and parcel of the emotional response rather than consequences of the emotion. By combining all these elements into one transactional system we emphasize that modifying any component of the emotional system is likely to change the functioning of the entire system. In short, if one wants to change one’s own emotions, it can be done by modifying any part of the system. Like Davidson and colleagues (Davidson, 1998) we contend that emotion regulation can be both automatic as well as consciously controlled and that emotion regulatory processes are an integral part of emotional responding. In DBT, our focus is on first increasing conscious control and second eliciting sufficient practice to over-learn skills such that ultimately the regulation becomes automatic.

**Pervasive emotion dysregulation.**

Emotion dysregulation is the inability, even when one’s best efforts are applied, to change or regulate emotional cues, experiences, actions, verbal responses, and/or non-verbal expressions under normative conditions. Pervasive emotion dysregulation is when the inability to regulate emotions occurs across a wide range of emotions, adaptation problems, and situational contexts. Pervasive emotion dysregulation is conceptualized as due to an increased vulnerability to high emotionality combined with an inability to regulate intense emotion-linked responses. Emotion vulnerability, from this theoretical position, is defined as heightened sensitivity to emotional stimuli, intense reactions to such stimuli, and a slow, delayed return to an emotional baseline. Characteristics of emotion dysregulation include an excess of aversive emotional experiences, an inability to regulate intense physiological arousal, problems turning attention away from emotional stimuli, cognitive distortions and failures in information processing, insufficient control of impulsive behaviors related to strong positive and negative affects, difficulties organizing and coordinating activities to achieve non-mood dependent goals when emotionally aroused and a tendency to “freeze” or dissociate under very high stress. Pervasive dysregulation occurs across the entire emotional system, including the behavioral, physiological, cognitive and experiential sub-systems of emotional responding.

**Borderline Personality Disorder: Pervasive Emotion Dysregulation**

BPD is a severe mental disorder with a serious dysregulation of the affective system at its core. Patients show a characteristic pattern of instability in affect regulation, impulse control, interpersonal relationship, and self-image. The often severe functional impairment leads to substantial treatment utilization and a mortality rate by suicide of almost 10%, which is 50% higher than the rate in the general population (American Psychiatric Association, 2001). BPD
affects approximately 1% to 2% of the general population, up to 10% of outpatients treated for mental disorders, and up to 20% of inpatients (TorgerSEN, KrINGLEN, & CRAMER, 2001). Because of the severity of the disturbance and the intensive treatment use, patients with BPD constitute a disproportionately large subset of psychiatric inpatients and outpatients, consuming considerably more mental health resources than most other psychiatric groups (BENDER ET AL., 2001b; BENDER ET AL., 2001a), (ZANARINI, FRANKENBURG, KHERA, & BLEICHMAR, 2001b; ZANARINI, FRANKENBURG, KHERA, & BLEICHMAR, 2001a).

Affective dysregulation in BPD is viewed as a consequence of an interplay between genetic vulnerability and sociobiographic experience, resulting in enhanced sensitivity to emotional stimuli and inability to effectively modulate emotional responses and response tendencies. Specifically, most DSM-IV BPD criterion behaviors can be defined either as a direct consequence of emotion dysregulation or as responses that function to modulate the aversive emotional states (Linehan, 1993b; McMain, Korman, & Dimeff, 2001). In a vicious cycle, this dysfunctional modulation of aversive emotions then serves as negative reinforcement for the criterion behaviors.

Enhanced sensitivity. According to Linehan’s theory, emotion dysregulation in BPD is hypothesized to consist of greater emotional sensitivity (low threshold for recognition of or response to emotional stimuli), greater emotional reactivity (high amplitude of emotional responses), and a slower return to baseline arousal (long duration of emotional responses) (Linehan, 1993b). To date, there have been relatively few studies examining the first component of Linehan’s emotion dysregulation theory in BPD; “high sensitivity to emotional stimuli”. Wagner and Linehan (WAGner & LINEhan, 1999) compared recognition of facial emotional expressions between women diagnosed with BPD, non-BPD women who reported a history of sexual abuse, and normal controls. They found that BPD patients were primarily accurate perceivers of others’ emotions and showed a tendency toward a heightened recognition of fear. In contrast, Levine Marziali and Hood (LEVINE, MARZIALI, & HOOD, 1997) reported that 30 male and female BPD patients were less accurate compared to 40 gender balanced non-BPD controls at recognizing facial expressions of anger, fear, and disgust. Both of these studies used facial affect stimuli at 100% expression. Using morphing technology that allow examination of accurate perception at lower levels of intensity, (LYNCH ET AL., 2005) demonstrated that, as facial expressions morphed from neutral to full intensity, participants with BPD correctly identified facial affect at an earlier stage than healthy controls. Participants with BPD were more sensitive than healthy controls at identifying emotional expressions in general, including both negative (i.e., anger) and positive (i.e., happiness) emotional expressions. These findings could not be explained by participants with BPD responding faster with more errors, supporting contentions that heightened emotional sensitivity is a core feature of BPD (LYNCH ET AL., 2005).
Enhanced reactivity. By applying emotional challenge paradigms to neuroimaging studies it is possible to investigate neural correlates of affect processing. The material used can either be standardized (e.g. emotional slides) or personalized (e.g. autobiographic scripts). Using standardized negative emotional material from the International Affective Picture System (IAPS) Herpertz and colleagues (Herpertz et al., 2001) found increased activity in the amygdala of six patients with BPD and without comorbid psychiatric disorders compared to healthy controls. Donegan and colleagues (Donegan et al., 2003) examined neural responses to neutral, sad, fearful and happy facial expressions (Ekman and Friesen series) in 15 BPD and 15 control subjects. BPD patients showed greater left amygdala activation to all facial expressions regardless of valence (i.e., sadness, fear, happy) but also to neutral faces, compared with controls. The lack of differentiation between the four expressions raises questions regarding stimulus specificity of the left amygdala response.

Using the method of script-driven imagery, Schmahl and co-workers (Schmahl CG, Vermetten E, Elzinga BM, & Bremner JD, 2004) used autobiographic scripts to investigate processing of stressful memories in patients with BPD. Exposed to memories of traumatic life events, women with BPD failed to show increased blood flow in the ACC, the orbitofrontal cortex and dorsolateral prefrontal gyrus, as did women without BPD. In addition, regional blood flow was investigated during imagination of situations of abandonment (Schmahl et al., 2003); significant decreases in the anterior cingulate and medial prefrontal cortex in women with BPD were found in this study. Medial prefrontal cortex including ACC is involved in stress and emotion (Lane et al., 1997); (Reiman, 1997) and also has inhibitory connections to the amygdala (Devinsky, Morrell, & Vogt, 1995); (Vogt, Finch, & Olson, 1992). In a recent study (Driesen et al., 2004) neural correlates of traumatic memory versus aversive but nontraumatic memory were investigated in BPD patients with (n=6) and without PTSD (n=6). When comparing the reaction to the two memory types, differential responses for BPD patients with and without PTSD were found: Those without current PTSD showed a widespread activation of the orbitofrontal cortex (OFC) in both hemispheres, whereas those with current PTSD demonstrated only minor activation of the right more than the left OFC. Instead there was a major right-sided activation of the anterior temporal lobe, including parahippocampal gyrus and amygdala. These results may indicate the existence of different neural networks in trauma-associated mental disorders. Taken together, a dysfunction of dorsolateral and medial prefrontal cortex may be associated with the recall of traumatic memories in women with BPD, of the second component of the emotion dysregulation schematic, “high reactivity to emotional stimuli.”

Prolonged activation. There is an almost absolute dearth of published studies examining the third component of the Linehan emotion dysregulation schematic, “slow return to emotional baseline” Linehan (Linehan, 1993b) suggests that problems with recovery from peak emotional intensity makes a BPD individual more vulnerable to other triggers in their environment.
that might re-fire or exacerbate reactive emotional responding. Thus, BPD patients may have special difficulties “turning off” the processing of either emotionally negative information, specifically, or emotionally arousing material in general. That said, to our knowledge, only one study has found support for the third component of Linehan’s theory. Stiglmayr and his associates (STIGLMAYR, SHAPIRO, STIEGLITZ, LIMBERGER, & BOHUS, 2001); (STIGLMAYR, GRATHWOL, LINEHAN, FAHRENBERG, & BOHUS, 2005) compared subjectively perceived states of aversive tension between female patients with BPD with normal controls. Highly significant differences were found regarding the duration and intensity of subjectively perceived states of aversive tension in the BPD group.

Emotion Regulation Skills in DBT

Emotion regulation skills in DBT are taught in the context of mindfulness skills, which are viewed as central in DBT and are thus labeled the “core” skills. These skills represent a behavioral translation of Zen meditation and practice and include observing, describing, spontaneous participating, non-judgmentalness, focused awareness in the present moment, and focusing on effectiveness (rather than being “right”). Unlike standard behavior and cognitive therapies which ordinarily focus on changing distressing emotions and events, a major emphasis of mindfulness, and, thus, DBT, is on learning to bear emotional pain skillfully. Representing a natural progression from mindfulness skills, distress tolerance skills encompass the ability to experience and observe emotions without evaluation and without necessarily attempting to change or control emotional experiencing, arousal or distress. In essence, distress tolerance skills target reducing maladaptive behavioral reactivity (e.g., impulsive acts, secondary negative emotions) to emotional responses without changing the distressing emotional response itself. Emotion regulation skills, in contrast, target the reduction of emotional distress through exposure to the primary emotion in a nonjudgmental atmosphere and application of a set of specific skills. Whereas distress tolerance skills focus on tolerating distressing emotions, emotion regulation skills focus on changing distressing emotions.

All of the skills in DBT target emotion regulation in one way or another. Our approach to developing the skills was to combine an approach that focused on targeting specific emotion components with a simultaneous emphasis on targeting specific time points in the emotion generative process. Our model of emotional processes is very similar to that developed by Gross (GROSS, 1998a). He distinguished two points of emotion regulation.

The first is at the point of the emotion cue where regulatory processes of situation selection, situation modification, attention deployment and cognitive change are important and the second is at the point of the emotional response tendencies where processes of response modulation are important. As can be seen in Figure 1, DBT added three additional time points. First
DBT adds a focus on vulnerability to emotional arousal. The idea here is that individuals will vary over time in their vulnerability to the same emotional cues. One can increase vulnerability to positive emotional cues and decrease vulnerability to negative emotional cues. Second, although we agree that there is a need to reduce emotional response tendencies once they have been initiated, i.e., the tendency to over- or under-respond or escalate or suppress an emotional response, there is also a need for emotion regulation once an emotional response is full blown, i.e., well past the point of initiation. Regulatory processes that may have been effective in the initial stages of an emotional response may be much less effective under con-
dition of intense emotional arousal. Third, emotions have after-effects that can serve as new emotional cues, re-firing the same emotion again or precipitating a secondary emotion. In some respects, one can say emotions are self-organizing attractors and a major task in modulating emotions already fired is to stop re-firing the emotion.

In addition to the five sets of emotion regulatory processes proposed by Gross, DBT targets five additional processes: biological change and context change (at the point of vulnerability to emotion cues), consequence expectancy change and response appraisal change (at the point of emotional response tendencies) and emotion reactivity change (at the point of emotional after-effects). We moved the emotion modulation process described by Gross as operating at the point of emotional response tendencies to more clearly focus at the point of intense emotional responding. The point of emotional response is the culminating point of emotional response tendencies combined with emotion regulating processes. In the case of the pervasively dysregulated individual, this point is likely to be a point of extreme and intense emotions due to inadequate or misapplied regulation strategies. As will be seen, there is an extensive overlap of the skills prescribed in DBT and the emotion regulation procedures proposed by Gross.

Thus, we articulate two distinct types of emotional responses. Low magnitude emotional response tendencies that include relatively low to moderate intensity responses and high magnitude emotional responses that reflect responses of high intensity that are also products of emotion regulation processes occurring at the response tendency level. Thus, as in the Gross model (GROSS, 1998b; GROSS, 1999) our model describes emotional responses as sharing many qualities of emotional response tendencies and also reflecting the influence of emotion regulation or lack thereof on these tendencies. Our model focuses on both intensity and timing of responses. Emotion regulation strategies that work well when deployed in advance of a stressful experience may fail to help one regulate emotions already evoked by a stressor. In addition, emotion regulation strategies that work well at relatively low emotion intensity may not work well at high intensity. In general, intensity and temporal issues have rarely been explored in studies of emotion regulation.

In what follows, we will describe the specific skills taught in DBT. The names of many of the skills are arbitrary and were developed by extensive pilot testing to do two things: entice clients into trying the skills and aid them in remembering the core idea of often complex sets of skills. Although we have organized the skills according to the regulation process that are most centrally related to, it should be clear that the functions of each set of skills can apply across many of the regulation processes. Our categorization, therefore, is somewhat arbitrary but, none-the-less helpful in understanding the skills. This is particularly the case for mindfulness skills which in one way or another can be viewed as critical at every juncture in the emotion regulation process.
Changing vulnerability to emotional cues

Emotional disorder, particularly when characterized by pervasive emotional dysregulation, is most often characterized by an imbalance of high negative emotionality with low positive emotionality although highly activated positive emotion, as in the case of mania, would also constitute disorder. An important task in learning to down-regulate negative emotions is to decrease vulnerability to negative or distressing emotions and increase the probability of positive events and emotions, the latter to both increase happiness and to increase resilience in stressful situations. By vulnerability we mean both sensitivity to and intensity of reactions to emotional cues. Changing emotion vulnerability changes the “establishing operation” or reinforcing effects of particular events and the subsequent behavior of the individual (Michael, 1993). For example, food deprivation is an establishing operation that momentarily increases the salience of food as a form of reinforcement. Two sets of processes are needed here: biological change and context change.

Biological change refers to reducing biological vulnerability to negative emotional cues. The data are clear that there are broad individual variations in physiological reactivity to emotional stimuli (Boyce & Ellis, 2005). Even when some components of this variability may be due to immutable genetic dispositions and early developmental experiences, most components can come under the control of the individual. Accordingly, DBT skills were designed to target behaviors that contribute to biological homeostasis and the reinforcing effects of various stimuli known to influence emotional reactivity. The DBT “PLEASE” skills target treating Physical Illness (Anderson, Hackett, & House, 2004), balancing nutrition and Eating (Smith, Williamson, Bray, & Ryan, 1999; Green, Rogers, Elliman, & Gatenby, 1994), staying off non-prescribed mood-Altering drugs, getting sufficient but not too much Sleep (Brendel et al., 1990), and getting adequate Exercise (Stella et al., 2005).

Context change refers to creating both psychological and environmental contexts conducive to emotional resiliency, i.e., the ability to minimize negative effects and maximize positive effects of exposure to emotional cues. Although emotional reactivity may move from relatively greater plasticity to progressively lower plasticity over time (Turkheimer & Gottesman, 1991; Waddington, 1966) one can influence vulnerability to emotional arousal by modifying the context in which emotional cues occur. DBT targets external context by teaching skills for accumulating positive life events and targets psychological context by teaching skills for building a sense of generalized mastery.

Although individuals do at times report both positive and negative emotional experiences contemporaneously (Ebner-Priemera et al., 2005) the building of a life with a sufficient number of positive events, particularly when those events are important to the individual, will increase the individual’s resilience in the face of negative events. Increasing the number of pleasurable events in one’s life is one approach to increasing positive emotions. In the short term, this involves increasing daily positive experiences. In the long term, it means making life changes and working on goals related to important life values so that pleasant events will occur more
often. Building a general sense of mastery is done by engaging in activities that build a sense of competence and self-efficacy. Both skills have both been shown to predict decreased vulnerability to negative emotional states (Rosenbaum, Lewinsohn, & Gotlib, 1996); (Joiner, Jr., Lewinsohn, & Seeley, 2002); (de Beurs et al., 2005); (Bengtsson-Tops, 2004). The focus on mastery is very similar to activity and mastery scheduling in cognitive therapy for depression which has been shown to reduce depression even when active focus on cognitive change is removed from the treatment (Jacobson et al., 1996), (Dimidjian et al., 2005).

Changing emotional cues

Situation Selection/Modification. One way to regulate emotions is to regulate situations that increase unwanted emotions (e.g., stimulus control). This can be done by either avoiding or modifying situations that generate the unwanted emotions. DBT teaches a simple set of problem solving skills aimed at changing or developing strategies for eliminating, reducing or avoiding emotionally problematic situations. The focus here is on defining those situations that cue unwanted emotions and then applying standard problems solving steps such as those outline by D’Zurilla and Nezu (D’Zurilla & Nezu, 1999) and others. Because many problems are interpersonal and even if not may require interpersonal interactions to solve, DBT also includes a set of interpersonal effectiveness skills for asking for what one needs and saying no to unwanted requests. These skills focus on how to obtain a wanted objective while simultaneously maintaining both the interpersonal relationship as well as one’s own self-respect, and doing so alters the emotional cues. However, problem solving, particularly interpersonal problem solving often requires one to come into contact with emotional cues. Consequent high emotional arousal can interfere with the requisite coping necessary to solve the problem. With highly emotionally sensitive individuals, coping ahead with emotional situations via covert rehearsal of problem solving can be helpful in building the coping skills necessary for problem solving. (Fourkas, Avenanti, Urgesi, & Aglioti, 2005; Barkley, 2001). Coping ahead may also work by increasing the individual’s appraisal of their own ability to cope with the challenges of the emotional event, effectively increasing a sense of mastery and self-efficacy.

Attentional Deployment. There is consensus that cognitive processes play an important role in eliciting and regulating emotions. Many of these cognitive processes are implicit and automatic in nature (Ohman & Soares, 1993). At the input level, situations, whether external or internal stimuli, are appraised as either emotionally significant or emotionally insignificant. This appraisal process is operated by a range of cognitive processes relying on various levels of automaticity, voluntariness, and complexity (Smith & Kirby, 2000). At the output level, emotional states prime or facilitate specific cognitive modes. Christianson (Christianson, 1992) has shown that negative emotion biases attention toward the focal aspects of the situation that are emotionally relevant. Such focal attention might feed back in continuous appraisal, biasing the evaluation of the situation toward the activated emotion (McNally, 1995). Thus, from a regulation perspective, emotion might be modulated at different stages through cognitive process-
es: through appraisal that gives emotional meaning to a situation and through the cognitive processing mode that is elicited by the emotional state. Philippot, Baeyenes, Douilliez and Francart (Philippot, Baeyenes, Douilliez, & Francart, 2004) suggested that this process should result in an attentional bias for “schema-relevant” stimuli. Therefore, one important therapeutic approach involves training people to redirect their attention toward elements that are incongruent with their negative interpretation in order to develop a more balanced and objective view of the situation (Philippot et al., 2004).

**Situation appraisal change.** DBT focuses on analyzing and correcting situation appraisals by teaching a set of skills collected under the general rubric of “**checking the facts**.” These skills focus on discriminating assumptions, interpretations, ruminative thoughts and worries from the actual observed facts of situations. Support for this model of emotion regulation has been demonstrated in a number of studies comparing different reappraisal strategies, including non-appraisal control conditions, following presentation of emotional cues (Lazarus & Abamovitz, 1962); (Speisman, Lazarus, Mordkoff, & Davison, 1964); (Lazarus, Opton, Jr., Nomikos, & Rankin, 1965). The mechanisms by which appraisal change works, however, are not clear. In an elegant set of cross-sectional studies (Sheppard & Teasdale, 2000); (Sheppard & Teasdale, 2004) measured changes in two aspects of affective information processing in response to pharmacotherapy: 1) “schema access” and 2) “metacognitive monitoring”. Schema access is similar to the directing of attention to a negative thought or stimulus, whereas metacognitive monitoring can be thought of as mapping onto concepts of attentional disengagement (e.g., intentionally or non-consciously turning away from negative stimuli or thoughts about the self). Sheppard and Teasdale found that currently depressed subjects differed significantly from controls on both tasks, whereas partially remitted individuals displayed an intermediate pattern of results. Specifically, their metacognitive monitoring resembled that of controls, while schema access was indistinguishable from fully symptomatic subjects. Their results suggest that remission was not the result of changes in depressive schemata, but instead was a consequence of improvements in metacognitive skills similar to those taught in mindfulness. In other words, patients in remission still produced dysfunctional cognitions, but they showed improved abilities to recognize those thoughts as dysfunctional and changed their response to the negative cognition (i.e., see a thought as a thought, not literally true) instead of changing the content of the thought (i.e., reappraisal). Considering this, it is evident that further research must be conducted before conclusions regarding the mechanisms behind cognitive change will be firmly established.

**Changing emotional response tendencies**
The regulation of action tendencies associated with emotions is an important step in regulating dysfunctional emotions. For example, cue exposure in the treatment of anxiety necessarily requires the preventing of cognitive, emotional and behavioral avoidance of the cue. Indeed, evidence has accumulated that, at least in the case of anxiety (esp. social phobia), any less-
ening of the strength of anxiety stimuli, for example by including safety cues, will reduce the effectiveness of interventions (O'TO, SMITS, & REESE, 2005). While many treatment manuals seem to assume that clients can easily prevent dysfunction responses, DBT makes no such assumptions since the population DBT was designed for has great difficulty inhibiting emotion-based responses. Thus, DBT provides a range of distress tolerance skills aimed at inhibiting impulsive emotional responses that interfere with long-term emotion regulation.

**Consequence Expectancies Change.** Changing emotional behaviors can be extremely difficult when they are followed by reinforcing consequences; thus, identifying the functions and reinforcers for particular emotional behaviors can be useful. Generally, emotions, function to communicate to others and/or to motivate one's own behavior (BLAIR, 2003); (HORSTMANN, 2003). Emotional behaviors can also have two other important functions. The first, related to the communication function, is to influence and control other people's behaviors; the second is to validate one's own perceptions and interpretations of events (i.e.,"if I feel it, it must be true"). The function of the latter can be seen as stabilizing the individuals concepts of self (IZARD, LIBERO, PUTNAM, & HAYNES, 1993). The key idea here is that all components of emotions may come under the control of operant conditioning. For example, across studies displays of embarrassment (vs. non-display) following a transgression resulted in higher liking, greater forgiveness, and increased willingness to provide aid (see KELTNER & ANDERSON, 2000). Distressed behavior prompts both negative and solicitous emotions, but deters hostile reactions (BIGLAN, ROTHLIND, HOPS, & SHERMAN, 1989) and descriptions of how a person might feel in hypothetical depressive situations can be conditioned using social reinforcement (LAM, MARRA, & SALZINGER, 2005). Thus, changing consequence expectancies changes the probability of a response, including emotional responses. In DBT, the skill taught is evaluation of cons of specific emotional reactions. The goal is to bring into present awareness both short and long-term negative consequences of problem emotions and likely positive consequences of either changing negative emotions or enhancing positive emotions. Research has shown that asking normal controls to consider cons on a task related to handling an interpersonal problem lead to the development of a “deliberative mindset” in a subsequent task, compared to people asked to consider an action-oriented approach to the interpersonal problem (GOLLWITZER, HECKHAUSEN, & STELLER, 1990). In addition, poor rational problem solving skills problems (i.e., defining and formulating the problem and generating alternative solutions) was an important predictor variable of suicidality, hopelessness, and depression in a suicidal psychiatric sample, and moderately predictive of the same variables in a college student sample (D'ZURILLA, CHANG, NOTTINGHAM & FACCINI, 1998).

**Response Appraisal Change** refers to changing one’s appraisal of a negative emotion from an experience that cannot be tolerated and experienced willingly and, therefore, must be avoided or changed. The principle DBT skills here are those of reality acceptance. Emotion acceptance has been shown when compared to emotion suppression, or a neutral control to result in less subjective anxiety or avoidance in panic patients undergoing a carbon dioxide challenge.
In addition, coaching in an acceptance mindset when compared to coaching of a control-your-emotions mindset or a placebo significantly increased the amount of time a subject was willing to spend in a cold pressor task (Hayes et al., 1999). With respect to emotions, DBT reality acceptance skills (“turning-the-mind” towards acceptance, radical acceptance and willingness) focus on radical (meaning complete) acceptance of the current emotion and willingness to experience even aversive emotions.

**Changing emotional responses**

**Physiological Response Modulation.** DBT provides a set of skills designed specifically to downregulate the extreme physiological arousal that often accompanies intense emotions. The function of these skills is to impact high arousal quickly with skills that do not require a correspondingly high level of cognitive processing to complete. The first skill has to do with using cold, icy water on the face, a method derived from research on the human dive reflex which is elicited by a combination of breath holding and face immersion with cold water. The dive reflex is thought to be a physiologically protective oxygen mechanism whereby the subject is kept alive during submergence. The physiological response involves both branches of the autonomic nervous system: parasympathetic activation (bradycardia) and concurrent sympathetic activation (vasoconstriction) (Hurwitz & Furedy, 1986). Acute bouts of intense exercise are also recommended if arousal is very high. Most important here is that the intensity of the exercise. Cox and colleagues compared intensity of exercise (60% VO2max, 80% VO2 max, and a no exercise control) and found that while intensity of exercise conditions did not differ in state anxiety immediately after exercise, a significant difference favoring the 80% VO2max condition over the control condition emerged at 30 min post-exercise (Cox, Thomas, Hinton, & Donahue, 2004). Progressive relaxation, one of the most commonly used methods of relaxation, consists of first tensing an entire limb, holding it for a brief moment and then relaxing it. This procedure, with sufficient practice, can become a rapid method of reducing generalized physical tension (Pawlow & Jones, 2002)

**Behavioral Response Modulation: Opposite Action All-the-Way.** One strategy to change or regulate an emotion is to change its behavioral-expressive component by not only preventing emotional actions but also acting in a way that opposes or is inconsistent with the emotion. The DBT skill of **opposite action** is based on the idea that, as Barlow noted, the “essential step in the modification of emotional disorders is the direct alteration of associated action tendencies” (Barlow, 1988, p.313). Others have made this same point. Izard stated that treatment for anxiety disorders involves “the individual learn[ing] to act his way into a new feeling” (cited in Barlow, 1988, p. 410).

Cognitive behavioral interventions for anxiety, or fear, disorders all include this one common element: individuals have to approach the object/situation that is fearful, thus acting counter to (and inhibiting) their prominent urges to avoid. Effective treatments for anger also require the individual to act counter to the urges associated with anger (attack physically or verbally).
by leaving the situation. Anger interventions also focus on opposite perspective taking; shifting from aggression and blame to gentleness and forgiveness (e.g., (TAFRATE, KASSINOVE, & DUNDIN, 2002). A number of researchers have observed that effective therapies for depression (sadness) all share a common thread: They activate behavior. For example, successful treatments for depression, such as Cognitive Therapy (BECK, RUSH, SHAW, & EMERY, 1979) and Behavioral Activation (BA; (MARTELL, ADDIS, & JACOBSON, 2001), require that the individual galvanize him/herself to engage in activities that give them a sense of mastery or pleasure. This engagement runs counter to the urges associated with depression, such as withdrawal, fatigue, and shutting down.

Opposite Action “all the way” targets changing the entire range of physical responses that accompany action, including visceral responses, body postures and facial expression as well as movements. A large literature has demonstrated that the activation of a specific physical states activate the other facets of the corresponding emotion responses, be it via the face (MATSUMOTO, 1987), the posture (STÄPPER & STRACK, 1993) or respiration. Vice versa, there is ample empirical evidence that modulating one’s physical state alters one’s emotional state (PHILIPPOT ET AL., 2004). Also targeted in “all the way” opposite action are emotion-linked thought patterns and verbal responses. It is very important to note that the idea here is to act contrary to an emotion, not to mask or hide emotions (GROSS & LEVENSON, 1993).

In part, opposite action is hypothesized to work by influencing classically conditioned emotional responses (LYNCH, ET AL., in press). Opposite action may also create sensory feedback from facial muscles and skin that can be transformed directly into emotional experience without cognitive mediation (IZARD, 1971); (TOMKINS, 1962). Overall, these studies indicate that facial expression can be sufficient (but not necessary) to elicit an emotional experience, and the intensity of facial expression is positively correlated with the subjective experience of emotion (e.g., (DUCLOS & LAIRD, 2001); (HESS, KAPPAS, MCHUGO, LANZETTA, & KLECK, 1992); (MATSUMOTO, 1987); (SOUSSIGNAN, 2002); (STRACK, STEPPER, & MARTIN, 1988); (TOURANGEAU & ELLSWORTH, 1979). Finally, self-perception of expressive behavior and appraisals regarding proprioceptive sensations has been proposed to influence subjective emotional experience (LAIRD, 1974); (LAIRD, 1984). Opposite action may influence emotion by changing the perception of the emotional event. Thus, by behaving opposite to the automatic response or action urge of an emotion the meaning of the emotional event may be altered automatically and without conscious effort (LYNCH ET AL., 2005). In essence, the individual concludes that he/she is feeling safe because she is “acting as if” all is safe.

Changing emotional after-effects

Reactivity to Emotions Change. After-effects of emotions on attention, memory, and reasoning are fairly well established (see (DOLAN, 2002). As noted above, these after-effects can increase the probability of a re-firing of the same or similar emotion. Interrupting the cycle can be enhanced if the individual actually notices and identifies a current on-going emotion which can
then guide application of change strategies applicable to specific emotions or emotion groups. There is emerging evidence that low emotional awareness and problems identifying and describing one’s own emotions are linked to a variety of emotional disorders (Subic-Wrana, Bruder, Thomas, Lane, & Kohle, 2005; Taylor, 1984; Bydlowski et al., 2005). For example, these characteristics are important components of Alexithymia (Lane et al., 1996), a condition characterized by widespread difficulties in experiencing and processing emotions. As noted previously, emotions are complex behavioral responses. Their identification often requires the ability not only to observe one’s own responses but also to describe accurately the context in which the emotion occurs. Thus, learning to identify an emotional response is aided enormously if one can observe and describe (1) the event prompting the emotion; (2) the interpretations or appraisal of the event that prompt the emotion; (3) the phenomenological experience, including the physical sensations, of the emotion; (4) the expressions and actions associated with the emotion; and (5) the aftereffects of the emotion on other types of functioning. Instructions for identifying emotions are given in the DBT Observe and Describe Emotions Skills. This skill is based on the research showing that processing emotional experience with greater specificity has advantages for improved emotion regulation over emotional processing that is overgeneral or non-specific (e.g., Williams, 1996; Williams, Stiles, & Shapiro, 1999; Borkovec, Ray, & Stober, 1998). Indeed recent research has demonstrated that priming individuals with overgeneral emotional memories results in more intense emotional experience compared to priming specific emotional memories or a control condition (Schafer et al., 2003). In addition, experimentally manipulated anxiety regarding public speaking has been shown to be reduced by observing and describing specifically the fear-producing cues, in contrast to general impressions regarding cues that resulted in higher fear (Philippot, Burgos, Verhasselt, & Baeyens, 2002). Drawing from the work of both Shaver (Shaver, Schwartz, Kirson, & O’Connor, 1987) and Hupka (Hupka, Lenton, & Hutchinson, 1999). Linehan developed a taxonomy of ten basic emotions (anger, disgust, envy, fear, jealousy, joy, love, sadness, shame and guilt), listing for each emotion the 1) family of emotion names associated with the basic emotion, and typical 2) prompting events, 3) interpretations or appraisals, 4) biological changes and experiences, 5) expressions and actions, 6) aftereffects, and 7) secondary emotions associated with each family of emotions. Using the taxonomy, clients are coached in learning to observe and describe both their primary and their secondary emotions to various events.

The role of DBT Core Mindfulness Skills in emotion regulation

Mindfulness is the “core” skill in DBT and when used with respect to current emotions means observing, describing and “allowing” emotions without judging them or trying to inhibit them, block them, or distract from them. It is hypothesized to operate on a number of emotion reg-
ulatory processes simultaneously. Consequently, we review this skill separately and the impact it is hypothesized to have on each component of the DBT emotion regulation model.

Changing vulnerability to emotional cues

**Biological Change:** Mindfulness is hypothesized to reduce biological vulnerability to negative emotional cues. Indeed, research has demonstrated that for those with experience in mediation, a meditative state was associated with increased prefrontal and basal ganglia activation, as well as decreased activation in anterior cingulate and gyrus occipitalis, EEG patterns consistent with improved capability in moderating the intensity of emotional arousal, and increased left anterior EEG activation (also associated with positive affect) (Aftanas & Golosheyn, 2005); (Davidson et al., 2003); (Ritskes, Ritskes-Hoitinga, Stokilde-Jorgensen, Baerentsen, & Hartman, 2003).

**Context Change:** Mindfulness is hypothesized to create an internal context that functions as an extinction reminder. Prior research has demonstrated that the extinction of classically conditioned responses is context dependent (Bouton & Brooks, 1993); (Bouton, 1993); (Bouton, 2002). Indeed, Bouton (Bouton, 1993) has argued that renewal effects, (i.e., a re-emergence of the originally conditioned response due to a change in context following extinction) may be due to a failure to retrieve a memory of extinction. An extinction reminder is a cue that is paired with an extinction response and when re-presented upon return to the original conditioning environment functions to reduce renewal effects (Bouton et al., 1993). It is hypothesized that new associations to previously avoided (or pursued) CSs become increasingly dominant via repeated practice of mindfulness. The extinction reminder is activated simply by engaging in the act of mindful awareness (i.e., re-presents the cue) whenever the previously avoided CS appears.

Changing emotional cues.

**Situation Selection/Modification:** Mindfulness may influence situation selection by non-judgmentally expanding awareness regarding situations that in the past have evoked emotional experience. This awareness is hypothesized to increase sensitivity to the current contingencies in the environment allowing the opportunity for new learning. Thus, by seeing reality “as it is” (i.e., being in the present moment without historical filters), mindfulness may enhance the ability of an individual to make decisions regarding what situations to avoid, attempt to problem solve, or cope ahead with.

**Attentional Deployment:** Mindfulness may influence emotion via attentional control. Mindfulness involves learning to control the focus of attention, not the object being attended to (e.g., observing a thought as a thought or emotion as emotion, without an attempt to change the thought or emotion). Being able to disengage from emotional stimuli may reduce the tendency to experience negative affect (Ellenbogen, Schwartzman, Stewart, & Walker, 2002) and re-deploying attention has been postulated to lead to a “flexibility of attention” that may free
up cognitive resources (Jersild, 1927); (Posner, 1980); (Teasdale, Segal, & Williams, 1995). Thus, mindfulness may help modulate emotional experience by enhancing the practitioners ability to turn their attention from that which is not useful (or effective) and attend to what is (Lynch et al., 2005); (Lynch & Bronner, 2006).

Situation appraisal change: Mindfulness may alter situation appraisal by reducing literal belief in emotional appraisals. Mindfulness teaches individuals to observe appraisals as only thoughts that are not necessarily literally true. This is hypothesized to increase sensitivity to the current contingencies in the environment allowing the opportunity for new learning. In this context, mindfulness in DBT would not be predicted to reduce the frequency of distressing thoughts but instead decrease the influence these thoughts have on subsequent behavior and emotions (see more on this under Response Appraisal Change below).

Changing emotional response tendencies

Consequence Expectancies Change: Mindfulness involves focusing on effectiveness (rather than being “right”) and evokes concepts related to wisdom. Research has demonstrated that that people with higher wisdom-related knowledge have higher affective involvement (e.g. interest, attentiveness) but lower affective arousal (Kunzmann & Baltes, 2003), and greater preference for the use of cooperative skills during conflict (Kunzmann et al., 2003). Thus, mindfulness may lead to consequences that reinforce adaptive behavior, particularly in the interpersonal realm.

Response Appraisal Change: Mindfulness is hypothesized to influence the habitual or automatic response to emotional behaviors and any associated appraisals (Lynch et al., 2004). A number of theoretical accounts of emotion have described emotions as response tendencies (e.g., (Gross, 1998a) that have evolved over millennia to serve humans in their quest for survival (LeDoux, 2002). Mindfulness may alter automatic response tendencies by altering the response from habitual avoidance (or habitual approach) to that of “observe” (Lynch et al., 2004). Indeed, by engaging in a response that is incompatible with an emotion (e.g. observing a defensive emotion rather than automatically avoiding it) the practice of mindfulness may parallel reciprocal inhibition research showing that changing the behavioral response also alters the meaning of the cues eliciting the emotion. (e.g., (Wolpe, 1954). Thus, without deliberately trying to change what is observed, mindful observation itself may alter emotional experience.

Changing emotional responses

Opposite action: Mindfulness may alter rigid or habitualized attempts to over-control private experiences (e.g., emotions, cognitions, sensations). By accepting or observing aversive experience rather than automatically attempting to change experience mindfulness may function as non-reinforced exposure to previously avoided emotions, thoughts, and sensations. Thus, mindfulness can be conceptualized as consistent with interoceptive exposure (Craske, Barlow, & Meadows, 2000). By not avoiding, changing, judging, or attempting to escape interoceptive
experience the mindful practitioner develops new associations to previously avoided CSs (LYNCH ET AL., 2004).

**Changing emotional after-effects**

*Reactivity to Emotions Change.* Mindfulness to current emotions requires experiencing emotions without judging them or trying to inhibit them, block them, or distract from them. The basic idea here is that exposure to painful or distressing emotions, without association to negative consequences, will extinguish their ability to stimulate secondary negative emotions. The natural consequences of a person’s judging negative emotions as “bad” are feelings of guilt, anger, and/or anxiety whenever feeling emotionally distressed. The addition of these secondary feelings to an already negative situation simply makes the distress more intense and tolerance more difficult. Thus, mindfulness is hypothesized to maximize a quick return to emotional baseline.

**Future Research**

As noted previously, there is substantial data indicating that comprehensive DBT, including individual therapy, skills training, skills coaching, and team meetings for therapists, is effective for individuals with borderline personality disorder and for other emotional disorders. What is not known is whether the skills taught in DBT are an important component of the treatment’s effectiveness. A previous pilot study by Linehan and colleagues (described in (LINEHAN, 1993b) found that DBT group skills training in the absence of a DBT individual therapist was not effective with women meeting criteria for BPD. This is not a complete surprise since the role of the DBT skills trainer is skills acquisition whereas the role of the DBT individual therapist is skills utilization. A larger study of the efficacy of DBT skills training alone versus individual therapy alone versus comprehensive DBT is currently on-going. There are, however, some data that skills utilization is positively correlated to treatment outcome (BOHUS, LIMBERGER, KLEINDIENST, & SCHMAHL, 2006) and weekly DBT skills training alone with one-half hour telephone coaching are effective in treating chronic depression (LYNCH ET AL., 2003).

We do not know whether some DBT skills are more useful than others nor is there data regarding the role of competence of skills application, i.e., whether application of the “right skill at the right time” is important. It is also not clear which skills are the right skills for various situations. Given the propensity for emotional avoidance among many emotionally disturbed individuals, it is extremely important to find out when to teach patients to distract from unwanted emotions and emotional stimuli and when to expose to emotions and emotional stimuli. In DBT we make a distinction between moderate versus extreme emotional responses. Extreme emotional responses are defined as those accompanied by cognitive processing so compromised that skills requiring high use of cognitive resources (e.g., problem solving, checking the facts)
are unlikely to be successful. With extreme responses, skills more directly impacting somatic arousal (e.g., deep breathing, applying ice water to the face) or attention (e.g., distraction) are recommended. Data verifying the wisdom of these recommendations are sorely lacking. This is particularly important in light of the increasing use of mindfulness-based treatment interventions which teach individuals to notice and accept on-going emotional responses. The question might be reframed as when is mindfulness of current emotions (a DBT skill) more or less important.

Although there is a fair amount of evidence for most of the specific skills taught in DBT when tested in experimental conditions, there is little evidenced that they are effective as treatment interventions, particularly for those with serious emotion regulation disorders. The systematic examination of the DBT skills, both individually and in combination is an essential first step in improving treatment for deregulated individuals. This is particularly important for the skill of opposite action. Linehan has suggested that opposite action will be effective across a wide range of both dysfunctional positive and negative emotions. Even the experimental literature is meager here and much more research is needed on opposite action as a clinical intervention. For example, a recent study by Rizvi and Linehan (Rizvi & Linehan, 2006) found promising results for opposite action with shame but other emotions have not been studied explicitly. Thus, although thoroughly evaluated in efficacy studies, there has been substantially less emphasis on the processes by which treatments produce change and future research must work to narrow this gap.

References

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