FIELD INDEPENDENCE, SOMATIC AWARENESS, AUTONOMIC AROUSAL, AND EMOTION DIFFERENTIATION AS PREDICTORS OF EMOTION REGULATION

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A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Psychology (Clinical Psychology)

Chapel Hill
2008

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Abstract

Carolyn Kanagy: Field Independence, Somatic Awareness, Autonomic Arousal, and Emotion Differentiation as Predictors of Emotion Regulation
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A thread of the growing literature on emotion and emotion regulation aims at understanding the psychological processes an individual uses to regulate emotion, and at identifying what characteristics and abilities are conducive to efficient emotion regulation. These studies have produced a growing list of emotion regulation correlates suggesting that a quality of self-awareness, the tendency to be attentive to self rather than surroundings, the ability to understand one's feelings precisely, and recently the very specific ability to put exact words to one's feelings are all positive predictors of emotion regulation.

This study investigated whether the qualities described by earlier emotion regulation models were, in fact, related to the construct of field independence, a cognitive processing style characterized by the ability to separate and categorize information. We hypothesized that this style might result in an increased ability to describe sensations of autonomic arousal which would in turn predict more precise descriptions of emotional states. We hypothesized that this ability to differentiate emotional states would lead to improved overall emotion regulation as well as some of its subcomponents. In addition, we were interested in whether baseline body awareness was related to autonomic arousal and emotion regulation.

The hypothesized mediational model was not supported; because our measure of autonomic arousal assessed overall intensity rather than differentiation of symptoms, the data could not adequately test the overall model. However, both baseline body awareness and field independence were found to independently predict improved overall emotion regulation and/or some of its subcomponents.

The relationship between field independence and emotion regulation led us to examine the literature on executive attention which we discuss in the context of field independence. In addition, we discuss the implications of meditative practice on both constructs. Our results suggest that there may be multiple routes to emotion regulation.

Future directions might include a cross-sectional comparison of multiple components of attention with field dependence/independence and with emotion regulation in adults. In addition, functional neuroimaging studies comparing field independence and components of attention would be of interest.

Acknowledgments

I owe primary thanks for my survival during this dissertation study to my advisor, Laura Clark. She was willing not only to let me work on a project of my own choosing, but to stay with the project in every way when I chose to work outside her primary area of interest. She has consistently been an inspiration in her willingness to take on and think seriously about a remarkable range of topics, and I could not have completed either of my graduate research projects without her guidance.

I also owe many thanks to Joe Lowman and Erica Wise: To Joe for his willingness to chair my dissertation committee, but more for his continued support, encouragement, and generosity of spirit throughout my graduate career: To Erica for her support and kindness, and for my initial training as a therapist.

I appreciate immensely the willingness of Jesse Prinz and Mitch Picker to stay with this project, to provide feedback and assistance, and to do so with good humor. This has been invaluable.

Finally, I need to thank my younger son, Max Kaufman, for his willingness to be genuinely on my side beyond all expectations. I am forever impressed and forever grateful.

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Introduction

Overview

This study focuses on the relationship between field independence and the ability to regulate emotion. The inspiration for the project came from a clinical observation that clients enrolled in a Dialectical Behavioral Therapy (DBT) (Linehan, 1993) skills training group, all of whom experienced deficits in emotion regulation, reported little or no somatic awareness, or how their bodies "feel" (Moorhead, personal communication, 2005). The suggested relationship between body awareness and emotion regulation prompted interest in developing a somatic therapy. Examination of the emotion regulation literature provided clues that the absence of somatic awareness might be indicative of a style or type of approach to emotion regulation. The current study is designed to provide background for such an intervention by establishing a cross-sectional relationship between this "style" and emotion regulation. Supporting information will include some review of the early literature describing emotion in terms of physiological processes, the resulting divergent trains of thought that generated much of emotion research in the 20th century, and the more contemporary thinking on emotion and emotion regulation. Finally, the recent studies on emotion awareness and emotion differentiation that inspired the current hypotheses are reviewed.

Background and Significance

Early history of emotion as a biological phenomenon. Modern interest in the physiology of emotion began with the ideas of William James in his publication of

Principles of Psychology (1890/1981). James postulated, in his "peripheral theory," that bodily changes occur in response to stimuli, and that the experience of these changes as they occur constitute the emotion. James further believed that the experience of emotion goes no further than this initial experience and that there are no brain centers or circuits other than the sensory and motor cortical areas specifically involved in the experience of emotion. His original theory was modified by his colleague, Carl Lange (1885), who provided detailed descriptions of the physiological changes accompanying what he considered to be the four basic emotions: happiness, sadness, anger, and fear. Lange proposed that two kinds of phenomena accompany all emotion reactions; muscular enervation and vasomotor phenomena, and provided a description of the specific changes in each that occurred with each emotion.

The theory of James and Lange was challenged by Walter Cannon (1927) who questioned the idea that emotion is not processed neurologically; he suggested that physiological response, in particular visceral response, was too slow and insensitive to account for an individual's perception of emotion. Experiments by Cannon and Bard (Bard, 1928, 1929) in which a disinhibition syndrome was observed in animals with cortical lesions, strengthened their argument for a neural circuitry underlying these "sham" emotional responses.

Although interest in the James-Lange theory and in Cannon and Bard's work was not revived until the 1950s, their ideas about emotion-specific physiological responses and specific neural circuits involved in the processing of emotion have been driving forces in the field of research on emotion in the 20th century. The search for specificity of physiological responses spawned numerous studies in which measurements of heart

rate, respiration, and galvanic skin response were monitored under conditions designed to generate emotional response. Initial studies suggested some specificity for negative emotions such as fear and anger (Ax, 1953; Schachter, 1957). Since these earliest measurements much research energy has been focused on describing autonomic nervous system (ANS) specificity, particularly for negative emotions. Overall, there is good evidence for some specificity in cardiovascular changes; for example, heart rate acceleration is associated with anger (Frijda, 1986; Roberts & Weerts, 1982), fear (Bugental & Cortez, 1988; Waters et al, 1989), and sadness (Schwartz et al., 1981), but disgust is associated with heart rate deceleration (Hare et al., 1971; Klorman & Ryan, 1980). Peripheral vascular differences have also been recorded; although both fear and anger are associated with increase in skin temperature and diastolic blood pressure, the increases are consistently smaller for fear than for anger (Graham, 1962; Roberts & Weerts, 1982; Schwartz et al., 1981).

Despite these apparent overall trends, Lacey et al. (Lacey et al., 1953; Lacey & Lacey, 1958) found physiological patterns to be more characteristic of an individual than between two people. Furthermore, ANS patterns during fear, anger, and sadness appear to differ depending on the source used to induce the emotion; real-life fear generated by reading Poe's "The Fall of the House of Usher" in a darkened room produced a statistically different autonomic profile than did a task in which subjects were asked to speak about a frightening personal event (Stemmler, 1989). Finally, no systematic, replicable differences that distinguish between positive and negative affect have been reported (Watson et al., 1999; Lang, 1995). For example, happiness produces heart rate acceleration and increased skin conductance increase which are similar in direction but

smaller in amplitude than the changes seen in fear (Levenson et al, 1990), and increase in finger temperature which is much smaller in amplitude to that observed in anger (Ekman et al., 1983). ANS response to positive emotion has been traditionally difficult to detect under laboratory conditions, largely because positive emotion is difficult to generate. For this reason, most laboratory study has focused on negative emotion. General consensus is that there exists some emotion specificity in ANS response, although differences of opinion about the magnitude continue to exist (Davidson et al., 2000). Levenson (1992), a champion of the concept of ANS specificity, pointed out that ANS specificity does not require demonstrating that every emotion has a unique "ANS signature," but only that some emotions differ from others in consistent ways.

The difficulty in reproducing reported physiological responses between individuals led to an interest in the perception of bodily change. Measures were developed in which a subject was asked to describe in some detail the levels of a wide range of physiological changes during the experience of a given emotion (Malmo et al., 1950; Mandler & Kremen, 1958; Mandler et al., 1958). These studies focused on personal awareness of physiological activity, and attempted to correlate these perceptions with actual physiological measurements of arousal. Their results suggested that individuals with higher levels of autonomic response, generally heart rate and galvanic skin response, tended to be more aware of physiological change. These results have not been reproduced consistently. The question of whether greater reported physiological response was due to a lower feedback threshold for this physiological activity or to cognitive factors leading to an increase in awareness of change raised some of the first

questions about the validity of self-report, and a concern with what was being measured during these experiments (Shields & Stern, 1979).

The difficulty inherent in studying emotional responses may also relate to factors other than differences in physiological perception. For example, a given stimulus may not elicit the same emotional memory (therefore physiological response) in two subjects (Sutton et al., 1997). Even the use of emotion words is acknowledged to be problematic since a given word may have different meanings for different individuals (Davidson & van Reekum, 2005; Kagan et al., 1988; Lang et al., 1993). Sometimes misreporting occurs for reasons unrelated to the use of emotion words or physical perceptions; for example, distortions in retrospective affective evaluations are common. Two studies showed that individuals who were asked how nervous they had been during the past month were likely to place more emphasis on information about a peak episode of nervousness rather than to consider the entire period. (Kahneman 1999; Schwarz & Strack, 1999). Finally, Davidson (2004) points out that the assumption that emotions are conscious feeling states is likely to be erroneous, and that like all human mental processes, emotions are likely to be only partially accessible to conscious awareness.

The study of ANS arousal, whether by physiological measurement or self-report measure, continues to be subject to ambiguity, and the search for assessment measures and methods for generating emotional response in a laboratory has generated a large literature. Because there are no methods available for the direct physical measurement of perception of physical sensation or for perception of emotional processes, research continues to rely at least partially on self-report. Two measures were recently developed that involve clinician inference based on subject performance or clinical interview; the

Levels of Emotional Awareness Scales (Lane et al, 1990) and the Affect Regulation and Experience Q-Sort (Westen et al., 1997). Although time-consuming and with potentially limited reliability, these instruments suggest that efforts are being made to resolve the self-report-of-emotion problem. The choice of measures is a source of concern in all studies of emotion including the present study; these concerns will be specifically addressed below.

The contemporary line of research on physiological feedback in emotion that most resembles James's original theory is the self-perception theory of Bem (1972), who hypothesized that feelings are generated in response to emotional behaviors. Bem suggested that we observe our own behaviors as does an outsider, and must thus "infer" our feelings from these behaviors. Early studies by Laird (1974, 1967) demonstrating induced feelings of happiness and anger in response to manipulated facial expressions are consistent with Bem's model; since that time, numerous studies have been published in which emotional states have been induced by manipulations of expressive behaviors such as facial expressions (Duclos & Laird, 2001; Levenson et al., 1990), postures (Flack et al., 1999) , patterns of gaze (Williams & Kleinke, 1993), tone of voice (Hatfield et al., 1995; Siegman & Boyle, 1993), gestural movements (Brinol & Petty, 2003; Forster & Strack, 1998), and breathing patterns (Philippot et al., 2002). Manipulation of emotion has additionally been achieved by suppression of expressive behavior (Laird et al, 1994), although this technique sometimes has the effect of moderating only physiological responses like heart rate and skin conductance (Gross, 1998; Gross & Levenson, 1993).

Although these studies give evidence that feedback from certain body poses causes autonomic change, Ekman (1992) contends that this autonomic response likely

comes from neural circuitry receiving efferents from the facial muscles and should not be considered an emotion-specific response from the peripheral nervous system. The current thinking expressed by some, but not all, researchers on the subject of behavioral feedback is that differentiation of emotions likely takes place largely in central neural circuitry, although peripheral feedback may have a role in modulating emotional intensity (Cacioppo et al.,1993; LeDoux, 1994; Leventhal & Tomarken, 1986).

Neural circuitry underlying emotion. During the search for autonomic specificity of emotions, the famous studies by Schachter and Singer (1962) introduced the concept of cognitive appraisal. The authors demonstrated that the physiological changes produced by injections of norepinephrine produced different emotions, depending on what information the individual subjects had prior to the injections. The authors generalized these results to conclude that initial physiological reactions were nonspecific and that cognitive appraisal of a given situation was responsible for the specificity of emotional response. Although the studies were shown to be flawed, the concept of cognitive appraisal as a component of emotion became incorporated into mainstream thinking.

Affective neuroscience, describing the relationship between specific areas of the brain and emotion, has developed rapidly during the past 30 years. The field has produced a model of a neural circuit that explains the cognitive appraisal described by Schachter and Singer as a component in the modulation of physiological response. Critical components of this circuit are areas of the prefrontal cortex and the amygdala.

Although the role of the amygdala was first thought to be in the establishment of conditioned fear, recent evidence suggests its involvement in recognition of facial

expressions of fear (Adolphs et al., 1995, 1996, 1998; Broks et al., 1998), recognition of vocal fear and anger (Scott et al., 1997), aversive gustatory and olfactory stimuli (Zald et al., 1997, 1998), and response to unconscious exposure to fearful face masks (Whalen, Rauch, et al., 1998). The amygdala is currently believed to automatically initiate physiological arousal in response to stimuli that evoke previously learned negative affect (Davis, 1992; Kesner, 1992). For example, studies in rats have shown that when auditory information associated with being shocked is delivered via the thalamus to the amygdala, an immediate conditioned fear response is initiated. This response occurs when projections from the amygdala to the hypothalamus and brain stem stimulate subsequent autonomic arousal (Petrovich et al.,1996; Savander et al., 1995). Tucker et al. (2000) also provided evidence that the amygdala functions to increase allocation of attention to external stimuli, and is instrumental in modulating sensory systems for processing incoming sensory information. Finally, rapid habituation of the amygdala's response to aversive stimuli suggests that its function in the processing of emotion is time limited (Breier et al., 1996). Given that the bulk of data on the amygdala has been concerned with negative emotion, the question remains whether it is involved in the processing of all emotion, or just negative affect.

Direct evidence for involvement of the prefrontal cortex (PFC) in emotion processing was observed initially in rats with medial prefrontal lesions. These animals showed dramatically slower extinction of a learned aversive response compared with controls (Morgan et al., 1993). The authors of this study inferred a descending pathway between the medial PFC and the amygdala that is inhibitory and represents a component of extinction. In the absence of this inhibitory input, Morgan et al. postulated that the

amygdala remains active and that stimulus of the autonomic nervous system continues.

The composition of the PFC/amygdala circuit have been studied extensively since Morgan's first observations (see, for example, Miller & Cohen, 2001). Briefly, for the purposes of this study, the circuitry suggests that the following train of events may resemble the initiation and moderation, in keeping with the appraisal model, of the physiological response of a given emotion. Sensory perception of an initial stimulus, arriving via the thalamus at the amygdala, is interpreted based on earlier aversive conditioning. An initial physiological response is generated from the amygdala via the brainstem and hypothalamus which results in autonomic stimulation. This is a subconscious process. Cognitive appraisal of the context of the stimulus results in efferent signal from the PFC to the amygdala which serves to modulate the amygdalar signal generating arousal. This modulated signal then results in the pattern of autonomic response characteristic of the given emotion (Ohira, 2004).

The prefrontal/amygdalar circuit has been studied extensively during the past two decades and is now believed to consist of two partially separable circuits which likely moderate positive and negative affect respectively. This hypothesis stems from early studies of patients with unilateral prefrontal cortical damage that indicated a relationship between incidence of depressive symptoms and left-sided damage (Morris et al, 1996; Robinson et al., 1984). The interpretation of this data was that depressive symptoms are increased upon left prefrontal damage because this area participates in a circuit involved in positive affect, and diminished capacity to experience positive affect is considered to be a hallmark feature of depression (Watson et al, 1995). This concept was tested initially by Davidson et al. (1990) who demonstrated that laboratory-induced disgust and

fear increase relative right-sided prefrontal and anterior temporal EEG activation, whereas induced positive affect produces an opposite (left-sided) pattern of asymmetric activation. Similar results for generation of negative affect have been observed by others (Ahern & Schwartz, 1985; Tucker, 1981).

Stronger forms of negative affect have been induced in clinically anxious patients by presenting them with specific types of stimuli known to provoke their anxiety. Davidson et al. (2000) produced large increases in right-sided anterior EEG activation in social phobics who anticipated making public speeches, and Rauch et al. (1997) reported on the use of Positive Emission Tomography (PET) to observe similar right-sided increases among provoked subjects with a variety of anxiety diagnoses. Although Davidson et al. (1990) reported a relationship between induced positive affect and relative left-sided prefrontal activation (above), less evidence is generally available on the subject of positive relative to negative affect. This is attributed both to the aforementioned difficulty of eliciting positive emotion in the laboratory, and to "negativity bias," the general tendency for organisms to react more strongly to negative than positive stimuli (Cacioppo & Gardner, 1999; Taylor, 1991).

The differences in EEG signal level between left and right hemispheres have also been found to relate to affective style. Tomarken et al (1992) found that EEG activation asymmetry patterns in adults are stable over time. Large individual differences in the magnitude and direction of baseline asymmetric activation in EEG activity were observed in both infants (Davidson & Fox, 1989) and adults (Davidson & Tomarken, 1989.) In adults, these differences in symmetry have been found to predict dispositional mood (Tomarken et al., 1992), self-report measures of behavioral inhibition (Sutton &

Davidson, 1997), repressive defensiveness (Tomarken & Davidson, 1994), reactivity to positive and negative emotion elicitors (Wheeler et al., 1993), baseline immune function (Kang et al, 1991), reactivity of the immune system to emotional challenge (Davidson & Rickman, 1999), and the magnitude of recovery following a negative affective stimulus (Larson et al., 1998). This last result has generated much interest, with the speculation that left prefrontal activation may result in inhibition of the amygdala; thus reducing overall affective reactivity (Davidson, Marshall et al., 2000).

This wide array of behavioral characteristics predicted by patterns of asymmetry, coupled with their temporal stability, suggests that many of these behavioral patterns might be traitlike and resistant to change. This presents challenges to the development of interventions related to regulation of mood and affect. Thinking anatomically, one might wonder where in these circuits there exists the plasticity necessary for change. Recent evidence of molecular modifications to the amygdala with acquired aversive learning suggest that this is a site of potential change (Schafe et al., 1999; Weisskopf & LeDoux, 1999.) However, the study of plasticity in emotion regulation has been confined largely to animals and has focused on early development. One study, described in some detail below, (Davidson et al., 2003), has demonstrated a mindfulness training intervention that appears to produce change in prefrontal asymmetry; this suggests that the prefrontal area is also a site of plasticity and that other therapies aimed at such modifications might be possible.

Psychological approaches to emotion and emotion regulation. Concurrently with the physiological approach to emotion and its regulation has been the development of psychological perspectives. Modern theories on emotion regulation began with

Freud's concept of defenses against anxiety and included such techniques as avoidance and suppression of impulses (Freud, 1926/1959). Treatment consisted of learning new ways to regulate anxiety through corrective experiences in which the feared consequences of impulse expression do not materialize (Basch, 1976). In contrast to this early psychodynamic perspective, the first cognitive approach was the stress and coping tradition which introduced the concepts of primary appraisal (of the stressor), secondary appraisal (of the capacity to respond) and response (coping) (Selye 1956, 1973). Ultimately, distinctions were made between types of stressors and types of coping responses such as "problem-focused coping," aimed at solving problems, and "emotion-focused coping," aimed at lessening negative emotion experience (Folkman & Lazarus, 1985).

The present study utilizes components of the physiological approach to emotion regulation described earlier as well as more contemporary perspectives, which are reviewed briefly here. The current literature on emotion distinguishes between emotion, emotion regulation, affect, mood, and stress responses. The definition of emotion used here is that it serves to coordinate diverse response systems, and to help individuals respond to important challenges or opportunities (Levenson, 1994). The example often cited is fear; with the experience of fear, muscles are primed, senses are sharpened, and the cardiovascular system provides increased oxygen and energy. General characteristics of an emotional experience are that it is short-lived and entails changes in subjective experience, expressive behavior, and central, autonomic, and endocrine response systems (Lang, 1995). Emotion is distinguished from mood (periods of longer duration) (Scherer, 1984), and the terms "affect" and "emotion" are often used interchangeably, as they will

be here. Finally, a recent but widely used model of emotion describes it as being two-dimensional in that its subjective experience includes valence (pleasantness or hedonic value; i.e. how good or bad) and arousal (specific bodily activation) (Barrett., 1998).

Interest in the subject of emotion regulation deficit has multiple sources; emotion dysregulation has been implicated in most Axis II disorders (Gross & Munoz, 1995), substance abuse (Hayes et al., 1996), generalized anxiety disorder (Mennin et al., 2002), and post traumatic stress disorder (Cloitre, 1998). However, the work of Linehan (1993) describing emotion dysregulation as underlying the development of borderline personality disorder has provided the most comprehensive understanding of the phenomenon. Her descriptions of the self-destructive behaviors adopted by individuals attempting to regulate their emotions has been empirically validated (Briere & Gil, 1998; Gratz, 2003) and has made clear both the seriousness of the problem, and the extent to which it extends beyond the realm of persons with borderline personality disorder.

Although, as described above, earlier attitudes towards emotion regulation focused largely on the control of negative feelings, emotions regulation is now loosely defined as a conscious or unconscious attempt to modulate the subjective experience of emotion (Cortez & Bugental, 1994; Garner & Spears, 2000; Zeman & Garber, 1996). A still broader approach suggests that emotion regulation is not synonymous with emotional control and that it properly involves the ability to experience and differentiate a range of emotions, to understand and evaluate them, and to respond appropriately (Cole et al., 1994; Pavio & Greenberg, 1998; Thompson, 1994). Two recent studies demonstrated that regulating emotion by control of experience (avoidance) and suppression of expression, correlate with increased likelihood of psychological disorder (Hayes et al,

1996; Stewart et al., 2002). Gross & Levenson (1997) demonstrated that instructions to constrict or conceal expression of emotion increased physiological arousal. These and other results suggest that attempts to control without accepting or understanding emotions may be detrimental to the process of regulation (Linehan, 1993; Cole et al, 1994). Futhermore, adaptive regulation is considered by some to involve modulating an emotion rather than eliminating it; the goal then becomes reduced arousal such that behaviors can be controlled in the presence of negative emotions (Linehan, 1993; Melnick & Hinshaw, 2000).

A recently-developed assessment tool that reflects this current thinking of emotion regulation as a complex and largely conscious process is the Difficulties in Emotion Regulation Scales (DERS) (Gratz & Roemer, 2004). The measure was initially developed for use with patients diagnosed with Borderline Personality Disorder in order to describe the complexities of their deficits in emotion regulaton. Factor analysis of the measure has identified six subscales: (1) Nonacceptance of emotional responses, (2) Difficulties engaging in goal-directed behavior, (3) Impulse control difficulties, (4) Lack of emotional awareness, (5) Limited access to emotion regulation, and (6) Lack of emotional clarity. Dysregulation is conceptualized here as a multi-faceted process, and the suggestion is that emotion regulation difficulties may occur for a number of reasons. Examination of individual items suggests that some subscales (1 and 5) relate largely to cognitive appraisal or cognitive style, another (6) may relate significantly to awareness of physiological arousal, and some (2, 3, and 4) may relate to both. This represents a departure from earlier measures that examined more traditional subconscious defenses or, alternatively, the suppression of negative affect.

Using a slightly different model, Gross's 1998 review of contemporary work on emotion lists five methods by which an emotion may be consciously regulated: (1) prior to an eliciting event, i.e. situational selection, (2) situational modification; analogous to solution-focused problem solving, (3) attentional deployment, seeking to redirect attention in the face of an emotion-arousing stimulus, (4) cognitive reappraisal, described earlier as reassessment of the situation based on information available, and (5) response modulation or influencing emotion response tendencies once they arise. Cognitive therapies work at helping individuals learn to reappraise situations in order to reduce emotion intensity; behavioral therapies teach individuals to choose their situations differently, change situations that generate negative emotion, and reduce the intensity of already-generated emotions with a variety of physiological techniques.

This study focuses on an aspect not addressed by Gross but which is engaged by the Gratz & Roemer measure; that is, the possibility of modification of the specific awareness of physiological arousal. We assume that identification and labeling of an emotion based on its physiological arousal pattern is not a given, that this is in fact a variable that affects an individual's ability to identify his emotion, and that it is subject to individual differences. It is our belief that awareness of autonomic arousal, and the ability to differentiate states of autonomic arousal are essential for the accurate perception of emotion, and that a more accurate perception of emotion informs the conscious emotion regulation process. The individual components of the pathway between autonomic arousal and emotion regulation are described in the literature and discussed below. We will propose that an additional variable be involved in the sequence, specifically that the cognitive dimension of field dependence/independence is a factor

affecting the awareness of emotional states, and is thus related to some of the conscious processes of emotion regulation. Because our interest is in a sequence of variables, progressing from field independence through emotion awareness to emotion regulation, the current state of thinking on these individual components is briefly reviewed here.

Somatic awareness and emotion. Although there exists an extensive literature on somatic sensitivity in some anxiety disorders (e.g., Fergusen et al., 2006; Hoehn-Saric et al., 2004; Lenze et al., 2005), and somatic sensitivity relative to pain and symptom reporting, the relationship of general somatic awareness to emotion and emotion regulation has received relatively less attention. A search of the current literature for measures of somatic awareness produces studies of "objective" body awareness, that is, perception of how one's body might be perceived by others or, alternatively, satisfaction with one's own body (Lindberg et al., 2006; McKinley & Hyde, 2006; Pingitore et al., 1997). This literature has doubtless appeared in response to the vast increase in the cases of eating disorder during the past two decades. However, in the study of somatic awareness and emotion, there has been little in the way of development of new measures for their assessment.

A few studies, however, have examined the relationship between resting body awareness, and body awareness during emotional arousal. Shields and Simon (1991) examined the relationship between self-report of somatic arousal during emotion and self-report of somatic awareness during non-emotional states. Perception of arousal within a given individual correlated more highly between different emotional states than between any emotional state and the nonemotional, resting state. Although non-emotional body awareness correlated positively with somatic awareness during emotion

change, the correlation was small, and the authors speculated that another factor was involved during emotional arousal. Pennebaker and Epstein (1983) observed low concordance between attentiveness to low levels of physiological arousal and to high levels of arousal during emotion. Blaskovich and Katkin (1983) similarly found little relationship between awareness of physiological emotional arousal and detection of body symptoms in a nonemotional state; these authors concluded that self-reported physiological arousal accompanying emotion is colored by beliefs about the symptoms and the emotion itself. Pennebaker and Skelton (1981), in an experiment in which subjects were given suggestions about what sensations to expect, found that individuals selectively encode some internal sensations and filter out others consistent with their hypotheses. The authors point out that selective filtering of external stimuli has been demonstrated as well and that these results lend credence to the idea that self-report of physiological emotional arousal may have limited reliability. Thus although the relationship between body cues and emotion has been established, the above results suggest that body awareness during emotional arousal differs from baseline body awareness, or that other, unidentified factors may be involved.

Recent research has focused less on somatic awareness and more on other properties of emotional arousal. A hypothesis which has received much support is that the ability to differentiate emotions, that is, to precisely distinguish one emotion from another, is essential for some aspects of conscious emotion regulation. Sources of emotion differentiation have been addressed in the recent literature.

Emotion differentiation and emotion regulation. Emotion differentiation is defined as the ability to clearly distinguish one emotion from another; to be able to recognize and state one's feelings precisely. The extent to which one generally differentiates between emotions is considered to be a traitlike quality with wide individual variability. For example, in repeated measures studies of individuals' reports of affective experiences, some subjects consistently show low correlations between such negative emotions as sadness, anger, and apprehension, suggesting that they perceive them differently. At the other extreme is the subject who describes his feelings in a nearly undifferentiated manner along a positive/negative continuum, stating, for example, that he feels "just awful". Even within a given individual, increased emotional intensity is associated with less emotion differentiation (Feldman Barrett et al., 2001). Individuals who show high levels of emotion differentiation tend also to have more information about their emotions; specifically, they are more likely to be aware of the cause, context, physiological symptoms, and potential means of regulation of an individual emotion than an individual with a lower level of differentiation (Mesquita & Frijda, 1992; Schwarz & Clore, 1983; Shweder, 1993). Conversely, undifferentiated feelings assigned only a valence (positive or negative) and intensity provide the individual with little information about how best to deal with the emotion and the circumstances causing it (Schwarz & Clore, 1983, 1996).

Studies of mood differentiation are limited but informative. Swinkels & Giuliano (1995) studied individuals they called "mood labelers" those individuals more able to precisely define their moods, and "mood monitors" those individuals more likely to monitor the intensity of their moods. They found that mood labelers tended to seek and

like social support, were more likely to be extraverts, to experience positive affect, had higher levels of self-esteem, experienced diminished social anxiety, and reported more life satisfaction. Mood monitors, conversely, reported more intense affective states, stated that their moods affected their behavior adversely and that they had poor success regulating their moods. In an earlier study, they had found that scores on the Beck Depression Inventory were negatively predicted by mood labeling, while reported ability to regulate negative mood was positively predicted by mood labeling. (Swinkels and Giuliano, 1992). These results are consistent with the concept of precise mood labeling being positively related to the ability to regulate mood.

Feldman Barrett et al. (2001) examined the relationship between emotional differentiation and emotion regulation by evaluating subjects' emotion journals for levels of emotion differentiation; this level of emotion differentiation was then compared to self-reports of emotion regulation. They found that emotion differentiation correlated significantly with regulation for negative but not for positive emotion, and pointed to the results of Schwarz & Clore (1983) suggesting that in our culture, negative emotions are more subject to regulation than are positive emotions. The authors related their results first to the "affect-as-information" perspective which states that specific emotional states are less subject to misattribution errors (Keltner et al, 1993; Schwarz, 1990; Schwarz & Clore, 1996). Specifically, discrete emotions, unlike global states, are typically associated with identification of a causal object (Russell & Feldman Barrett, 1999) which, as suggested above, is likely to be useful in the process of emotion regulation (Schwarz & Clore, 1983; Mesquita & Frijda, 1992.)

An exception to the positive relationship between emotion differentiation and emotion regulation has been observed in individuals with generalized anxiety disorder (GAD). Current thinking on GAD suggests that it may be rightfully classified as a disorder of emotion regulation (Mennin et al., 2005; Turk et al., 2005); however, Novick-Kline et al. (2005) recently demonstrated that individuals diagnosed with GAD showed higher levels of emotion awareness/differentiation than controls. This is inconsistent with the generally accepted model of poor emotion regulation relating to poor emotion differentiation, and the authors suggest that this anxiety disorder may result from a different or more complex form of emotion dysregulation. For this reason, anxiety will not be a focus of the present study.

The above studies suggest that the ability to precisely identify emotional states may be useful in the process of regulating these emotions, but they do not address the sources of the wide range of individual differences seen in this ability. Given that perception of physiological arousal has been identified as instrumental in generating emotion, an examination of individual differences in these somatic perceptions and how they relate to emotion awareness may be informative. Specifically, the question arises whether differentiation of emotion relates to either differentiation of or sensitivity to somatic cues.

Models of Emotional Reaction, Awareness, and Regulation

Somatic awareness and attention to internal cues. The modest relationship between general baseline body awareness and awareness of physiological arousal in emotion (Shields & Simon, 1991) was described earlier. How and to what extent an individual attends to and perceives body cues in the presence of an emotional stimulus

varies widely and is not well understood. The demonstrated relationship between the magnitude of direct measurement of physiological arousal and the perception of that arousal as assessed by self-report has repeatedly been weak (Blascovich, 1990; Blascovich & Katkin, 1982; Pennebaker & Hoover, 1984; Pennebaker & Roberts, 1992). This relationship varies between as well as within individuals; that is, a given individual may be more aware of some forms of physiological arousal (heart rate) than others (blood pressure, sweating) (Katkin et al., 1981; Reed et al., 1990).

A model for explaining individual differences in attention to internal cues has been described by Blascovich (1990). In his biopsychosocial model, he defines a personality dimension at whose extremes are "hypersensitive" and "hyposensitive" individuals. The term "hypersensitive" is used to describe individuals who are specifically sensitive to somesthetic cues, that is, perception of physiological arousal. Hypersensitive individuals are described as those likely to look to internal cues for confirmation of their attributions of arousal, whereas hyposensitive individuals are likely to get more information from external cues. Blascovich postulates that attentional capacity in response to emotion stimuli must be split between internal (somesthetic) and external (environmental) stimuli. He appears to regard this as a subconscious process which is independent of cognitive appraisal. The allocation of attention varies as a function of the relative strength of perception of internal and external cues; these differences are presumably in dispositional sensitivity to somesthetic (body) cues. Blascovich's description of allocation of attention in response to emotional stimuli suggests, consistent with the findings of Shields & Simon (1991), that this attentional distribution may be re-allocated in the presence of emotional stimulus. Thus when

aroused, hypersensitive individuals get relatively more information about autonomic arousal whereas hyposensitive individuals get relatively more information about valence. Blascovich's model does not specify the nature of the arousal information; that is, it is not clear whether his hypersensitive individual has more information about intensity of physical symptoms, specificity of physical symptoms, or both.

In a later study, Blascovich (1992) demonstrated a negative correlation between emotional intensity (in this case, the trait of experiencing emotions intensely) and attention to internal mood states, thus causing him to postulate that emotion intensity may be positively related to external attention. Reisenzein (1994) observed a relationship between emotion intensity and the tendency to view a situation as personally relevant. Results of the two studies suggest that individuals more attentive to external cues should be more likely to judge social (external) situations as personally relevant and thus be more emotionally reactive to their environment (Frijda, 1986; Reisenzein, 1994). Similarly, Larsen & Diener (1987) corroborated these findings in an independent study demonstrating an association between the tendency to experience affect intensely and a tendency to be emotionally responsive to cues from the environment. Together, these studies suggest that individuals who are attentive to external cues tend both to be emotionally responsive to these cues, and to experience emotion intensely.

The appearance of Blascovich's model was followed by a number of studies aimed at further describing the nature of attention paid to both internal (somatic) and external cues during emotion formation. A concept of affect as being a two-dimensional construct was initially developed by Reizenstein (1994) and Russell (1989) and has more recently been studied by Feldman (1995). The dimensions of valence and arousal are

described as being subjective perceptions with valence being "the hedonic quality of pleasantness associated with emotion" and arousal as "the perception of arousal associated with such an experience." The terms "valence focus" and "arousal focus" were proposed to reflect the degree to which different individuals incorporate the subjective experience of valence and arousal into their emotional experiences (Feldman, 1995). Individuals high on arousal focus are those with a tendency to attend to internal sensations, while those high on valence focus are those with a tendency to attend preferentially to the pleasant or unpleasant aspects of an affective experience. This new terminology suggests a restructuring of Blascovich's model; although his "hypersensitive" individuals are described by the two-dimensional model as those high in arousal focus, his "hyposensitive" individuals, focused on external stimuli, are reconceptualized by the two-dimensional model, as being high in valence focus (perception of and attention to intensity). The difference between the two models lies in their identification of the "core" trait of individuals low in arousal focus; one model posits this trait as valence focus, or attention to emotion intensity; the other model suggests that the core trait, interpreted as valence focus in the first model, is actually attention to external cues. The focus of these studies has been on the precise nature and consequences of diminished attention to internal states. Some discussion of the implications for internal focus is presented below.

Information about internal states and emotion differentiation. Because the literature has suggested that differentiation of emotional states is positively correlated with some aspects of conscious emotion regulation, we describe here the aspects of somatic arousal experience that might relate to this process. Only two studies were found

demonstrating a relationship between attention to body cues and differentiation of specific emotional states. Feldman (1995), in a study of 24 undergraduates, demonstrated relationships between the extent of valence focus (i.e., the ability to differentiate between different levels of positive or negative feeling), extent of arousal focus, (ability to differentiate between and describe different levels of physiological arousal) and self-report of anxious and depressed mood. She found that individuals vary in the degree to which valence and arousal are components of their mood ratings (i.e. that ratio of valence content to arousal content varies), and that the ability to distinguish between depressive and anxious symptoms was positively related to focus on both valence and arousal, that is, minimal levels of both types of awareness were required. In attempting to explain these results, Feldman cites Blascovich's model (1992), which posits that those individuals with sufficient arousal focus (those higher in "hypersensitivity" or somesthetic awareness) would be more likely to distinguish between two negative (similarly valenced) emotional states. In her study, differentiating depression from anxiety requires, in addition to acknowledging negative valence, the distinction between an increase or a decrease in level of specific aspects of autonomic arousal.

Parkes (1981), in an earlier study, had made a similar point by correlating field independence with the ability to distinguish between symptoms of depression and anxiety, although not with overall affect intensity. The constructs of field dependence and field independence, discussed in more detail below (Witkin, 1950), stipulate that a field independent individual has the quality of being able to "differentiate" perceived information. Thus Parkes's field independent subjects, better able to distinguish internal

from external cues and presumably between internal states, were similarly better able to distinguish between two negative emotional states.

Field dependence/independence. An interesting finding from the research on manipulation of facial expressions discussed earlier is that these behavioral manipulations affect the emotional responses of only a portion of the population. Examination of individual differences suggested that those people who were emotionally responsive to their own behaviors were those who were focused on their own bodies and personal cues as opposed to situational cues (Duclos & Laird, 2001; Flack et al., 1999; Kellerman et al., 1989; Williams & Kleinke, 1993). Laird, in attempting to devise a method for screening these individuals for experimental purposes, found that measures of self-consciousness, self-monitoring, internal/external locus of control, and body consciousness all failed to correlate with the behavior, although body consciousness measures produced "parallel" results. He found, however, that the emotional response to imitation behavior correlated best with field independence as measured, optimally, by the rod and frame test and alternatively by the embedded figures method (James Laird, personal communication, 2006).

The concept of field dependence/independence was first articulated by Herman Witkin, whose interest was in understanding how individuals orient themselves in space. His initial study required that subjects in a darkened room orient a luminous rod to the vertical when the rod and a surrounding luminous frame were tilted. He found that two extremes of perceptual orientation could be identified; one group, which he described as field-dependent, used the frame or external visual cues to orient the rod, while the other, field-independent group, relied more on internal or proprioceptive cues and moved the

rod closer to true gravitational vertical (Witkin, 1948). Witkin's initial interpretation was that these two groups differed in "the extent to which the organization of the prevailing field dominates perception of any of its parts" (Witkin et al., p. 8, 1971). Two other measures were developed for the assessment of field dependence/independence. The Body Awareness Test (BAT) (Witkin, 1949) requires that a subject orient himself to vertical in a tilted room and the Embedded Figures Test (EFT) (Witkin, 1950) requires that a subject differentiate a simple geometric figure from a more complex drawing in which it is embedded. Results of these measures were found to correlate highly with results of the Rod and Frame Test; the combination of the three has been used as a standard battery for the assessment of field independence.

The description of the field dependence/independence construct has generated a large body of research; what originally appeared as a difference in visual perceptual style has subsequently been shown to correlate with differences in general perceptual style, cognitive style, perception of self, body concept, as well as psychological defenses used (Witkin et al., 1971). Witkin's differentiation hypothesis, which suggests that the tendency of field independent individuals is to differentiate and organize information from all sources, is relevant to this study. He suggests that among the categories of information noticably differentiated by field-independent individuals is body (somatosensory) information, and that field-dependent individuals, by contrast, often have difficulty describing exactly what they are feeling (Witkin et al., 1974). This articulated body concept was demonstrated repeatedly in both children and adults with articulated (field independent) cognitive style: Figure drawings included more detail, more realistic proportions, and greater attempts at role representation relative to drawings

of subjects with a more global (field dependent) style (Karp et al., 1969; Winestine, 1969). Using more experimental means to evaluate the articulation/global difference, Silverman et al. (1961) observed that field independent men show finer 2-point discrimination on the back of a hand than do field-dependent men. Field independent men also tend to show more accurate identification of letters written with a rod on the forehead and dorsum of the hand (Cohen et al., 1962).

The nature of body boundaries as an aspect of body concept was investigated in a study by Fisher and Cleveland (1958). These authors developed a 'barrier index', based on Rorschach content, which expressed the extent to which perceived body boundaries are effective at separating body from environment. Women with high barrier scores were found to be significantly more field independent than those with low scores; the results for men were in the same direction but were less significant.

Relevant to the present study were early concerns that differences seen in the body alignment task (BAT) for assessing field dependence might be a result of body sensitivity rather than differentiation. Witkin & Wapner (1950) demonstrated that tests of body balance and body steadiness, both of which involve use of body cues, had little relation to field independence. They further demonstrated that field independent individuals lost their advantage in the body alignment test when their eyes were closed, and concluded that alignment with the eyes shut depended on body sensitivity rather than differentiation of information which was, in fact, a different construct.

The concept of field independence as a cognitive ability has been advanced by some researchers who observed that field independence correlates significantly with the Block Design and Picture Completion, subtests of the Wechsler Adult Intelligence Scale

(WAIS) although poorly with the overall WAIS score itself (Goodenough & Karp, 1961; Karp, 1963). It has been proposed, however, that the ability to differentiate and categorize information is a component of intelligence, and that field dependence represents a specific deficit.

The field dependence/independence construct has not been prominent as a factor in the study of emotion and emotion regulation. Parkes (1981) noted that field independent individuals, although better able to differentiate symptoms, showed similar levels of pathology (depression and anxiety) as field dependents in a single study. Witkin, in an early review, concluded that the level of psychopathology does not differ as a function of level of field independence, although the nature of psychological disorder does (Witkin et al., 1971). He also points out that individuals at either extreme on the continuum are at higher risk for any psychopathology than individuals with more moderate field dependence (Witkin et al., 1954). The study by Parkes (1981) described above which demonstrated the ability of field-independents to differentiate depression and anxiety, and the finding by Laird (J. Laird, personal communication, 2006) that emotional response to facial expressions correlated with field independence are the only two studies known to this author that specifically mention the construct in relation to emotions. Both studies suggest a relationship between somasthetic perception and the experience of emotion, and both suggest that the tendency to attend to somasthetic cues may be related to field independence.

The hypersensitive/hyposensitive extremes proposed by Blascovich and the more refined valence focus/arousal focus model both have characteristics of the distinction between field independence and field dependence, and it is puzzling why the comparison

is not made in the literature. If an individual's level of emotion differentiation is predicted by field independence, this implies characteristics of cognitive style across a range of functions. This is, presumably, a more complex construct than Blascovich's "hypersensitivity" model or the valence/arousal model of Reisenzein/Russell/Feldman-Barrett. Each approach to explaining differences in types of emotion focus ultimately suggests, however, that this differentiation is a result of increased attention to internal (somatic) information, albeit possibly for different reasons. Blascovich's concept of hypersensitivity is less explicit than the concept of field independence; his description of individuals as being more "attentive" to internal states may or may not include the differentiation of information that Witkin's definition of field independence implies. However, his description of the hyposensitive individual who attends preferentially to external cues resembles Witkin's field dependent individual who attends to external cues and does not differentiate himself effectively from them. The valence/arousal model of Reisenzein/Russell/Barrett comes close to the field dependence/independence model in that it invokes differentiation of internal states; however, this model differs from Witkin's model in its simplification of field dependence to "valence focus." As mentioned earlier, it is difficult to know if any of these constructs best accounts for individual differences observed, or whether the core traits that result in lack of emotional awareness are as yet undefined.

Model for field dependence/independence in emotion regulation. The above review suggests and describes relationships between several of the variables related to emotion regulation. First, the relationship between non-emotional body awareness and awareness of emotional physiological arousal is observed but is modest. Second, the

relationship between emotion awareness and ability to regulate emotion is not simple and suggests that awareness of emotion specificity (emotion differentiation) rather than awareness of emotion intensity is positively related to emotion regulation. Third, it appears that the emotion differentiation necessary for effective regulation may be related to the ability to differentiate somatic information during states of emotional arousal. And fourth, the ability to distinguish the autonomic arousal signals accompanying different emotions may be a traitlike quality independent of overall baseline body awareness. A precise description of the traits has not been established, although the concept of valence focus/arousal focus is the model most recently put forth.

This review is intended to provide background for the study of a model to describe the relationship between field dependence/independence and emotion regulation. Testing of this model was intended to examine the hypothesis that the "attentiveness to internal states" observed to accompany emotion regulation may be a construct which, in fact, resembles field independence. In addition, the study attempted to relate baseline body awareness to emotion regulation; observation of such a relationship would provide a rationale for the development of an intervention to improve body awareness as a means to improve emotion regulation. This has been a popular topic for graduate research; and appears in more dissertations than can be mentioned here. Briefly, however, some topics addressed have been the relationship between somatic awareness and moods (Heberlein, 1988), sensorimotor therapy for treatment of trauma (Ogden, 2003), the effects of a somatic awareness intervention on emotion regulation and golf performance (Bouchard, 2001), and somatic practice for transforming conflict (Deer, 2000). In addition, body awareness training is utilized for fibromyalgia and chronic pain as well as for chronic

aspecific psychosomatic symptoms (CAPS) (Gard, 2005; Kendall et al., 2000; Landsman-Dijkstra et al., 2006).

Mindfulness based body awareness and attention to internal cues. Most relevant to the hypotheses to be presented here, however, are two studies on the effects of mindfulness training. The first study addressed anxiety reduction, and the second investigated the effects of mindfulness on prefrontal EEG asymmetry, which, as discussed earlier, has been related to affect and its regulation. Mindfulness Based Stress Reduction (MBSR) (Kabat-Zinn, 2003) is a method commonly used with considerable success in training individuals to reduce their stress levels; the program includes three components of training: (1) meditation, (2) breathing meditation/awareness, in which the individual is taught to focus on the sound of his breathing, and (3) the body scan; a directed exercise in which the individual listens to a voice directing him/her to mentally scan, over a period of forty minutes, over all parts of his/her body. In a study of 22 medical patients with DSM-III-R-defined anxiety disorders, Kabat-Zinn et al. (1993) were able to demonstrate a significant reduction in level of anxiety following an 8-week administration of the MBSR training; these results were found to persist in significant measure at both 3-month and 3-year follow-up (Miller et al., 1995). In a second study utilizing MBSR, a non-clinical population undergoing 8 weeks of the training was observed to demonstrate a significant shift in prefrontal EEG asymmetry, with a relatively increased left prefrontal signal indicative, in accordance with Davidson's work on EEG asymmetry, of increased positive affect and increased ability to regulate emotion or to cope with stress (Davidson et al., 2003). The concept of mindfulness, as articulated by Kabat-Zinn, refers to the ability to control the placement of consciousness (Kabat-

Zinn, 1993) and is rooted in the eastern Zen tradition. Mindfulness is generally taught using meditative or breathing techniques; the inclusion of body scan is unique to Kabat-Zinn's program and brings to mind questions about the mechanism of action. For example: (1) Are the observed effects a result of the interaction of the three components of the training, or might a single component be effective, in some measure, independently of the others? In the context of the above admittedly sparse literature on the relationship between body awareness and emotion regulation, and the Davidson study showing EEG changes, one might question whether the body scan component of the MBSR package alone might be effective at improving emotion regulation. (2) Does the body scan work by increasing body awareness, or does it simply help the individual diminish his attention to external cues, as do the meditative and breathing exercises? Restated, is the observed clinical effect a general cognitive/attentional effect, or a simply a result of enhanced somatic awareness?

The Present Study

The present study was intended to provide background for the design of a body awareness intervention, and to better understand some of the cognitive basis for attention to internal cues. It examined whether field independence is significant in the process of emotion regulation, and if so, how the relationship might be mediated. The study questions whether the valence/arousal model from the literature might be better described as a field dependence/independence model. Specifically, it asked whether the extent of field dependence/independence is related to the ability to attend to and be aware of body cues in the face of emotional arousal. It examined whether the ability to differentiate states of autonomic arousal was related to the ability to differentiate emotional states.

And it attempted to examine the relationship between differentiation of emotional states and multiple aspects of the emotion regulation process.

Evidence from the literature presented above suggests conflicting evidence on some of these questions. In addition, although numerous studies are cited that examine one or more of the variables included in this study, none includes all steps in the path from field independence to emotion regulation. We will propose a model here to describe a path from field independence to emotion regulation that includes the relevant variables explained above, as well as the relationships between them. Specifically, this model includes: (1) A first step relating field dependence/independence to awareness of autonomic arousal during emotional states. This implies an ability to differentiate and be aware of multiple symptoms of arousal, and is distinguished from simple sensitivity to or awareness of intensity of arousal. (2) A second step relating awareness of arousal during emotional states to awareness (differentiation) of emotional states. (3) A third step relating this awareness and differentiation of emotional states (or lack thereof) to an overall difficulty with emotion regulation.

Given the subscales of the emotion regulation measure, it was thought that emotion differentiation would relate most specifically to two particular subscales; those assessing goal-directed behavior and impulse control. Prediction of these specific relationships was based on suggestions from the literature that precise description of emotions enables precise definition and selection of coping strategies, which implies the ability to concentrate and focus, as well as to apply coping techniques in a goal-directed manner.

Finally we examined the relationship between baseline body awareness and perception of autonomic arousal; although we did not expect body awareness to relate directly to emotion regulation, we anticipated that it might be indirectly related through autonomic perception. We also examined whether field dependence/independence better predicts body awareness or autonomic perception in order to confirm our suspicion that it is the autonomic perception variable that should be included in the mediational model.

Self-report measures of baseline body awareness, autonomic perception of arousal, and difficulties with emotion regulation as well as evaluation by the examiner of measures of field dependence/independence and emotional differentiation were used to evaluate the following hypotheses:

I. I hypothesized that baseline body awareness would significantly predict perception of autonomic arousal.

II. I hypothesized that field independence would significantly predict baseline body awareness.

III. I hypothesized that field independence would significantly predict perception of autonomic arousal and that this prediction would be stronger than the prediction by field independence of baseline body awareness.

IV. I hypothesized that perception of autonomic arousal would significantly predict awareness and differentiation of emotions.

V. I hypothesized that awareness of emotions would be a significant negative predictor of overall difficulty with emotion regulation as well as two of its components, difficulties with impulse control during emotional arousal

and difficulties maintaining goal directed behavior during emotional arousal.

VI. I hypothesized that field independence exerts an indirect and negative effect on emotion regulation difficulty that is mediated by steps III, IV, and V above.

Methods

Research Design

The present study employed a correlational, cross-sectional design in which variables of interest were assessed using observational and self report measures. Observational data was obtained from the evaluation by the examiner of two participant performance measures.

Participants

Participants were taken from a group of 138 undergraduates enrolled in an introductory psychology course at the University of North Carolina at Chapel Hill, who obtained course credit in exchange for their participation in the study. Data from two participants was discarded when it was discovered that they had failed to complete the reverse side of one measure; thus the final N was 136. Individuals currently taking medication for attention deficit disorder were not included in the study given that such medication could have affected their performance on the measure of field independence. This was listed as an exclusion criterion when students signed up for the study. There were 11 males and 125 females ranging in age from 18 to 25 years old.

Measures

Difficulties with emotion regulation. The Difficulties in Emotion Regulation Scale (DERS) (Gratz & Roemer, 2004) (Appendix A) is a 36-item self-report measure designed to assess not only modulation of emotion arousal, but the awareness,

understanding, and acceptance of emotions, and the ability to act in appropriate ways in the presence of strong emotion. The measure is unique in that it imparts a behavioral interpretation to the concept of "emotion regulation," defining it as the ability to behave appropriately in the presence of strong, possibly negative emotion. Factor analysis based on a sample of 357 young adults produced six components of the measure: (1) Nonacceptance of Emotional Responses, reflecting the presence of negative emotion in response to primary emotional responses, (2) Difficulties Engaging in Goal-Directed behavior, reflecting difficulties in concentrating and remaining engaged in the presence of negative emotion, (3) Impulse Control Difficulties, (4) Lack of Emotional Awareness, (5) Limited Access to Emotion Regulation Strategies, reflecting the belief that there is little to be done to regulate emotions once an individual is upset, and (6) Lack of Emotional Clarity, reflecting the extent to which individuals are aware of which emotions they are feeling. Individuals are asked to rate each item on a 5-point Likert-type scale describing the frequency with which they experience a given thought or feeling related to their emotions (e.g., "I know exactly how I am feeling," "When I am upset, I become angry with myself for feeling that way"). Items are scored in the directions suggested by the individual wordings. A positive score on any subscale or the overall measure is an indication of difficulty with emotion regulation.

Psychometric properties of the measure are good. Internal consistency for the individual subscales was adequate with Cronbach's $\alpha > .80$ for each subscale. Construct validity was examined by calculating correlations between the DERS and its individual subscales with the Generalized Expectancy for Negative Mood Regulation Scale (NMR, Catanzaro & Means, 1990), the Emotional Expressivity Scale (EES, Kring et al., 1994),

and the Acceptance and Action Questionnaire (AAQ, Hayes et al., 2004), a self-report measure of experiential avoidance. All correlations were significant and in the expected directions. Predictive validity was examined by evaluating correlations between the DERS and (1) frequency of self-harm, and (2) frequency of intimate partner abuse. The overall DERS score showed highly significant correlations with self-harm in both men and women ($\underline{r}(97)) = .26$ and $\underline{r}(260) = .20$ respectively); the correlation with intimate partner abuse was significant only for males ($\underline{r}(96) = .34$), consistent with expectations. Further support for criterion validity comes from the differential pattern of correlations with the behavioral measures and individual subscales (factors) of the measure; all subscales showed significant correlations with self-harm for women; correlations were less likely to be significant for men. Correlations with intimate partner abuse were highest with the impulse control and goal directed behavior subscales for men, and the impulse control subscale for women. Test-retest-reliability over a period ranging from 4 to 8 weeks was good for the entire measure ($\underline{\rho} = .88$) and adequate for the subscales, ranging from $\underline{\rho} = .57$ to $\underline{\rho} = .89$; all were significant. Psychometric properties of this measure were established with a population of undergraduates as well as a group of individuals between the ages of 18 and 48.

Body awareness. The Body Awareness Questionnaire (BAQ, Shields et. al., 1989) (Appendix B) is an 18-item self-report measure designed to assess awareness of normal body processes not associated with emotion or objective body image. Individual items load onto four factors; (1) awareness of responses or changes in body processes (e.g. “I notice differences in the way my body reacts to various foods”); (2) ability to predict body reaction (“I always know when I’ve exerted myself to the point where I’ll be

sore the next day"); (3) awareness of sleep-wake cycle ("I am aware of a cycle in my activity level throughout the day"); and (4) awareness of onset of illness ("I know I'm running a fever without taking my temperature"). Items are rated from 1 ("not at all true about me") to 7 ("very true about me"). Higher scores reflect higher levels of body awareness. The measure is internally consistent (Cronbach's $\alpha > .80$), and has acceptable test-retest reliability ($\underline{r} = .80$). Discriminant validity was demonstrated partially by establishing that the BAQ did not correlate with correlates of a tendency to symptom reporting; specifically trait anxiety, low self-esteem, neuroticism, and hypochondriasis as assessed by the Eysenck Personality Inventory (EPI) Neuroticism scale (Eysenck & Eysenck, 1963), the Rosenberg Self-Esteem Scale (Rosenberg, 1965), the Trait Anxiety Inventory (Spielberger et al., 1970), and the Pennebaker Inventory of Limbic Languidness (Pennebaker, 1982). Furthermore, it did not correlate with the tendency to respond in a socially valued manner, assessed with the EPI lie scale. Convergent validity was demonstrated by correlations with scores on the Public and Private Self-Consciousness subscales of the Self Consciousness Inventory (Buss, 1980; Fenigstein et al., 1975), and Public and Private Body Consciousness subscales of the Body Consciousness Questionnaire (Miller et al., 1981), as well as a separate study comparing BAQ scores between a group of aerobics instructors and a random comparable group of women (Shields et al., 1989). The scale is not correlated with age (initial validation tests included subjects up to 70 years old) and contains no items that are sex, age, or race specific. Authors concluded that the measure is suitable for use in student and nonstudent adult populations.

Perception of autonomic arousal . The Autonomic Perception Questionnaire-Revision (APQ-R) (Shields, 1984) is a self-report questionnaire designed to determine an individual's experience of body sensation during emotional arousal, both quantitatively (how intense, how often) and qualitatively (how many different sensations). The measure is a modification of Mandler et al.'s 1958 measure which was intended to assess awareness of autonomic arousal during anxiety. Shields's modifications include additions of specific items to describe symptoms of both sadness and anger; the 30-item measure used in this study is the same as that used by Shields & Simon (1991), and includes all items from the sadness, anxiety, and anger subscales. Internal consistency for individual subscales was good in Shields's study (1984); Cronbach's alphas ranged from .83 to .89**.** Only the anger subscale was used in this study. The participant was asked to remember a specific instance when he experienced anger, and then to use that description as a standard of reference for rating his or her symptoms on a 9-point Likert-type scale. Items are phrased in sentence form and all begin (for the anger subscale) "When I feel angry (My hands become cold, I feel my heart beat faster….).". The scale ranges from *not at all true about me (1)* to *neutral, not sure (5),* to *very true about me* (9). The measure was scored by summing item values within each subscale.

Level of emotion awareness/differentiation. The Levels of Emotional Awareness Scale (LEAS) (Lane et al., 1990) is an observer-related questionnaire that measures emotional awareness in a manner consistent with the theory of Lane & Schwartz (1987). The content of the measure is such that in order to receive a score suggesting high awareness of emotions, one must also be able to differentiate simultaneous emotions. Thus, although the LEAS assesses emotion awareness, high awareness scores on this

measure also imply emotion differentiation. The original measure consists of 20 hypothetical scenes, each of which is described in two to four sentences, involves two people, and is designed to elicit four types of emotion (anger, fear, happiness, and sadness). The different scenarios are designed to elicit and assess for different levels of complexity of emotional awareness (Lane & Schwartz, 1987); for example, level one scenarios cue for bodily sensations such as the pain when hitting your finger with a hammer. Level two scenarios cue for an action tendency or global arousal such as the reaction to a foreign acquaintance making derogatory remarks about one's native country. Level three scenarios attempt to elicit emotional extremes; an example scenario describes an individual waiting in line at a bank while the person in front of him/her makes a long transaction. Level four scenarios cue for blends of possibly opposing emotions that may be experienced simultaneously, such as a reaction to a friend whom you've told to call anytime calling you in the middle of the night. Level five scenarios call for more complex and differentiated emotion states, such as the reaction one might have if his friend changed his mind about investing in a business venture with him.

After reading a scene, a participant is asked to write a response to two questions: "How would you feel?", and "How would the other person feel?" Responses are scored for each person and for each scene. A Level 0 response is described as a non-emotional response such as a thought or cognitive state without emotional content; for example, "confused." A Level 1 response, suggestive of very low emotional awareness, reflects either an awareness of body sensation or a frank statement of no emotion or of emotional uncertainty ("I don't know what he would feel"). A Level 2 response, interpreted as expressing low emotional awareness, includes undifferentiated emotion words ("I'd feel

bad", or "I'd feel like crying"). Level 3 responses are interpreted as indicating average emotional awareness; they include expressions of differentiated emotion such as "He's really mad" as opposed to "He feels bad". Level 4 responses are composed of two or more distinct Level 3 responses ("I'd feel frustrated, but happy for him all the same"), and are considered to reflect high emotional awareness. Level 5 responses, given when Level 4 scores are given for both "self" and "other" responses, are interpreted to mean superior emotional awareness. High scores from each scenario are summed to generate a possible total score of 100.

Psychometric properties were initially examined in a study of 38 participants. Convergent validity of the LEAS was examined using Pearson product moment correlations with other measures tapping aspects of emotion awareness and expression. Significant positive correlations with the Parental Description Conceptual Level score (Blatt et al., 1979) ($r(38) = .35$) and the Loevinger Sentence Completion Test (Loevinger & Wessler, 1970) ($r(38) = .40$) demonstrate a correlation with measures of emotional complexity. In addition, the LEAS correlated significantly and positively with the Openness to Experience (Coan, 1972) total score ($\underline{r}(38) = .33$). Finally, a comparison with the Differential Emotions Scale (Izard, 1972), demonstrated a highly significant negative correlation with the Denied Emotions subscale ($\underline{r}(38) = -.27$), consistent with the LEAS measuring level of emotional awareness. Discriminant validity was demonstrated by the absence of a significant relationship to either positive or negative emotion subscales of the Differential Emotions Scale, the Manifest Anxiety Scale (Bendig, 1956) or the Marlowe-Crowne Scale of social desirability (Crowne & Marlowe, 1960). The possibility that the LEAS was measuring "verbal productivity" rather than complexity

was ruled out by summing the words across the 20 scenes and correlating with the LEAS score; the correlation was non-significant (r(38) = .12). Interrater reliability, based on twenty protocols scored by two raters, was high (r(20) = .84). Internal consistency, measured by Cronbach's alpha, was .81 (n=35).

The present study utilized a modified form of the LEAS entitled the LEAS-A which included only 10 scenarios but which included the same distribution of levels of complexity of emotion. Although the LEAS was used in its long form in earliest studies, the modified shortened form has appeared in more recent studies due to the length of time required to both complete and score the 20-item measure (Frewen et al., 2008; Subic-Wrana et al., 2005). The psychometric properties of the short form have not been established, but the results observed in both cited studies were significant and as hypothesized (R. Lane, private communication).

Field dependence/independence. The Group Embedded Figures Test (GEFT) (Oltman et al., 1971), modified from the Embedded Figures Test described below, is an 18-item, timed performance test designed to assess an individual's ability to organize and differentiate information in a complex visual field. The task is to visually identify a simple, two-dimensional geometric figure which has been embedded within a larger, complex figure, the design of which has been organized so as to obscure the target simple figure. The participant's score on the test is rate in figures per minute at which the participant identifies the simple figure in the complex background.

The original Embedded Figures Test (Witkin et al., 1971) contained 24 complex figures and 8 simple figures; the complex figures were presented to the subject in series, and a maximum time of 5 minutes was allotted for the location of the given target figure

within the complex field. The procedure for administration consists of presenting the participant with a card containing a representation of a simple target figure, labeled from A through H, for ten seconds. The simple figure is then removed and a complex figure containing it is presented. The amount of time required, up to 3 minutes, for the participant to correctly identify the simple figure in this complex figure and trace it with a stylus is recorded. The final score is the average of the 24 individual times in seconds. High scores are indicative of field independence, low scores suggest field dependence.

Short forms of the EFT have been developed; the EFT A and B versions each contain 12 of the original 24 complex figures and use a 3-minute limit per figure. Reliabilities for the short form of the test were computed using Tryon's variance method and come from comparisons of the 24-items and 12-item tests as well as comparisons of odd and even items. Reliabilities ranged from .79 for female college students, .82 and .85 for male college students, and .90 and .82 for male and female adults respectively (Witkin et al, 1971). Convergent and discriminant validity were demonstrated in several ways; the tests are too numerous to list here, but are cited in Witkin et al, 1974. Specifically: (1) The EFT was demonstrated to relate positively to other tests of perceptual discrimination but not to performance tests which require other skills such as sustained attention, concentration, or verbal comprehension. (2) The EFT was demonstrated to relate to cognitive/intellectual aspects of psychological differentiation. (3) EFT scores were shown to relate to nature of psychological defenses with low scorers more likely to engage in isolation and intellectual defenses while high scorers tended to use global techniques of repression and denial. (4) EFT scores were shown to relate predictably to numerous different forms of psychopathology.

The present study utilized the Group Embedded Figures Test (GEFT), a version of the EFT which was adapted for group administration. The measure was developed with the goal of increasing ease and speed of administration and had been used extensively with both groups and individuals (Oltman et al., 1971). Psychometric properties of the measure have been tested: Internal consistency, test-retest reliability, and both concurrent validity and criterion validity relative to the Rod and Frame Test were found to be acceptable (Kepner & Niemark, 1984; Moran, 1983; Panek et al., 1980; Witkin et al., 1971).

The measure as used in the current study consists of 18 complex figures; in each figure, one of 8 simple figures is buried. Each participant was given a booklet consisting of written instructions; the 8 simple figures are displayed on the back cover of the book, and two complex figures are displayed per page. Participants completed simple practice items individually; this was followed by a 2-minute timed group practice section which included 7 complex figures. When it was established that everyone understood the task, an 18-item timed section was administered. Each complex figures includes a caption that reads "Find simple figure X (where X = figures A through H) in the above figure". Participants were informed that they would be given 7 minutes to find as many simple figures in these complex figures as they could; they were additionally told that they were not expected to complete the measure. Provisions were made for participants who completed the measure before the time limit; they were instructed to raise their hands quietly if they finished before time was called. Participants were sitting in a circle facing outward and were not able to see one another; they were thus unlikely to be aware of one another's performance.

Standard administration of the original GEFT consisted of administering the 18 figures in two different 5-minute timed segments. It was discovered in preliminary sessions of this study, when participants were timed individually, that this population was completing the task in much less time than 5 minutes; thus a 5-minute test session sometimes included considerable downtime and was not representative of time to complete the task. After multiple individual timings, a time of 7 minutes total for the 18 figures was selected as giving optimal spread in performance. This limit was short enough that most participants did not complete the measure, but long enough that most participants got some score. It has been observed elsewhere in the literature that norms for the measure, even within a college student population, have varied. Preliminary norms (Witkin et al., 1971) and those measured five years later (Renna & Zenhausen, 1976), both from smaller liberal arts school in the U.S., showed samples who more field dependent than that observed in 1980 (Carter & Loo, 1980) at a large Canadian university. The authors attributed the difference to cultural changes as well as educational setting. A casual observation of the present study was that most of the very high scores on field independence, expressed as the speed with which embedded figures were identified, were achieved by male students. Cultural differences, specifically time spent playing video games and attending to visual media, may account for this shift in norms, particularly among young males. Data from preliminary sessions was included as these individuals were all timed carefully, and results were reported in figures identified/minute.

Procedure

Participants were seen in groups of 6 to 8 individuals. At the start of the session, participants were informed that the study was concerned with differences in individual experiences of emotion. They were told that the duration of the session would be 1.5 - 2 hours, and that the tasks would consist primarily of pencil-and-paper self-report measures with a single timed task. They were then asked to sign a consent form. Participants were given the Difficulties With Emotion Regulation Scale (DERS) first, followed by the Levels of Emotional Awareness Scales (LEAS-A), the Body Awareness Questionnaire (BAQ), and the Autonomic Perception Questionnaire (APQ). It was explained that the LEAS-A generally produced individual variations in time required to complete the measure, and that they should work at whatever speed felt comfortable. Participants were asked to leave the room when they finished these measures; this provided a break and allowed those who wrote more slowly to complete their tasks without feeling pressured. The last measure administered was the timed Group Embedded Figures Test. Following completion of the last measure, participants were debriefed with the explanation that our interest was in the relationship between field independence, body awareness in different states, and the experience and regulation of emotion.

Statistical Analysis

Data for the study was analyzed using Mplus (Version 4.1), a structural equation modeling software (Muthen & Muthen, 1998-2006). The mediational model proposed was tested using a set of simultaneous linear regression equations representing the individual steps in the mediational pathway. Mplus performs a simultaneous analysis of these regressions and produces a model whose parameters represent overall fit of all

regressions. Output includes regression coefficients, standard errors, and r^2 and p values for each individual step as well as for the overall model. In addition, the bivariate relationships that were proposed independently of the mediation pathway were tested by simple bivariate regressions.

Results

Descriptive statistics for the variables used in the present study are displayed in Table 1. Included are means and standard deviations for the Group Embedded Figures Test (GEFT), the Body Awareness Questionnaire (BAQ), the Autonomic Perception Questionnaire (APQ), the Levels of Emotional Awareness Scales (A) (LEAS-A), the Difficulties in Emotion Regulation Scales (DERS), and the DERS subscales: Clarity (CLA), Limited Access to Emotion Regulation Strategies (STR), Lack of Emotional Awareness (AWA), Impulse Control Difficulties (IMP), Difficulties Engaging in Goal-Directed Behaviors (GLS), and Nonacceptance of Emotional Responses (NAC). The total number of responses in each mean is the same (136) for all but the GEF which was missing for participants 14 and 25. The estimator feature of Mplus, was used to estimate these two values.

This study proposed a number of bivariate relationships which were synthesized into an overall mediational model. This larger model will be discussed first, followed by examination of the individual steps.

Hypothesis VI proposed an overall model relating decrease in field independence (GEFT) to increased emotion regulation difficulty (DERS), suggesting that this relationship was mediated by perception of autonomic arousal (APQ) and emotion awareness (LEAS-A). The model and relevant data are displayed in Table 2. The overall mediational model was not supported ($r^2 = 0.000$, p=.207). Analysis of the individual steps, proposed in Hypotheses III – V provides insight into this overall lack of fit.

Table 1

Means and Standard Deviations for all Variables

Variable	N	Mean	Standard Deviation
GEFT	136	1.623 [a]	0.823
BAQ	136	83.126	14.545
APQ	136	133.199	32.922
LEAS	136	33.235	5.410
NAC	136	12.654	5.326
GLS	136	16.816	9.617
IMP	136	10.390	3.559
AWA	136	12.897	4.043
STR	136	16.721	6.067
CLA	136	10.552	2.870
DERS	136	79.302	17.980

NOTE. GEFT=Group Embedded Figures Test, score represents items identified/minute; BAQ=Body Awareness Questionnaire; APQ=Autonomic Perception Questionnaire; LEAS=Levels of Emotional Awareness Scales; NAC= NONACCEPTANCE subscale of the Difficulties with Emotion Regulation Scales (DERS); GLS = GOALS subscale of the DERS; IMP=IMPULSIVITY subscale of the DERS; AWA=AWARENESS subscale of the DERS; STR=STRATEGIES subscale of the DERS; CLA=CLARITY subscale of the DERS; DERS=DERS total score.

[a] Two missing data points were supplied by Mplus estimator function.

Table 2
Regression Coefficients for the Mediational Model Relating Field Dependence/ Independence (GEFT) to Difficulty With Emotion Regulation (DERS)

β_1GEFT → β_2APQ → β_3LEAS → DERS

Predictor	β	β Std Error	p
GEFT	0.536	3.434	.876
APQ	0.029*	.014	.032
LEAS-A	-0.053	.285	.852

Model: r^2 (3, 132) = 0.000, p = .207

NOTE. GEFT=Field Independence in Figures Identified/Minute as measured by the Group Embedded Figures Test; APQ=Autonomic Perception as measured by the Autonomic Perception Questionnaire; LEAS-A=Emotion Awareness as measured by the Levels of Emotion Awareness Scales; DERS=Difficulties With Emotion Regulation Scales.

* $p \leq .05$

Regression coefficients for the independent variables on one another are displayed in Table 3; this includes field dependence/independence (GEFT), body awareness (BAQ), perception of autonomic arousal (APQ), and emotional awareness (LEAS-A). Data relevant to Hypotheses I, II, III, and IV are contained in this table. Hypothesis I, which predicted a relationship between body awareness and perception of autonomic arousal, was supported: Body awareness (BAQ) was a highly significant predictor of perception of autonomic arousal (APQ) ($t(134) = 3.01$, $p = .003$) such that increased body awareness predicted increased perception of arousal. This relationship was not a part of the overall mediational model, but was included as a possible route to manipulating perception of autonomic arousal, a variable in the proposed mediation pathway.

Hypothesis II was not supported, however, in that field dependence/ independence (GEFT) failed to predict baseline body awareness (BAQ) (Table 3). This hypothesis was not a part of the overall mediational model but was tested in order to determine whether field dependence/independence better predicts baseline body awareness or perception of arousal**.**

Similar to Hypothesis II, Hypothesis III was not supported; field dependence/independence did not predict autonomic perception. The assertion by Hypothesis III that field dependence/independence better predicts autonomic arousal than baseline body awareness is not supported by the data, but is also not directly testable.

Hypothesis IV relating autonomic perception to emotion awareness was supported; data for this bivariate regression is displayed in Table 3. Autonomic perception (APQ) significantly predicted emotion awareness/differentiation (LEAS-A)

Table 3

Coefficients for Regression of Independent Variables, Field Independence (measured by the GEFT), Body Awareness (BAQ), Autonomic Perception (APQ), and Emotional Awareness (measured by the LEAS-A) on one another.

Independent Variable	Dependent Variable	β	β Standard Error	r^2	p
BAQ	APQ	0.568	0.189	0.063	0.003**
GEFT	BAQ	1.444	1.541	0.007	0.349
GEFT	APQ	0.536	3.434	0.000	0.876
APQ	LEAS-A	0.029	0.014	0.032	0.034*
GEFT	LEAS-A	-0.663	0.561	0.010	0.238
BAQ	LEAS-A	-0.045	0.032	0.014	0.159

NOTE. GEFT=Field Independence in Figures Identified/Minute as measured by the Group Embedded Figures Test (GEFT); BAQ=Body Awareness as measured by the Body Awareness Questionnaire; APQ=Autonomic Perception as measured by the Autonomic Perception Questionnaire; LEAS-A=Emotion Awareness as measured by the Levels of Emotion Awareness Scales.

** $p \leq .01$; * $p \leq .05$

df = (1, 134) for all regressions

such that increased autonomic perception predicted increased emotion awareness (t(134) = 2.07, p = .034).

Data relevant to Hypothesis V is displayed in Tables 4 and 5. Hypothesis V proposed that emotion awareness (LEAS-A) was inversely related to overall difficulty with emotion regulation (DERS) as well as to the specific subscales tapping impulsivity (IMP) and difficulties with goal-directed behavior (GOALS). Awareness of emotions (LEAS-A) did not significantly predict difficulty with emotion regulation (DERS) in either a bivariate regression (Table 4), or in a total multivariate regression (Table 5). It did, however, predict impulsivity (IMP) in both the bivariate (t(134) = 2.45, p = .042 (Table 4)) and multivariate (t(131) = 3.39, p = .004 (Table 5)) regressions as hypothesized, and it predicted difficulties with goal-directed behavior (GOALS) (t(131) = 1.78, p = .034 (Table 5)) in a multivariate regression, also as hypothesized. The direction of the predictions was such that the LEAS-A predicted decreased difficulty with impulsivity and goal-directed behavior. Hypothesis IV was thus partially supported in that the LEAS-A predicted the specific subscales suggested by the hypothesis but failed to predict the overall measure.

Exploratory Analyses

Despite failure of the data to support much of what was hypothesized, and, in particular, the concept of a mediational model, several significant and interesting relationships were observed upon exploratory analysis. The results of a multivariate linear regression of the DERS and its subscales on all independent variables (GEFT, APQ, LEAS, and BAQ) are displayed in Table 5. The model includes body awareness (BAQ) despite its not being a part of the proposed model mediating field dependence/

Table 4

Coefficients for Regression of Difficulty with Emotion Regulation (DERS) and DERS Subscales on the Level of Emotional Awareness Scales (LEAS-A)

Dependent Variable	β	β standard error	r^2	p
DERS	-0.053	0.285	0.000	0.852
CLA	0.027	0.045	0.003	0.553
STR	-0.017	0.096	0.000	0.856
AWA	-0.054	0.064	0.005	0.397
IMP	-0.135	0.055	0.042	0.014*
GLS	-0.196	0.152	0.012	0.197
NAC	0.140	0.084	0.020	0.093

NOTE. DERS=Difficulties With Emotion Regulation Scales, total score;

CLA=CLARITY subscale of the DERS; STR=STRATEGIES subscale of the DERS;

AWA=AWARENESS subscale of the DERS; IMP=IMPULSE subscale of the DERS;

GLS=GOALS subscale of the DERS; NAC=NONACCEPTANCE subscale of the DERS.

* $p \leq .05$

df = (1, 134) for all regressions

Table 5

Coefficients of Regression and Overall Model Fits for Multivariate Linear Regression Models: DERS and Subscales of DERS Regressed on Independent Variables (1) Field Dependence/Independence (GEFT), (2) Body Awareness (BAQ), (3) Perception of Autonomic Arousal (APQ), and (4) Emotional Awareness (LEAS-A)

Model Dependent Variable	GEFT β_1 Δr^2 (p)	BAQ β_2 Δr^2 (p)	APQ β_3 Δr^2 (p)	LEAS-A β_4 Δr^2 (p)	r^2	p
DERS	-3.750* .029 (.032)	-.141 .012 (.172)	0.196** .116 (.000)	-.370 .012 (.176)	0.144**	.000
CLA	-0.690* .039 (.015)	-0.033* .025 (.049)	0.025** .121 (.000)	-0.022 .002 (.619)	0.126**	.001
STR	-1.126 .023 (.066)	-0.022 .002 (.549)	0.048** .061 (.003)	-0.095 .007 (.322)	0.084*	.015
AWA	-0.323 .005 (.435)	-0.062** .046 (.010)	-0.001 .001 (.943)	-0.080 .011 (.215)	0.061	.068
IMP	0.107 .001 (.765)	0.001 .000 (.955)	0.025** .018 (.007)	-0.161** .056 (.004)	0.096**	.006
GLS	-1.770 .022 (.066)	-0.054 .006 (.341)	0.072** .025 (.004)	-0.319* .030 (.034)	0.089**	.010

Table 5 Continued

NAC	-1.130*	0.005	0.041**	0.080	.111**	.002
	.030	.000	.057	.006		
	(.032)	(.882)	(.003)	(.333)		

NOTE. DERS = Difficulties with Emotion Regulation Scales, CLA = CLARITY subscale, STR = STRATEGIES subscale, AWA = AWARENESS subscale, IMP = IMPULSIVITY subscale, GLS = GOALS subscale, NAC = NONACCEPTANCE subscale

** $p \leq .01$; * $p \leq .05$

df = (4, 132) for all models

independence and emotion regulation difficulty. The rationale for its inclusion comes from the literature which inspired this study; specifically that body awareness might be related to awareness of autonomic arousal which might, in turn, relate via another pathway to emotion regulation. The combination of all four independent variables significantly predicted 14.4% of the variance in the overall measure of emotion regulation difficulty (DERS) ($p = .000$). Two of the independent variables from the proposed mediation pathway significantly predicted the DERS: Increased field dependence (decrease in GEFT) significantly predicted an increase in emotion regulation difficulty, accounting for 3% of the variance in the DERS above that predicted by the other variables ($\underline{p} = .032$). Increased perception of autonomic arousal (APQ) was a highly significant predictor of increased emotion regulation difficulty, accounting for 12% of the variance in the DERS above that predicted by other variables ($\underline{t}(131) = 3.40$, $\underline{p} = .000$). The direction of this second prediction is inconsistent with the original conception of increased autonomic awareness supporting improved emotion regulation.

The effects of the independent variables on the subscales of the DERS are also displayed in Table 5. Decreased field independence significantly predicted, in addition to the DERS, increased lack of emotional clarity (CLA; $\underline{t}(131) = 2.16$, $\underline{p} = .015$), and increased nonacceptance of emotional responses (NAC; $\underline{t}(131) = 1.87$, $\underline{p} = .032$). Body awareness, not proposed to be a part of the mediational pathway, significantly predicted both the Lack of Emotional Clarity subscale (CLA; $\underline{t}(131) = 1.66$, $\underline{p} = .049$) and the Lack of Emotional Awareness subscale (AWA; $\underline{t}(131) = 2.36$, $\underline{p} = .010$) such that increased body awareness predicted increased clarity and awareness of emotions.

Perception of autonomic arousal (APQ), which was expected to predict emotion awareness (LEAS-A), was a highly significant predictor of not only the DERS, but of all subscales with the exception of Lack of Emotional Awareness (AWA). Increased perception of arousal predicted an increase in Lack of Emotional Clarity (CLA, $t(131)= 2.72$, $p = .004$), Limited Access to Emotion Regulation Strategies (STR; $t(131) = 2.72$, $p = .005$), Nonacceptance of Emotional Response (NAC; $t(131) = 3.17$, $p = .001$), increased Impulse Control Difficulties (IMP; $t(131) = 1.98$, $p = 0.025$), and increased Difficulty Engaging in Goal-Directed Behavior (GLS; $t(131) = 1.99$, $p=.021$) (Table 5). The APQ showed not only a highly significant direct effect on the emotion regulation measure through all but one of its subscales, but it dominated prediction of variability in the total DERS measure relative to the other independent variables examined. The percent of variance in each of the subscales predicted by the APQ was, however, low, ranging from 1.8% to 12.1% (Table 5).

The proposed mediational pathway contained variables not directly hypothesized to be related to one another. Nevertheless, relationships among these independent variables (GEFT, BAQ, APQ, LEAS) were explored and are also displayed in Table 3. None of the exploratory regression analyses were significant.

Discussion

The purpose of this study was to examine the relationship between field dependence/independence and emotion regulation difficulty. The premise was that such a relationship exists and is mediated by awareness of autonomic arousal during emotional arousal and by emotion awareness and differentiation. The hypotheses of the overall model as well as the mediational steps were based on the empirical literature demonstrating many of these individual relationships. The concept of field independence as a predictor of emotion regulation was a unique addition to the model. This was based on descriptions in the emotion regulation literature of individuals with good or poor emotion regulation which bore qualitative similarities to field independent and field dependent individuals. Prominent among these traits was a tendency for field dependent individuals to look externally vs. internally for cues when emotionally aroused, and to tend more to emotion intensity than emotion accuracy/differentiation. Independent of the mediation pathway, the relationship of baseline body awareness to perception of autonomic arousal was examined with the goal of understanding its potential use as an intervention for emotion regulation difficulty. In addition, the relationship between field independence and baseline body awareness was examined with the goal of comparing this to the field dependence/independence – autonomic perception relationship.

Field Dependence/Independence→Autonomic Perception→Emotion Awareness →Emotion Regulation

Field Dependence/Independence→Baseline Body Awareness

Baseline Body Awareness → Autonomic Perception

The overall mediational model predicting emotion regulation was not supported. However, many individual relationships were found to be significant, and post hoc exploratory analysis demonstrated multiple relationships between predictors and subscales of the measure of emotion regulation.

Field dependence/independence, the first step in the mediational model, did not significantly predict perception of autonomic arousal. It did, however, significantly predict the final difficulties with emotion regulation measure and two of its subscales, lack of emotional clarity and nonacceptance of emotions, such that increased field independence predicted improved clarity and acceptance of emotions.

The first proposed mediator, perception of autonomic arousal, significantly predicted the second proposed mediator, emotion awareness/differentiation, in the direction hypothesized; that is, increased perception of arousal predicted increased emotion awareness/differentiation. However, it also predicted the emotion regulation measure and all but one of its subscales in the direction opposite to that proposed; that is, increased perception of autonomic arousal predicted increased difficulty with emotion regulation.

The second proposed mediator, emotion awareness/differentiation, significantly predicted two subscales of the emotion regulation measure such that increased awareness predicted diminished impulsivity and increased goal-directed behaviors during arousal. These predictions were as hypothesized, but emotion awareness/differentiation failed to predict the overall measure. The hypothesized mediation between autonomic arousal and emotion awareness was not supported.

Finally, field dependence failed to predict baseline body awareness, as it had failed to predict perception of autonomic arousal. However, the hypothesized relationship between baseline body awareness and perception of autonomic arousal was supported; in addition, baseline body awareness predicted two subscales of the emotion regulation measure, such that increased body awareness predicted both increased awareness and increased clarity of emotions.

Perception of Autonomic Arousal

Contrary to hypothesis, the data demonstrated a highly significant positive relationship between perception of autonomic arousal (APQ) and difficultly with emotion regulation (DERS). This is in contrast to the assumption of the study that a high score on the APQ would reflect an ability to distinguish and report multiple autonomic sensations during experiences of emotional arousal, aiding in emotional awareness. The disconfirmation of this hypothesis regarding the role of autonomic perception, as well as the position of the APQ in the mediational model, likely contribute to the overall poor model fit.

The APQ measure was selected for this study for two reasons: First, it incorporated sensations that had been endorsed for anger, anxiety, and sadness, giving the participant a wide range of choices and presumably encouraging individual variability in the overall reporting of arousal symptoms. This had been the intention of the authors (Shields & Simon, 1991). Secondly, it had been used in conjunction with the BAQ to evaluate the relationship between baseline body awareness and awareness of bodily symptoms during arousal in an earlier study (Shields & Simon, 1991). This gave us the opportunity to replicate their findings as well as to examine the role of baseline body

awareness in emotion regulation. A comparison of the results of the present study with those of the 1991 study are displayed in Table 6. Although means and standard deviations for baseline body awareness are similar in the two studies, there is a statistically significant difference in the mean values of autonomic perception ($t(101) = 4.37$, $p < .001$). Correlation coefficients between the BAQ and the APQ were positive for both studies.

Both studies used undergraduate participants; however, the 1991 study sample was 70% female while the present study sample was 91% female. Both men and women in the 1991 study scored higher on the APQ (mean scores 139.8, 153.9) than the overall sample in the present study where the scores were not separated by gender due to the low percentage of male participants. In both instances, the target emotion was anger. The discrepancy in scores might be explained by differences in the method of administration: Both studies queried participants with the statement, "When I feel angry …," but the 1991 study asked participants to write a brief description of an instance of anger prior to answering this question. During the present study, participants were simply asked to think of an instance of anger prior to answering; the writing step was eliminated during the present study in order to minimize the number of times during the session that participants were required to write about feelings, but it may have accounted for the decrease in overall intensity of symptom report relative to the earlier study. The Shields & Simon study provides no more specific information than total scores, so it is

Table 6

Comparison of BAQ and APQ Results With Those From Shields & Simon (1991)

Study	N	Mean APQ(SD)	Mean BAQ(SD)	r^2
Present Study	136	133(33)	83(14.5)	6.3%
1991 Study	245	150(33)	82(15.0)	5.8%

NOTE. APQ = Autonomic Perception Questionnaire, BAQ = Body Awareness Questionnaire

impossible to know if the effects of this writing were on number or intensity of symptoms.

The prediction of increased rather than decreased emotion regulation difficulty by the APQ may be explained by the observation that a total score on the APQ reflects a combination of both the number and the intensity of sensations reported. A high score could be achieved by an individual who is able to distinguish and identify multiple sensations. This had been the expectation of this study. However, such a score might reflect autonomic "flooding" in an individual who experiences intense arousal leading to indiscriminate reporting of symptoms. The former might lead to emotional awareness and improved regulation, while the latter might lead to interference with cognitive processing. This might lead to impaired regulation due to difficulty sorting out and identifying feelings or to impaired judgment and control. Finally, individuals experiencing "numbing" or suppression of emotion might receive low scores which mask their actual level or number of symptoms.

Witkin's original conceptualization of field independence correlated it with increased attentiveness to internal signals (Witkin et al., 1971). The APQ measure as utilized in this study does not distinguish attentiveness to internal signals from perception of internal signals. Analysis of the APQ data showed that higher scores were not correlated with the number of symptoms endorsed, but with the average intensity rating for each symptom ($\underline{t}(134) = 9$, $\underline{r} = .57$, $\underline{p} = .000$). Thus individuals with higher APQ scores tended to endorse feeling symptoms more intensely but did not necessarily report significantly more symptoms than individuals with overall lower scores.

In the present study, only one emotion, anger, was queried on the APQ measure in the interests of limiting the length of the test sessions. Had the measure been administered in such a way as to assess responses to multiple emotions, for example if the study had queried responses to fear, sadness, and anger independently, more information might have been gathered. In such a case, the hypothesis that autonomic flooding, not sensory discrimination, significantly predicts high scores on this measure would be supported if symptom profiles for all three emotions were more similar for high scorers than for low scorers.

Field dependence/independence and perception of autonomic arousal. That field dependence/independence failed to show a relationship to perception of autonomic arousal may be more understandable in light of the APQ results. That field independence was a significant independent predictor of overall improved emotion regulation as well as increased emotional clarity and acceptance, albeit predicting a small amount of variance for each (2.9% for DERS, 3.9% for CLA, 3.0% for NONACC) suggests that there may be multiple paths to the emotion regulation process. Witkin's original differentiation hypothesis of field independence suggests that attention to and differentiation of somatic information is only one facet of this cognitive style that categorizes and differentiates information from all sources (Witkin et al, 1979). Although the present study failed to capture the possible somatic connection between field independence and emotion regulation, the direct relationship between the two variables suggests the possibility of a more cognitive mechanism that operates independently of the evaluation of somatic information to promote emotion regulation. This is discussed below when the literature on executive attention is addressed.

The specific subscales predicted by field independence in this study may be indicative of how emotions are affected: Diminished non-acceptance of emotions ("When I'm upset, I feel guilty…," "When I'm upset, I feel ashamed") may suggest that field independence is accompanied by overall lower emotionality, given that these non-acceptance terms imply the negative appraisal and judgment that often accompany heightened negative emotion. Alternatively, diminished non-acceptance may imply better ability to differentiate between having an emotion and judgments of self-worth, a skill more cognitive in nature. Better clarity of emotions ("I have difficulty making sense out of my feelings," "I have no idea how I am feeling") suggests an ability to categorize and differentiate information, consistent with Witkin's description of the construct.

Perception of autonomic arousal and emotion awareness/differentiation.

Increased autonomic perception (APQ) simultaneously predicted increased regulation difficulty (DERS) and increased emotional awareness (LEAS-A); a higher score on the LEAS-A in turn predicted diminished impulsivity (IMP), and diminished difficulties with goal-directed behaviors (GLS), two components of improved regulation. The relationship between increased APQ score, if it is interpreted in this study as reflecting an undifferentiated intense perception of arousal symptoms, and increased emotion awareness/differentiation, is inconsistent with the findings of Feldman Barrett et al. (2001), which suggested that, in a given individual, increased emotional intensity is associated with less emotion differentiation. Although this study originally hypothesized the APQ/LEAS-A relationship, the assumption had been that high APQ indicated differentiation of somatic symptoms. The inconsistency can best be explained in light of the very small percent of LEAS-A variance predicted by the APQ (3%), such that the

APQ may slightly influence emotional awareness while also reflecting increased emotional/arousal intensity (leading to worse regulation) .

Emotion Awareness/Differentiation and Emotion Regulation

The LEAS-A was a highly significant independent negative predictor of both the impulse control difficulties (IMP) and difficulties with goal-directed behaviors (GLS) subscales of the DERS, as hypothesized. That the LEAS-A failed to better predict the DERS was initially surprising. The LEAS-A was selected based on literature studies which had demonstrated a positive relationship between precise mood labeling and the ability to regulate emotion (Feldman Barrett et al., 2001; Schwarz & Clore, 1983, 1996; Shweder, 1993). However, the only two subscales predicted by the LEAS-A were those suggesting utilization of various behavioral responses to emotion, consistent with the premise of the authors mentioned here that naming an emotion enables recognition of strategies for dealing with it (Mesquita & Frijda, 1992; Schwarz & Clore, 1983; Shweder, 1993).. The prediction of only these two subscales is thus not unreasonable and suggests that precise labeling of emotions may enable one of multiple routes to emotion regulation.

A final concern with the LEAS-A was with its length and the effort required to provide handwritten descriptions of emotional responses to 10 scenarios. Although the measure was originally written with 20 scenarios, it is increasingly used in 10-item form, likely due to the effort required by the scorer as well as participants. The fact that the measure predicted only impulsivity in bivariate regression caused concerns about validity; specifically that impulsive participants possibly did not take the time to express emotion differentiation, thus the measure might simply assess impulsivity. The LEAS-A

gained some credibility when it significantly predicted, additionally, the Difficulties with Goal Directed Behaviors (GLS) subscale, as hypothesized, in a multivariate regression.

Body Awareness

There was no *a priori* reason to include body awareness in the mediational model, since the literature better suggested a relationship between field dependence/ independence and somatic awareness when aroused than between field dependence/independence and baseline body awareness (Parkes, 1981). Our results neither supported nor refuted this hypothesis since field dependence/independence failed to predict either baseline body awareness or perception of arousal. We had chosen to include body awareness in the present study, however, due to questions raised about the methods of integrated mindfulness meditation training; specifically whether it is the increased mindfulness, learned through focus on body awareness that is useful, or whether it is the increased body awareness itself that is somehow related to self-regulation.

Body awareness and perception of arousal were positively correlated, but they nonetheless showed different directions in the prediction of emotion regulation subscales. If the intensity of autonomic symptoms which may in large part underlie high APQ scores is detrimental to emotion regulation, the BAQ might likewise have been expected to predict disregulation. The discrepant predictions are explained by the small percentage variance in the APQ predicted by the BAQ. This suggests the APQ score reflects an element of attention to body sensations when aroused in addition to a component of disruptive intensity of arousal. In trying to understand the correlation between the BAQ and the APQ, it seems unlikely that increased body awareness produced increased

perception of autonomic arousal, but more likely that those individuals predisposed to intense autonomic arousal become generally more attentive to body signals overall. The independent prediction of increased clarity and awareness of emotion by increased body awareness suggests a path to emotion regulation independent of those predicted by either emotional awareness or field dependence. This begins to address one of our original questions; specifically whether the body awareness or mindfulness components of integrative meditation training are effective in self-regulation. Thus, it suggests that body awareness itself contributes to emotion regulation. Of note, the awareness of emotion subscale contains 4 items that ask about baseline body states and only two that ask about aroused states; the items in this subscale also assess purposeful attention to feelings.

Theoretical Perspectives

The observations of this study suggest that a small but significant direct relationship exists between field independence and emotion regulation that is unrelated to somatic signals and awareness. This observation begs re-examination of the literature on the cognitive processes related to field independence and the regulatory correlates of some of these processes. This might indicate possible mechanisms underlying this relationship.

The suggestion that a cognitive style known to influence perception/organization of neutral information somehow affects emotion regulation is curious. The field dependence/ independence construct was chosen for examination because of similarities in the emotion regulation literature between those with regulation difficulties and those characterized as field dependent; primary among these is the tendency to look outward

for cues in the face of emotional arousal, and the tendency to be more aware of emotion intensity than emotion accuracy, i.e. to know how intensely one feels, but not to know precisely how one feels (Blascovich, 1990, 1992; Larsen & Diener, 1987; Mesquita & Frijda, 1992; Schwarz & Clore, 1983). These traits suggest the opposite of the cognitive/ perceptual field independent style of categorizing information and attending to internal signals.

Executive attention. Field dependence/independence has been related to aspects of attention in the context of education and academic functioning. Field independence has been found to relate to attention in children; Guisande et al. (2007) observed that field independent children demonstrated improved working memory, attentional focus and shift, and sustained attention, relative to intermediate or field dependent children. Stoner & Glynn (1987) observed that children diagnosed with ADHD were found to be field dependent relative to normals.

In the past two decades, interest in attention has grown significantly independent of its relationship to education and learning, and relative to its impact on emotion processing. The conceptual model of human attention posited by Posner & Petersen (1990) is widely utilized and describes three primary components of attention which include orienting, alerting, and detecting, and which are linked to separable brain regions. While the orienting and alerting functions pertain to selective attention and sustained focus, the "detecting" function, now referred to as executive attention, was initially described as "reporting the presence of a target event." This function is also described as "evaluation of error," or "stimulus-response selection in the face of competing streams of information" (Bush et al., 2000). Executive attention is differentiated from other forms in

that it describes a state in which the individual is not only alert and attentive, but also engaged in processing and selecting as well (Posner et al. , 1980).

Executive attention has received considerable interest in the developmental literature and is related to the emergence of self-regulation which is in turn related to emotionality, delay of gratification, compliance, and general adjustment (Eisenberg et al., 2004). Functions associated with the executive attention network overlap with the more general domain of executive function in childhood; this also includes working memory, planning, switching, and inhibitory control (Welch, 2001). Using this overlap, cognitive tasks assessing executive attention in adults, generally involving adult reading and word skills, are adapted to children (Rueda et al., 2005). Attention thus assessed has consistently been related to effortful control of behavior; Rothbart et al (1994) showed that children high in effortful control were low in aggressiveness, and Eisenberg et al (1994) observed that children with good attentional control tended to use nonhostile verbal methods to deal with anger rather than overt aggression.

Executive attention has been divided into cognitive and affective components which appear to have different neurological substrates. Increasing evidence suggests that these separable circuits have a connection of mutual inhibitory feedback such that increased activity in the circuitry supporting the cognitive aspect of executive attention contributes to diminished activity in the circuitry supporting the affective aspect of executive attention and vice versa. Multiple sources of information, including meta-analyses of functional imagine data, suggest that the circuitry supporting executive attention is localized to the anterior cingulate cortex (Drevets & Raichie,1998; Mayberg et al., 1999; Posner et al., 2007; Whalen et al., 1998). fMRI studies of this region have

demonstrated that Stroop-like tasks involving neutral words cause activation in the dorsal (cognitive) portion of the anterior cingulate while Stroop-like tasks involving emotion-laden words cause activation of the ventral (affective) portion of the anterior cingulate.

Executive attention and emotion. Drevets & Raichie (1998), in an extensive review, discuss the implications of these findings on the cognitive effects of intense emotion. They present a heuristic perspective, suggesting that an intense emotional response to threat, which generates rapid, automatic, potentially lifesaving responses, may suppress the slower semantic processing involved in reasoning through alternative courses of action. Similarly, in severely depressed patients, blood flow is increased to the emotion-related prefrontal and limbic areas. It was observed that depressed individuals with cognitive impairment exhibit diminished blood flow to the dorsal anterior cingulate (cognitive circuitry) whereas those without cognitive impairment do not (Bench et al., 1992; Drevets et al., 1992).

The direct relationship between executive attention and field independence has only been addressed in the education/child developmental literature, as described above; these are few in number, largely due to the difficulty of directly assessing executive attention in young children. The indirect relationship between these two constructs as they relate to this study was first noted in the literature with observations that meditation has been linked to both field independence and executive attention.

Meditation, attention, and field independence. Meditation has been correlated with improvement in multiple aspects of attention. Chan & Woollacott (2007) observed increased executive attention (ability to inhibit incorrect responses) in individuals who practiced regular meditation. Tang et al. (2007) demonstrated that as little as five days of

integrative body-mind training produced significant increases in executive attention, while Brefczynski-Lewis et al. (2007) and Jha et al. (2007) found changes in multiple aspects of attention in groups practicing concentration or mindfulness meditation. If meditation is the practice of filtering out and decreasing attention to unwanted thoughts, the process of meditation practice sounds, conceptually, like a rehearsal of executive attention skills.

Meditation and relaxation techniques have also been associated with changes in field independence. For example, transcendental meditation produced significant increases in field independence in children (Linden, 1973), high school students (So & Orme-Johnson, 2001), and adults (Sridevi & Krishna Rao, 2003). Increased field independence was also observed in college students practicing yoga (Sridevi & Krishna Rao, 2000); and in a group of college students practicing mixed methods of meditation (Fergussen, 1992).

The associations between certain aspects of attention and both meditative practice and field independence suggest that some aspects of meditation enable increased ability to evaluate and inhibit responses, and that these skills may be related to increased field independence. This might suggest a reframing of the concept of differentiation which is at the core of the field dependence/independence construct. Perhaps, for example, the ability to differentiate one's own internal signals from external cues (field independence) might be interpreted as the ability to inhibit attention to these external cues (executive attention) in favor of attending to internal signals. Either concept might be related to emotion regulation using the reciprocity model of cognition and emotion in the anterior cingulate cortex. Thus the effects of increased field independence or executive attention

on emotion regulation may be due to increased activity in the circuits subserving cognitive functions and thus inhibition of activity in the emotion-related circuitry.

The Present Study

The results of this study are consistent with such a model in that field independence was an independent, if very minor, predictor of emotion regulation. They suggest, in addition, that there may be multiple routes to emotion regulation, given that baseline body awareness, verbal expression of emotion differentiation, and field independence were all independent predictors of emotion regulation.

Results of the present study also address, in a small way, the original question of whether the mindfulness or body awareness aspects of integrated mindfulness therapy, in particular the MBSR model, is operative in emotion regulation. The results suggest that simple body awareness enhancement might be useful in facilitating certain aspects of emotion regulation. However, there are no studies known to this author which examine the extent to which integrated meditation practice, which employs the body scan or similar techniques and is shown to produce the cognitive changes described above, improves baseline body awareness.

*Limitations of the study and future directions***.** Although many relationships were significantly predicted by the data in this study, effect sizes were consistently very small. This suggests that there are other factors influencing emotion regulation which we were unable to address in the current study. In addition, the use of undergraduate participants on weekend afternoons could be a contributing factor to increase measurement error due to less than optimal effort on the measures, as participation was not voluntary but required for course credit. For example, some participants in the earlier (noon Saturday)

sessions acknowledged having slept until 15 minutes before the scheduled time. Some participants appeared to hurry through the sessions; there was a trend toward shortened sessions as the end of semester approached, possibly suggesting that these late dates selected for individuals who were either less invested or less interested in their performance.

In addition, the choice of measures may have introduced some error variance. Clearly, the selection of the APQ as a measure to assess the ability to distinguish somatic symptoms during arousal was a primary weakness of the study. Whether field dependence/independence predicts perception of autonomic arousal, and whether perception of autonomic arousal predicts emotion awareness/differentiation was, thus, not adequately addressed and remains a subject worthy of study. There is a consensus in the literature on the difficulty with self-report measures of autonomic arousal, and the idea that reporting of symptoms is affected by beliefs about these symptoms and emotions (Blascovich & Katkin, 1983; Pennebaker & Skelton, 1981). Given that Parkes (1981) observed a correlation between field independence and the ability to differentiate depression from anxiety in an inpatient population, a better approach in the present study would have been to assess responses to fear, anger, and sadness separately, looking for discrepancies in the symptom profiles as evidence of differentiation.

The field dependence/ independence measure (GEFT) may have been sensitive to state anxiety in some participants. The measure was timed, administered in a group setting, and was challenging. The literature on the measure has suggested that its administration has caused distress in other studies (Witkin et al., 1971). The measure was administered at the end of the session for this reason. The participant pool for the

present study was dominated by a mixture of Caucasian and African American students with a few Latino and Asian participants as well. The literature has demonstrated that ethnic minority students' test performance in an academic setting may be diminished by their stereotypical expectations of being outperformed by their Caucasian peers (Blair & Banaji, 1996; Spicer, 2000). Participants in the present study were arranged in the room such that they could not see one another, and those who finished before the deadline were asked to simply quietly raise their hands. The situation was nonetheless timed and for some, likely stressful. In addition, it was administered in a classroom/academic setting.

This concern is noted because the examiner, who scored the measures immediately following sessions, made the casual anecdotal observation that participants scoring high in field independence often displayed traits of extraversion, i.e. they spoke more to the examiner and to other participants during breaks and after the session. Alternatively, those participants who were quieter may have simply been more anxious and may thus have been somewhat impaired on the timed test. Ethnicity was not recorded or controlled for in the present study. The measure is routinely administered in groups, but literature on the effects of group composition on administration of the GEFT is not known to this writer. Although the Embedded Figures Test correlates well with the Rod and Frame Test for field independence, it carries the disadvantage that the participant is generally somewhat aware of his performance. Because this is not true for the Rod and Frame Test, it is likely a superior tool for the assessment of field dependence/independence. Individual session administration of the GEFT would be a second choice; although participants are aware of their own performance, the sense of comparison to others is minimized.

Given the network of relationships described in the literature between executive attention, meditation, and field independence, and given the results of this study relating field independence to emotion regulation, future work might focus on investigating this relationship. For example a simple cross-sectional study examining field dependence, executive attention, and emotion regulation might be productive and further enhance the current understanding of emotion regulation and its underlying processes. In addition, a comparison of concentration or breathing meditation and non-meditative body awareness training might shed some light on the exact differences produced by these interventions. Both behavioral and neuroimaging approaches might be useful for such a study.

Appendix A

Difficulties in Emotion Regulation Scale (DERS)

Please indicate how often the following statements apply to you by writing the appropriate number from the scale below on the line beside each item:

1	2	3	4	5
almost never (0-10%)	sometimes (11-35%)	about half the time (36-65%)	most of the time (66-90%)	almost always (91-100%)

_____ 1) I am clear about my feelings.

_____ 2) I pay attention to how I feel.

_____ 3) I experience my emotions as overwhelming and out of control.

_____ 4) I have no idea how I am feeling.

_____ 5) I have difficulty making sense out of my feelings.

_____ 6) I am attentive to my feelings.

_____ 7) I know exactly how I am feeling.

_____ 8) I care about what I am feeling.

_____ 9) I am confused about how I feel.

_____ 10) When I'm upset, I acknowledge my emotions.

_____ 11) When I'm upset, I become angry with myself for feeling that way.

_____ 12) When I'm upset, I become embarrassed for feeling that way.

_____ 13) When I'm upset, I have difficulty getting work done.

_____ 14) When I'm upset, I become out of control.

_____ 15) When I'm upset, I believe that I will remain that way for a long time.

_____ 16) When I'm upset, I believe that I'll end up feeling very depressed.

_____ 17) When I'm upset, I believe that my feelings are valid and important.

_____ 18) When I'm upset, I have difficulty focusing on other things.

Appendix A continued

1	2	3	4	5
almost never (0-10%)	sometimes (11-35%)	about half the time (36-65%)	most of the time (66-90%)	almost always (91-100%)

_____ 19) When I'm upset, I feel out of control.

_____ 20) When I'm upset, I can still get things done.

_____ 21) When I'm upset, I feel ashamed with myself for feeling that way.

_____ 22) When I'm upset, I know that I can find a way to eventually feel better.

_____ 23) When I'm upset, I feel like I am weak.

_____ 24) When I'm upset, I feel like I can remain in control of my behaviors.

_____ 25) When I'm upset, I feel guilty for feeling that way.

_____ 26) When I'm upset, I have difficulty concentrating.

_____ 27) When I'm upset, I have difficulty controlling my behaviors.

_____ 28) When I'm upset, I believe that there is nothing I can do to make myself feel better.

_____ 29) When I'm upset, I become irritated with myself for feeling that way.

_____ 30) When I'm upset, I start to feel very bad about myself.

_____ 31) When I'm upset, I believe that wallowing in it is all I can do.

_____ 32) When I'm upset, I lose control over my behaviors.

_____ 33) When I'm upset, I have difficulty thinking about anything else.

_____ 34) When I'm upset, I take time to figure out what I'm really feeling.

_____ 35) When I'm upset, it takes me a long time to feel better.

_____ 36) When I'm upset, my emotions feel overwhelming.

Appendix B

Body Awareness Questionnaire (BAQ)

A number of statements which people may feel are more or less true about themselves are given below. Read each statement and then, in the space to the left of the item, write the number which best describes how true the statement is of you. There are no right or wrong answers. The best answer is the one which honestly reflects the degree to which the statement fits your own experience. Use the following scale:

1	2	3	4	5	6	7
Not at all true about me			Neutral			Very true about me

_____ 1. I notice differences in the way my body reacts to various foods.

____ 2. I can always tell when I bump myself whether or not it will become a bruise.

____ 3. I always know when I've exerted myself to the point where I'll be sore the next day.

____ 4. I am always aware of changes in my energy level when I eat certain foods.

____ 5. I know in advance when I'm getting the flu.

____ 6. I know I'm running a fever without taking my temperature.

____ 7. I can distinguish between tiredness due to hunger and tiredness due to lack of sleep.

____ 8. I can accurately predict what time of day lack of sleep will catch up with me.

____ 9. I am aware of a cycle in my activity level throughout the day.

____10. I don't notice seasonal rhythms and cycles in the way my body functions.

____11. As soon as I wake up in the morning I know how much energy I'll have during the day.

____12. I can tell when I go to bed how well I will sleep that night.

____13. I notice distinct body reactions when I am fatigued.

____14. I notice specific body responses to changes in the weather.

____15. I can predict how much sleep I will need at night in order to wake up refreshed.

____16. When my exercise habits change, I can predict very accurately how that change will affect my energy level.

____17. There seems to be a "best" time for me to go to sleep at night.

____18. I notice specific bodily reactions to being over-hungry.

Appendix C

Autonomic Perception Questionnaire – Revised (APQ-R)

Please indicate how true each of the following statements is about you by writing the appropriate number from the scale below on the line beside each item:

1----------2----------3----------4----------5----------6----------7----------8----------9

Not at all true about me	Neutral, not sure	Very true about me

When I feel angry…..

_____ 1. My face becomes hot.
_____ 2. My hands become cold.
_____ 3. I perspire.
_____ 4. My mouth becomes dry.
_____ 5. I am aware of increased muscle tension in my body
_____ 6. I get a headache.
_____ 7. I breathe more shallowly.
_____ 8. I feel my heart beat faster.
_____ 9. The intensity of my heartbeat increases.
_____ 10. I am often aware of changes in my breathing.
_____ 11. My breathing becomes more rapid.
_____ 12. I am aware of changes in my heart action.
_____ 13. I feel as if blood is rushing to my head.
_____ 14. I get a lump in my throat or a choked-up feeling.
_____ 15. My stomach gets upset.
_____ 16. I get a sinking or heavy feeling in my stomach.
_____ 17. I have difficulty talking.
_____ 18. I feel cold or chilly.
_____ 19. My eyes get moist or watery.
_____ 20. I experience a dulling of my senses.
_____ 21. I become weak and shaky on my feet.
_____ 22. I get nauseated.
_____ 23. My palms get sweaty.
_____ 24. I get restless.
_____ 25. I urinate more frequently or have the urge to urinate more frequently.
_____ 26. My face feels cold and pale.
_____ 27. I get a heavy feeling or knotin my chest.
_____ 28. I get goosebumps.
_____ 29. I feel faint or dizzy.
_____ 30. I get a fluttering, light feeling in my chest.

Appendix D

Levels of Emotional Awareness Scales (LEAS-A)

INSTRUCTIONS

Please describe what you would feel in the following situations. The only requirement is that you use the word "feel" in your answers. You may make your answers as brief or as long as necessary to express how you would feel. In each situation there is another person mentioned. Please indicate how you think that other person would feel as well.

1. A neighbor asks you to repair a piece of furniture. As the neighbor looks on, you begin hammering the nail but then miss the nail and hit your finger. How would you feel? How would the neighbor feel?

2. A loved one gives you a back rub after you return from a hard day's work. How would you feel? How would your partner feel?

3. As you drive over a suspension bridge you see a person standing on the other side of the guardrail, looking down at the water. How would you feel? How would the person feel?

4. Your boss tells you that your work has been unacceptable and needs to be improved. How would you feel? How would your boss feel?

5. You are standing in line at the bank. The person in front of you steps up to the window and begins a very complicated transaction. How would you feel? How would the person in front of you feel?

6. You have been working hard on a project for several months. Several days after submitting it, your boss stops by to tell you that your work was excellent. How would you feel? How would your boss feel?

7. Your dentist has told you that you have several cavities and schedules you for a return visit. How would you feel? How would the dentist feel?

8. Your doctor told you to avoid fatty foods. A new colleague at work calls you to say that she/he is going out for pizza and invites you to go along. How would you feel? How would your colleague feel?

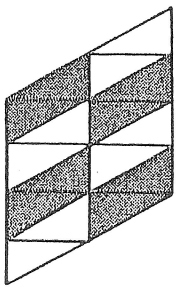
9. You and a friend agree to invest money together to begin a new business venture. Several days later you call the friend back only to learn that she/he changed her/his mind. How would you feel? How would your friend feel?

10. You fall in love with someone who is both attractive and intelligent. Although this person is not well off financially, this doesn't matter to you—your income is adequate. When you begin to discuss marriage, you learn that she/he is actually from an extremely wealthy family. She/he did not want that known for fear that people would only be interested in her/him for her/his money. How would you feel? How would she/he feel?

Appendix E

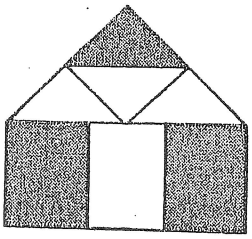
Exerpts from the Group Embedded Figures Test (GEFT)

6



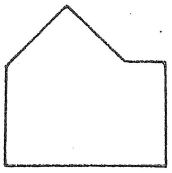
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8

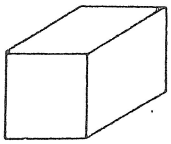


Find Simple Form "D"

D



E



GEFT Test Booklet © 1971, 2003 Philip K. Oltman, Evelyn Raskin & Herman A. Witkin
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