Interoceptive Awareness and Emotion Regulation Among Individuals with Depression and Anxiety in Emotionally-Focused Individual Therapy

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Abstract

Depression and anxiety may be considered transdiagnostically as emotional disorders with emotion dysregulation at the centre of their development and maintenance. Research has found that interoceptive dysregulation may also serve to precipitate, maintain and exacerbate symptoms of depression and anxiety. Attention to emotion regulation via interoceptive experiences could play a role in transdiagnostic therapeutic approaches in treating these emotional disorders. The present thesis examines the relationship between interoceptive awareness, emotion dysregulation, depression and anxiety at baseline in a sample of people with emotional disorders. It also examines how depression, anxiety, emotion dysregulation, and interoceptive awareness changed among this population across an experiential attachment-based therapeutic intervention of Emotionally-Focused Individual Therapy (EFIT). And last, in order to examine the effects of change in interoceptive awareness on the course of treatment, the present study examines how any changes in interoceptive awareness in the first half of 15 weeks of therapy may predict changes in symptoms of depression, anxiety, and emotion regulation across the course of treatment. The findings suggest that, at baseline, higher levels of interoceptive awareness were significantly related to lower levels of self-reported symptoms of depression and anxiety, as well as emotion dysregulation. Additionally, depression and anxiety significantly decreased across the treatment while emotion dysregulation decreased and interoceptive awareness increased but not significantly. Increases in interoceptive awareness in the first half of 15 weeks of therapy, particularly increasing interoceptive attention regulation and self-regulation as well as bodily trust, were significantly related to decreases in emotion dysregulation across therapy sessions. The clinical implications of these findings and recommendations for further research are discussed.

Keywords: depression, anxiety, interoceptive awareness, emotion regulation, attachment, polyvagal theory

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> Our whole cubic capacity is sensibly alive; and each morsel of it contributes its pulsations of feeling, dim or sharp, pleasant, painful, or dubious, to that sense of personality that every one of us unfailingly carries.
>
> —*William James, What is an Emotion?*

According to the Canadian Mental Health Association, approximately 8% of adults will experience major depressive disorder while 5% will experience an anxiety disorder at some point in their lives (Mental Health Commission of Canada, 2013). A multitude of evidence-based treatments exists for each disorder, often involving some form of manualized psychotherapy or pharmacological treatment or a combination of both. Despite these evidence-based interventions that may alleviate symptoms of depression and anxiety for some, many people with these disorders are unable to find relief and continue to suffer from debilitating affective, cognitive, and somatic symptoms (Fava, 2003; Mennin, 2006; Wilamowska et al., 2010).

Researchers and clinicians have noted the significant comorbidity of depression and anxiety (Barlow et al., 2004; Wilamowska et al., 2010). Rather than attempt separate manualized treatments for each disorder, leading to greater complexity for both clinicians and patients, some have introduced and adopted a unified protocol that considers depression and anxiety transdiagnostically as emotional disorders with emotion dysregulation being at the centre of their development and maintenance (Barlow et al., 2004). From the transdiagnostic perspective of the unified protocol, emotion dysregulation may stem from biological vulnerability, stressful and

unpredictable early childhood experience, and also from learned experience where emotion dysregulation was modeled (Barlow et al., 2004; Wilamowska et al., 2010).

A complementary transdiagnostic view of the emergence and presentation of emotional disorders is supported in various wide-ranging areas of literature on attachment styles (Johnson, 2019; Mikulincer & Shaver, 2016); emotion regulation (Aldao & Nolen-Hoeksema, 2010; Aldao et al., 2010); neurophysiological perspectives on emotion and emotion regulation (Dana, 2018; Porges, 1995, 2011; Siegal, 2020); and related literature on interoception or bodily awareness with regard to emotion regulation and emotion disorders (Avery et al., 2014; De Jong et al., 2016; Domschke et al., 2010; Dunn et al., 2007; Eggart et al., 2019; Ehlers & Breuer, 1996; Furman et al., 2013; Mallorqui-Bague et al., 2016; Paulus & Stein, 2010; Pollatos et al., 2009).

In attachment research, studies have found that individuals with a history of insecure attachment with primary caregivers in childhood and adolescence have a higher likelihood of developing an emotional disorder, as they may miss developing important skills related to resilience, coping, and self- and emotion regulation (Johnson, 2019; Khan et al., 2019; Mikulincer & Shaver, 2016). Furthermore, insecure attachment may lead to difficulties with impulse inhibition, goal setting, planning, and interpersonal relationships (Mikulincer & Shaver, 2016). In other words, experiences of insecure attachment may lead to emotion dysregulation, distress, and vulnerability to developing emotional disorders.

From a neurophysiological perspective, emotional disorders and accompanying emotion dysregulation may be similarly understood from a transdiagnostic perspective using polyvagal theory (Porges, 2011), an approach that brings together neurophysiology, attachment, and self- and emotion regulation. From the perspective of polyvagal theory, anxiety and depression may be understood as dysregulation of the autonomic nervous system, which is ‘stuck’ in patterns of

particular stress responses (i.e., fight, flight or freeze) that do not match the current environment, and thus limit the range of emotional expression, communication, and ability to regulate body and behavioural states (Dana, 2018; Porges, 1995, 2011). Dysregulation in the nervous system may be learned from early relational experiences with a caregiver where there was a lack of co-regulation, which may lead to hypervigilance to or withdrawal from perceived threats—hallmark symptoms of anxiety and depression respectively—and keep individuals from being in a state of social engagement (Dana, 2018; Porges, 2003, 2011).

Narrowing in on a particular element of the neurophysiological experience of emotion regulation is the subjective experience of emotion via self-reported interoceptive awareness, or awareness of the body's felt sense. Recent studies on interoceptive awareness complement a transdiagnostic perspective of emotional disorders, specifically that negative affect—a defining symptom of emotional disorders—is in part experienced as interoceptive dysregulation (Avery et al., 2014; Boswell et al., 2013; De Jong et al., 2016; Domschke et al., 2010; Dunn et al., 2007; Ehlers & Breuer, 1996; Eggart et al., 2019; Furman et al., 2013; Mallorqui-Bague et al., 2016; Paulus & Stein, 2010; Pollatos et al., 2009). Similar to the polyvagal perspective, studies on the interoceptive awareness of individuals with anxiety have found that there is a tendency towards heightened interoceptive awareness or anxiety sensitivity to the extent of hypervigilance, which activates a threat response to non-threatening internal stimuli (Domschke et al., 2010; Ehlers & Breuer, 1996; Mallorqui-Bague et al., 2016; Paulus & Stein, 2010). This is most clearly seen in panic disorder, where anxiety is compounded with the emotional reaction to the initial physiological arousal (Boswell et al., 2013). Furthermore, experiences of heightened arousal may also lead to maladaptive coping strategies such as avoidant behaviour as seen in agoraphobia and

checking behaviour as seen in obsessive compulsive disorder, in effort to reduce the intensity of the stimuli (Boswell et al., 2013; Mallorqui-Bague et al., 2016).

Findings on the interoceptive experience of those with depression are less definitive than the aforementioned studies on anxiety, though studies note a common element of a general lack of awareness of or inaccurate interoception, which has been linked to experiencing greater depressive symptoms (Avery et al., 2014; De Jong et al., 2016; Dunn et al., 2007; Eggart et al., 2019; Furman et al., 2013; Pollatos et al., 2009). Individuals with depression often experience disruptive somatic symptoms, such as sleep and eating disturbances, anhedonia, decreased energy, and decreased psychomotor activity (Duquette, 2017), which contribute to the overall negative affect experienced as a hallmark symptom of depression. Furthermore, Furman and colleagues (2013) found that individuals with major depressive disorder compared to healthy controls have a disrupted perception of bodily responses, which reduced the ability to experience positive arousal and to use interoceptive feedback to inform decision making.

The connection between low or inaccurate interoceptive awareness and depression is complex, and as Duquette (2017) noted may result from the dysfunction of interoceptive signals from the body to the brain, and/or cognitive biases (neurophysiological or learned) in interpreting and appraising interoceptive cues, both of which serve to perpetuate depressive symptoms. Interventions that promote greater interoceptive awareness and accuracy therefore may help individuals with depression recognize affective changes, distinguish one feeling state from another, and develop greater tolerance for unpleasant emotional and somatic states (Craig 2012/2016). It may also promote more adaptive top-down cognitive interpretations of interoceptive cues (Furman et al., 2013). Furthermore, individuals with emotional disorders could benefit from learning how to befriend their nervous systems via interoceptive cues, as it

may help develop emotion regulation skills that may have been missed in cases of insecure attachment.

A transdiagnostic view of emotional disorders may also be found in the theory and application of Emotionally-Focused Individual Therapy (EFIT), which is founded upon attachment theory and aims to foster improved emotion regulation and a more secure attachment orientation through the experience of exploring difficult emotions in therapy (Johnson, 2019). In EFIT, the therapist serves as an attachment figure providing a safe, attuned environment to facilitate corrective emotional experiences and the healing of old attachment wounds, all while promoting greater emotion regulation that extends beyond the therapeutic relationship (Johnson, 2019). In this experiential process, the client is supported in developing emotional awareness and increasing tolerance for unpleasant affective states through co-regulation with the therapist, which in turn fosters greater emotion regulation within the client (Johnson, 2019). These steps may include developing interoceptive awareness as an aspect of emotional experience. Furthermore, these enhanced skills in emotion regulation may help reduce symptoms of emotional disorders by helping individuals better manage their experiences of negative affect—a key feature of both depression and anxiety.

This study examined changes in interoceptive awareness, emotion regulation, depression, and anxiety among individuals with emotional disorders receiving EFIT. Specifically, the study examined the potential role of improved interoceptive awareness achieved through an experiential, attachment-based therapeutic intervention, in alleviating emotion dysregulation and improving symptoms of depression and anxiety.

Literature Review

Attachment Science and Attachment Development

Contemporary attachment science brings together perspectives from psychology, evolutionary theory and neuroscience, to view humans as a species wired for social bonding and their functioning as essentially interpersonal in nature (Johnson, 2019). British psychiatrist John Bowlby defined attachment theory in the 1950s and thereafter, having been influenced by his work with young children and by contemporary colleagues in ethology, who observed behaviours of animals with their young (Ainsworth & Bowlby, 1991; Bowlby, 1969). Bowlby, and attachment researchers who followed in his footsteps, noted that infants and children have an instinctual behavioural system aimed to preserve itself, and rely on the development of an emotional bond with the mother or another proximally close caregiver (Bowlby, 1969; Johnson, 2019; Mikulincer & Shaver, 2016). The core assumption of attachment theory is that these early experiences contribute to the development of a particular set of expectations and ways of relating in close relationships, namely an attachment style.

Through observation of mother-infant dyads, early researchers in attachment science came to classify three main attachment styles: secure, insecure-ambivalent (anxious), and insecure-avoidant (Ainsworth et al., 1971; Ainsworth & Bowlby, 1991). A fourth style—fearful-avoidant—was later added, to capture the presentation of individuals with high anxiety and avoidance (Main & Solomon, 1986; Lyons-Ruth & Spielman, 2003). In secure attachment, a strong emotional bond exists between the caregiver and child, as the child learns how to articulate needs and emotions, and trusts to have them consistently met (Ainsworth et al., 1971). The expectation that needs will be met creates in the child a coherent working model of self and other, fosters the broadening of developmental tasks beyond self-protection, and promotes an

overall sense of comfort within one's own intrapsychic experience (including within one's own body) and in relationship with others (Johnson, 2019; Mikulincer & Shaver, 2016).

In the case of insecure attachment, children find attachment figures either inconsistently or wholly inaccessible or unresponsive when they seek to get their needs met, and consequently experience the world as unsafe. This leads to insecure working models of self and other as well as the development of anxious or avoidant attachment patterns in effort to get fundamental needs met and avoid the painful experience of an unresponsive caregiver (Ainsworth et al., 1971; Johnson, 2019; Mikulincer & Shaver, 2016). In the insecure-anxious type, children develop a hyperactivated anxious demeanour in effort to protest inconsistent caregiving, while in insecure-avoidant situations, children develop a detached and dissociated disposition in response to distant caregivers (Ainsworth et al., 1971; Johnson, 2019). In more severe cases of childhood neglect and abuse, the child may develop a disorganized attachment style vacillating between anxious and avoidant states in effort to avoid pain and disappointment, and manage fear of the caregiver (Johnson, 2019; Lyons-Ruth & Spielman, 2003). In all types of insecure attachment, the child has learned to distort or deny emotional experience and needs, leading to emotional suppression, dysfunctional rumination on threats, and poor coping skills (Mikulincer & Shaver, 2016). In other words, insecure attachment sets the conditions for emotion dysregulation, and if provided no corrective experience, these patterns forged in early childhood often echo into adulthood and continue to influence relationships in later stages of life.

Adult Attachment

A core assumption of attachment theory is that early caregiving experiences influence attachment patterns over the life-course, and several longitudinal studies have demonstrated this

association (Chopik et al., 2014; Davila & Cobb, 2003; Dinero et al., 2008; Fraley et al., 2013; Hazen & Shaver, 1987; Zayas et al., 2011). Experiences of secure attachment in childhood tend to foster the development of a coherent and integrated sense of self, which is linked with positive mental health indicators such as resilience, optimism and high self-esteem (Johnson, 2019; Jurist & Meehan, 2009). The social and emotional skills gained from a history of secure attachment better allow an individual in adult relationships to attune to others, to regulate difficult emotions, and to turn to others for comfort and support (Feeney, 1995; Johnson, 2019; Mikulincer & Shaver, 2016).

In contrast, experiences of insecure attachment in childhood tend to lead to difficulties in achieving and maintaining intimacy and connection in adult relationships. Anxious attachment in adult relationships may include hyperactivating strategies such as intense monitoring of the other, strong efforts to maintain proximity, over-dependence on the other for comfort, and excessive demands for attention and care (Mikulincer & Shaver, 2016). Khan et al. (2019) found that individuals with insecure-anxious attachment tendencies tend to worry that others will not be available when needed, have negative beliefs about the self, and feel that they are unworthy of care. Furthermore, Feeney (1995) noted that individuals with an anxious attachment style make efforts to control their sadness and anger with their romantic attachment figure and believe their partner should do the same, thus preventing the relationship from being a safe haven to both hold and help alleviate the experience of negative affect, as is done in secure relationships.

Meanwhile, avoidant attachment in adult relationships may include emotionally deactivating strategies such as maintaining a controlled psychological distance from the other; avoiding interactions that require emotional involvement, intimacy, self-disclosure, and interdependence; compulsive self-reliance, perfectionism and self-criticism; and ignoring or

denying negative emotional states that might trigger attachment activation (Mikulincer & Shaver, 2016). Khan et al. (2019) found that these individuals tend to have less comfort with emotional intimacy and have negative beliefs about others as being unreliable. Similarly, Feeney (1995) found that individuals with an avoidant-attachment profile tended to avoid acknowledging experiencing anger, sadness and anxiety, and tend to not seek comfort from their romantic attachment figure.

Recent studies on adult attachment have raised important questions about whether attachment style changes or remains stable through various life stages (Davila & Cobb, 2003; Fraley & Roisman, 2019). Variables that may contribute to the relative change in attachment style over time are relationship-specific attachment patterns, such as having a different attachment style with a romantic partner or therapist than with a parent; the relative influence of close versus distant relationships with differing attachment patterns; and genetic or hereditary vulnerabilities activated by life experience (Fraley & Roisman, 2019). Davila and Cobb (2003) found that individuals with underlying vulnerability factors such as psychopathology or personality pathology are more prone to attachment instability over time, though tend to revert to an insecure style throughout the life course when triggered by stressful attachment-related events. These authors found that the underlying vulnerability factors produced a lack of clarity about the self and others that seemed to endure into early adult life, which presented as ongoing insecure attachment patterns (Davila & Cobb, 2003). These findings point to a correlation of insecure attachment tendencies, emotion dysregulation, and emotional disorders, such as depression and anxiety.

Emotion Regulation, Emotional Disorders and Adult Attachment

Emotion regulation is the process by which individuals are able to identify, accept and manage their emotional experiences, including both regulating responses to stimuli that evoke emotions as well as the ability to influence which emotions are experienced and how they are expressed (Gross & Muñoz, 1995; Victor & Klonsky, 2016). Successful emotion regulation includes the ability to change emotional experience through identifying, accepting and managing these experiences and responses based on goals in the face of negative emotions (Gratz & Roemer, 2004). Recent studies on emotion regulation noted the beneficial effects of increased flexibility in emotion regulation strategies, allowing greater adaptation and response to a given situation (Bonanno & Burton, 2013; Keever et al., 2015). Emotion regulation is thus a cornerstone of mental health and includes a set of cognitive, behavioural, and physiological skills (Gross & Muñoz, 1995) acquired through the co-regulation of the caregiver and child in secure attachment situations (Johnson, 2019; Mikulincer & Shaver, 2016; Porges, 2011).

In contrast, studies have demonstrated that individuals with emotion regulation strategies of rumination, suppression, and avoidance (i.e., emotion dysregulation) have a higher incidence of depression and anxiety (Aldao & Nolen-Hoeksema, 2010; Aldao et al., 2010; Barlow et al., 2004). Furthermore, these strategies often have the unintended consequences of increasing the feeling by focusing on it and creating a vicious cycle of emotion dysregulation (Barlow et al., 2004). As other studies noted, individuals with insecure attachment orientations often face such challenges of emotion dysregulation in their adult relationships, and consequently, are more vulnerable to developing emotional disorders such as depression and anxiety (Barlow et al., 2004; Gross & Muñoz, 1995; Johnson, 2019; Khan et al., 2019; Liu et al., 2009; Mikulincer & Shaver, 2016).

From an attachment perspective, emotion dysregulation strategies of rumination, hypervigilance, avoidance, and suppression of attachment needs and emotions are often unconsciously invoked (Mikulincer & Shaver, 2016), and may be conceptualized as an adaptive response to deal with the pain of having unmet attachment needs (Johnson, 2019). Furthermore, although emotion regulation strategies of suppression and avoidance might allow the individual to self-report feeling unaffected by negative emotional experience, studies have shown that individuals with insecure attachment styles using such emotion regulation strategies demonstrated physiological activation that indicated a stress response (Dozier & Kobak, 1992; George et al., 1996; Maunder et al., 2006; Roisman et al., 2004). For example, individuals administered the Adult Attachment Interview whose answers indicated deactivating or avoidant strategies in response to questions about experiences of loss in early childhood, also showed heightened electrodermal activity at these timepoints, thus indicating activation of a stress response in the sympathetic nervous system despite the emotion regulation strategy of suppression (Dozier & Kobak, 1992; George et al., 1996; Roisman et al., 2004). Similarly, individuals with avoidant tendencies maintained an elevated heart rate during stress tests regardless of the subjective self-report of lower stress levels, suggesting a strong correlation between levels of attachment insecurity, physiological stress, and latent emotion dysregulation via suppression (Maunder et al., 2006). These studies underscore the fundamental role of interoceptive processes—conscious or unconscious—in attachment security and emotion regulation.

Interoceptive Awareness

William James (1884) was among the first psychologists to describe and put forth a theory on the role of physiological awareness in the experience of emotion, asserting that an environmental stimulus triggers a visceral, somatic response, which then becomes interpreted as an emotion. Operating from this theoretical assumption, interoceptive awareness (that is, awareness of the viscera throughout the body) plays a large role in determining emotional experience and consequently emotion regulation. As Fustos and colleagues (2012) noted, the subtle perceptions of the body's felt sense may provide a wider selection of emotional possibilities from which to interpret situations that have led to emotional arousal.

The concept of interoception was originally introduced in the early 1900s by neurophysiologist Sir Charles Sherrington, and it referred to the sensory input from the interior of the body (Craig, 2016; Sherrington, 1906). Nearly a century later, neuroscientist A.D. Craig refined the term to mean the sense of the physiological condition of the entire body, which includes thirst, hunger, itch, heartbeat, sexual arousal, affective touch, temperature, and pain (Craig, 2002). Neuroscientists maintain that interoception is fundamental to the body's effort to maintain homeostasis, or the maintenance of the optimal, energy-efficient balance across the body (Barrett, 2017; Craig, 2016; Porges, 2011). In simplified neurobiological terms, interoception occurs as sensory fibers in all tissues and organs of the body detect fluctuating bodily experiences caused by internal and external stimuli, and send this information through afferent nerves to the thalamus and insular cortex in the brain, producing an ongoing read of homeostatic activity; fluctuations in homeostasis lead to changes in the autonomic nervous system, which produce emotional behaviours like goal-directed action, facial movements, and vocalizations (Craig, 2016; Johnston & Olsen, 2015).

Researchers have debated how to best study interoception, and related terminology continues to be disputed. Garfinkel et al. (2015) distinguished between interoceptive accuracy, an objective measure like heartbeat perception that allows the researcher to quantify individual subjective differences in performance; interoceptive sensibility, a subjective measure that assesses the individual's belief in their interoceptive ability; and interoceptive awareness, the relation of the subjective perception of interoception (i.e., sensibility) to the objective interoceptive accuracy. Clinical explorations that have focused on interoceptive accuracy used heartbeat detection as a possible measure for an individual's ability to tune into the body's inner felt sense (Dunn et al., 2010; Eggart et al. 2019). Greater interoceptive sensitivity and accuracy in heartbeat perception has shown significant correlation with higher levels of awareness levels of arousal, which influences the level of emotional awareness of self and others (Barrett et al., 2004).

Some researchers, however, have critiqued the heartbeat perception method as too narrow, in that it misses the rich phenomenology of a more broadly defined interoceptive awareness as a window into subjective emotional experience and interoceptive attentional style (Mehling et al., 2018; Ring & Brener, 2018). Instead, they argue that emotional experience, as a result of fluctuations in the autonomic nervous system, involves many perceptible physiological changes beyond heartrate variability (ex. blushing, sweating, chills, pressure, and breathing patterns), and therefore tools beyond heart rate detection remain possible (Mehling et al, 2018; Ring & Brener, 2018). Moreover, in a therapeutic context there is an inherent value in working with the client's subjective perception of their whole body's felt sense, as this awareness informs their sense of safety, comfort, well-being, and thus their ability to connect and co-regulate with the therapist (Duquette, 2017).

Subjective interoceptive awareness is a process that involves a visceral signaling from the body to the brain; the directing of attention toward the sensation from the body; and evaluation of the signals for their subjective meaning (Schulz & Vögele, 2015). Studies on healthy subjective interoceptive awareness noted that it is comprised of a mindful self awareness of bodily states, including the ability to recognize subtle body cues, a level of nonjudgmental acceptance of bodily states, and a sense of self grounded in experiencing physical sensations in the present moment (Carruthers, 2008; Fogel, 2009; Mehling et al., 2012). In an effort to develop an instrument able to measure the aforementioned dimensions of subjective interoceptive awareness and attentional style, Mehling et al. (2018) found it useful to consider subjective sensory awareness of the body's physiological states, processes (including pain and emotion), and actions (including movement); as well as a person's appraisals of these experiences. With this operational definition, Mehling and colleagues (2012/2018) developed the Multidimensional Assessment of Interoceptive Awareness - version 2 (MAIA-2), a 37-item self-report questionnaire to assess interoceptive awareness with a variety of subscales including *Noticing, Not-Distracting, Not-Worrying, Attention Regulation, Emotional Awareness, Self-Regulation, Body Listening,* and *Trusting*. The current research project uses the MAIA-2 and thus aligns with Mehling et al.'s (2018) definition of interoceptive awareness outlined above.

Interoceptive Awareness, Emotional Disorders, and Emotion Regulation

Studies have shown that individuals with anxiety disorders have demonstrated a heightened, hypervigilant orientation to bodily signals with a tendency to catastrophize, thus leading to a vicious cycle of anxiety (Boswell et al., 2013; Domschke et al., 2010; Mallorqui-Bague et al., 2016). Meanwhile, individuals with depression have been found to have lower interoceptive awareness and accuracy (Eggart et al., 2019; Furman et al., 2013; Pollatos et al.,

2009), including lower heartbeat perception ability (Dunn et al., 2010; Terhaar et al., 2012), and lower activity in brain regions responsible for interoceptive activity (Avery et al., 2014) compared to healthy control groups. Echoing these findings, Paulus and Stein (2010) noted that interoceptive dysfunction in emotional disorders can be attributed to distortions in interpreting internal body signals or a body prediction error, with an increased attentional bias toward threat leading to avoidance of feared aversive bodily states for those with anxiety, and an increased bias toward negative self-view leading to withdrawal among depressed individuals. Interoceptive experience and its interpretation thus plays a key role in emotional experience and emotion regulation.

In contrast, studies have also shown that heightened interoceptive awareness and accuracy is linked with positive mental health outcomes. Farb and colleagues (2015) argued that interoceptive awareness is directly linked with higher-level cognitive processes of predictive coding (i.e., cognitive appraisals of current states of well-being or distress based on past experience). Attending to these predictive coding processes via interoceptive awareness may facilitate therapeutic transformation, as it may help shift maladaptive appraisals of bodily sensations central to maintaining depression and anxiety, to those of greater acceptance and ease, while encouraging motivation towards goals by way of restoring a person's sense of agency and presence in the world (Farb at al., 2015). Similarly, heightened interoceptive awareness and accuracy via mindfulness-based cognitive therapy were found to reduce symptoms of depression (Fissler et al., 2016) and reduce chronic pain by facilitating the self-regulation of pain among patients (De Jong et al., 2019).

Cultivating awareness about the mind-body integration provides further insight into emotion regulation patterns and strategies (Dunn et al., 2007; Herbert et al., 2011; Herbert et al.,

2007). With respect to emotional disorders, the ability to observe and accept without judgement changing bodily sensations—in other words, a certain quality of mindful interoceptive awareness—may not only provide an anchor into present moment awareness but also foster a stance incompatible with rigid negative self-concepts often maintaining depressive states (Fissler et al., 2016), or the hyper-activated states of threat found in anxiety (Mallorqui-Bague et al., 2016). Therapeutic interventions like EFIT, which aim to provide an experience of secure attachment, co-regulation, acceptance and trust, may support the development of this quality of mindful interoceptive awareness, which may in turn play a role in better emotion regulation and the alleviation of depressive and anxiety symptoms.

Polyvagal Theory, Attachment and Emotional Disorders

Polyvagal theory offers a biobehavioural understanding of attachment theory and the influence of early attachment experience on emotion, emotion regulation and emotional disorders (Flores & Porges, 2017; Porges, 1995, 2011). Proposed by psychiatrist Stephen Porges in the mid-1990s and now a widely accepted theory in psychotherapy (Dana, 2018), polyvagal theory views the autonomic nervous system as the neurophysiological structure that regulates emotions and stress responses (Porges, 1995, 2011). Patterns of attachment forged in early childhood and carrying on into adulthood influence the development and activation of the vagus nerve and thus influence perceptions of safety and danger from other people in the environment (Flores & Flores, 2017). Secure attachment relationships in early life support the development of the ventral vagal nerve, which itself supports healthy parasympathetic responses to stress through social engagement (Porges, 2011). Activation of the ventral vagal nerve promotes calm, prosocial psychological states and behaviour, allowing the individual to rapidly engage and

disengage with the environment as needed without expending a lot of energy (Porges, 2003, 2011). In this state, individuals may feel, happy, active and interested, and perceive the world as safe, fun and peaceful (Dana, 2018). On a physiological level in the social engagement state, pupils constrict, the heart slows, muscles relax and digestion occurs (Porges, 2003, 2011).

Insecure attachment relationships prevent the full development of the ventral vagal nerve and in its place is an overreliance on the sympathetic nervous system or the 'fight-or-flight system,' leading to confrontation or retreat from the perceived threat (Porges, 2011). The sympathetic nervous system invokes the hypothalamic-pituitary-adrenal axis, which releases cortisol into the bloodstream and prepares the body for action (Dana, 2018). In this state, individuals may feel anxious or angry, and perceive the world as chaotic, dangerous, and unfriendly (Dana, 2018). The physiological elements of the fight-or-flight state include pupil dilation, speeding up of the heart and blood flow, muscle tension, and cessation of digestion, all in effort to prepare to the body for action (Porges, 2011). If the sympathetically-activated responses are unsuccessful in responding to the environment, the oldest, most primitive system of the parasympathetic nervous system—the dorsal vagal nerve or immobilization—is invoked, which in its fullest physical manifestation involves freezing and death-feigning (Porges, 2011). Emotionally, the individual may experience this as emotional shutdown, dissociation, numbing and hopelessness, and the world may be seen as empty, dead and dark (Dana, 2018). On a physiological level, immobilization is experienced as the shutting down of bodily systems to conserve energy and physical immobilization (Dana, 2018; Porges, 2011).

Regular access to the social engagement system in infancy helps dampen sympathetic nervous system and hypothalamic-pituitary-adrenal axis activity by calming the viscera and regulating facial muscles to promote prosocial behaviours, such as opening eye lids for looking,

moving facial and head muscles for expressing and orienting, and strengthening middle ear muscles for distinguishing human voice from background sound (Porges, 2003, 2011). For a full-term, healthy infant, the cortical pathways to activate the muscles in the face and head are sufficiently developed to facilitate social interaction with the caregiver through vocalizations, gazing and smiling (Porges, 2003, 2011). In contrast, a chronically unsafe environment and/or an inability to form a secure, coregulating relationship with a caregiver may dispose an infant or child to fight, flight or freeze states, establishing a pattern of hypo- or hyperreactivity, influencing the ability to attend to a task and to self-soothe or regulate emotions (Porges, 2003, 2011).

Given its function for bidirectional communication between the body and brain, the vagus nerve is the primary nerve of interoception (Porges, 2011). From birth, sensory stimuli provide ongoing information about perpetually changing internal and external environments, which an individual must detect and navigate in effort to maintain homeostasis (Porges, 1993b, 2011). Interoceptive processes in infants (i.e., the recognition and expression of the need for food, drink, sleep, comfort, etc.) are directly related to social interactions and the development of attachment patterns with the caregiver (Porges, 1993b, 2011). Interoceptive dysfunction or misattunement with a caregiver could lead to negative physiological or psychological impacts for an infant, such as difficulties recognizing, attending to and/or communicating one's interoceptive cues (Porges, 1993b, 2011), or difficulties trusting one's needs will be met (Dana, 2018). In this conceptualization, interoceptive processes are a foundation for physical, psychological, and social development, and the long-term impacts of interoceptive dysregulation may lead to patterns of emotion dysregulation and emotional disorders (Porges, 2011). Furthermore, when the social engagement system is depressed for prolonged amounts of time necessitating the

prolonged activation of the sympathetic nervous system, there is an increased risk for both physical (e.g., cardiovascular disorders) and mental (e.g., anxiety and depression disorders) illness (Dana, 2018). From a polyvagal perspective, anxiety disorders may arise from a prolonged nervous system state of fight-or-flight activation, while depressive disorders arise from a prolonged nervous system state of dorsal vagal activation or shutdown (Dana, 2018).

Helping individuals with emotional disorders explore their interoceptive cues connected to attachment-related emotional experiences in the context of a secure therapeutic relationship may help to improve capacity for emotion regulation, and thus alleviate symptoms of depression and anxiety. From an attachment perspective, which is the orientation of Emotionally-Focused Individual Therapy, working with clients to support a befriending of their nervous system responses and cultivating greater access to the social engagement system is a process that may not have been supported in situations of insecure attachment. In a safe therapeutic environment, individuals conditioned to fight-flight-freeze responses based on early attachment patterns may gradually learn how to access the social engagement system, as the therapist helps them to better understand and acknowledge their emotions and emotional responses, influencing their perception of self and other.

Emotionally-Focused Individual Therapy (EFIT) for Emotional Disorders

While research has demonstrated the relative stability of early caregiving attachment patterns into adulthood, there also exists an openness to change by way of later corrective experiences that challenge the validity of these early working models of self and other (Bowlby, 1988; Johnson, 2019; Mikulincer & Shaver, 2016). The malleability of attachment tendencies from insecure to more secure is what makes psychotherapy possible as an agent of

change. Emotionally-Focused Individual Therapy (EFIT; Johnson, 2019) is born from Emotionally-Focused Therapy (EFT; Johnson, 2004), an experiential, systemic, and evidence-based therapeutic approach used with couples and families. In addition to helping couples alleviate relationship distress, EFT had been reported to be effective in reducing depressive symptoms among couples in which one partner has been diagnosed with depression (Denton & Coffey, 2011; Denton et al., 2012; Dessaulles et al., 2003; Wiebe & Johnson, 2017; Wittenborn et al., 2019).

Like EFT, EFIT is an attachment-based experiential therapy that aims to foster a more secure attachment style though helping clients make sense of and regulate emotions in their attachment relationships, including that with the therapist and with significant others in the client's life. In a safe, therapeutic environment conducive to co-regulation, the EFIT therapist helps a client explore, make sense of and come to trust their emotional experience as valuable information about their attachment needs (Johnson, 2019). This may involve what Johnson (2019) calls affect assembly, or helping clients organize aspects of their emotional experience, including the initial perception, the bodily felt sense, the assigned meaning, and the motivational urge or action, and processing each aspect together as the emotions arise in session (Johnson, 2019). This process creates corrective emotional experiences and supports new patterns of connection in the client's attachment relationships (Johnson, 2019).

Emotional awareness and exploration cultivated in the presence of a therapist in a safe environment allows the client to experience strong feelings, while providing support for the slow experiential process of developing emotion regulation skills (Johnson, 2019). This process inherently fosters the development of trust in one's own emotional experience—a process that may not have happened or taken root in the individual's developmental experience with primary

attachment figures. The cultivation of trust in one's own emotional experience is intricately tied to the relationship to one's own bodily experience, and thus to their interoceptive awareness, done through a bottom-up process of tuning in to one's felt sense in therapy. In her review of considering interoception as a useful concept for psychotherapists from any approach, Duquette (2017) holds that meaningful therapeutic encounters involve helping the client tune into their interoceptive experience, and relaying a sense of safety to the client's body through empathic regard, interest, tone of voice, and non-verbal gestures.

Affect assembly is a stage in EFIT where individuals learn to tolerate and accept a wider intensity of emotional experiences, and thus develop greater flexibility in emotion regulation strategies. Gains in interoceptive awareness as part of the affect assembly process in EFIT could explain improvements in emotion regulation and symptom improvement of anxiety and depression. Among individuals with insecure-anxious attachment where anxiety symptoms are high, cultivation of awareness of bodily signals and their appraisal may be helpful, shifting the tendency of hypervigilance, catastrophizing, and immediate threat response to one of greater body trusting, acceptance and groundedness. Among individuals with insecure-avoidant attachment, attention and awareness can be cultivated around the body's sensations and their connection to emotional experience, aiming to 'increase the volume', listen more closely, and trust these cues rather than dismiss or blunt them.

The Present Study

The main purpose of the current research project is to examine the relationship between interoceptive awareness, emotion dysregulation and symptoms of depression and anxiety over the course of 15 sessions of Emotionally-Focused Individual Therapy (EFIT). Specifically, shifts

in interoceptive awareness in the first half of the therapy process (baseline to session 7) will be examined in relation to overall improvements in emotion dysregulation, and symptoms of depression and anxiety over the course of therapy. It is expected that improvements in interoceptive awareness early in the therapy process, as the client is encouraged to tune into their inner experience of emotions and relationships, will be related to greater improvements in emotion regulation and greater alleviation of depression and anxiety symptoms. This is the first study to examine changes in interoceptive awareness and emotion regulation among a transdiagnostic population of individuals with emotional disorders receiving EFIT.

Hypotheses

The hypotheses for this research project are:

1. a. Higher levels of interoceptive awareness at study baseline will be significantly associated with lower levels of depression at baseline.

   b. Higher levels of interoceptive awareness at study baseline will be significantly associated with lower anxiety symptoms at baseline.

   c. Higher levels of interoceptive awareness at study baseline will be significantly associated with lower emotion dysregulation at baseline.

2. a. Participants will demonstrate a significant linear decrease in depression measured across EFIT sessions from baseline to midpoint 1 (session 5), midpoint 2 (session 7), and post-therapy.

   b. Participants will demonstrate a significant linear decrease in anxiety measured across EFIT sessions from baseline to midpoint 1 (session 5), midpoint 2 (session 7), and post-therapy.

c. Participants will demonstrate a significant linear decrease in emotion dysregulation measured across EFIT sessions from baseline to midpoint 1 (session 5), midpoint 2 (session 7), and post-therapy.

d. Participants will demonstrate a significant linear increase in interoceptive awareness measured across EFIT sessions from baseline to midpoint 1 (session 5), midpoint 2 (session 7), and post-therapy.

3. a. Increases in interoceptive awareness from baseline to midpoint 2 (session 7) will be significantly associated with linear reductions in depression symptoms across EFIT sessions from baseline to midpoint 1 (session 5), midpoint 2 (session 7), and post-therapy.

   b. Increases in interoceptive awareness from baseline to midpoint 2 (session 7) will be significantly associated with linear reductions in anxiety symptoms across EFIT sessions from baseline to midpoint 1 (session 5), midpoint 2 (session 7), and post-therapy.

   c. Increases in interoceptive awareness from baseline to midpoint 2 (session 7) will be significantly associated with linear reductions in emotion dysregulation across EFIT sessions from baseline to midpoint 1 (session 5), midpoint 2 (session 7), and post-therapy.

Method

Participants

Participants for a larger randomized-controlled EFIT study were recruited through posters, social media and email circulated through university networks and public spaces, advertising a study exploring emotions in the treatment of anxiety and depression. Individuals

self-identified as having symptoms and/or a diagnosis of depression with possible comorbid anxiety, and those who met the screening and eligibility criteria described below were included in the larger study following their provision of informed consent. The sample for the current study (*N* =37 at baseline) included a subset of this larger participant pool.

Sample Selection

The sample for the current study included the first 37 individuals in the EFIT group who completed the first wave of data collection. As the larger study from which the current participant sample was derived is still ongoing, the data set was incomplete at the time of analysis (*N* = 37 at baseline and there were missing data at both midpoints and post-therapy given that many participants were still receiving the treatment condition). However, also note that analyses involving all time points were conducted using Hierarchical Linear Modeling (HLM), which accounts well for missing data (Singer & Willett, 2003).

Demographic Characteristics

Participants in the current study ranged in age from 18 to 72 with the mean age of 36.11 (*SD* = 12.63). In terms of gender identification, the sample comprised twenty-five women (68%) and 12 men (32%). Twenty-seven participants identified as Caucasian (73%), seven participants identified as Southeast Asian (18.9%), while the remaining three participants identified as Indigenous, Latin American, and South Asian, respectively (2.7% each). The majority of participants (70.3%) were in a committed relationship and more than half of these individuals reported living with their partner. There was a wide annual income range from 13.5% reporting

less than $20,000 to 35.1% participants reporting more than $100,000. The remaining participants fell somewhere between this range.

The majority of participants (73%) have participated in psychotherapy in the past, and 33 of 37 participants reported either current or past experience (including diagnosed and undiagnosed) with mood disorders (29.7%), anxiety disorders (35.1%), eating disorders (2.7%), as well as dysthymia and postpartum depression. Sociodemographic data are summarized in Table 1.

Table 1

Participant Demographic Characteristics

	N	**Percentage**
Gender		
Women	25	68
Men	12	32
Ethno-racial background		
Caucasian	27	73
Southeast Asian	7	18.9
Indigenous	1	2.7
Latin American	1	2.7
South Asian	1	2.7
Mental Health background		
Mood disorders	11	29.7
Anxiety disorders	13	35.1
Eating disorders	1	2.7
Other (dysthymia, trauma)	8	21.6

Procedures

Screening and Eligibility Criteria

Participants in the current study were recruited as part of a larger EFIT randomized-controlled trial. Screening involved a two-step process: first, with a telephone interview

including a verbally administered Beck Depression Inventory (BDI; Beck et al., 1996) and Beck Anxiety Inventory (BAI; Beck et al., 1998) to ensure participants presented symptoms of these emotional disorders; and second, participants who passed the initial screening were invited to a one-on-one assessment session (in-person before March 2020 and online after March 2020), where they were administered a psychodiagnostics interview, the Anxiety and Related Disorders Interview Schedule for DSM-5 (ADIS-5; Brown & Barlow, 2014) to determine final eligibility.

Inclusion criteria for participants were: over the age of 18 years, fluent in English, meets criteria for major depressive disorder with optional comorbid symptoms of anxiety disorders using the ADIS-5 (Brown & Barlow, 2014) in the study assessment sessions; and mild to moderate scores on the BAI (Beck et al., 1988) and BDI (Beck et al., 1996) questionnaires. Exclusion criteria were: psychotropic medication change six weeks before or during the study; or current DSM diagnosis of bipolar disorder, schizophrenia spectrum disorder, post-traumatic stress disorder, and/or substance dependence or abuse.

Treatment Procedure

Eligible participants to the larger randomized-controlled trial were randomly assigned into one of two groups: the EFIT treatment group where they received 15 weeks of weekly Emotionally-Focused Individual Therapy with a trained practitioner (psychologists, psychotherapists, and social workers), or they were assigned to a wait list group for 15 weeks. The current study used data from the treatment group only.

Assessment Procedure

Participants in the current study were invited to complete the first battery of questionnaires before EFIT treatment began, at two midpoints during therapy (weeks 5 and 7), and at the end of 15 weeks of treatment. All questionnaire data was collected from participants online via Qualtrics, a secure online survey platform. Each participant was given a unique identifying code to input in each survey to ensure anonymity and provide extra protection of disaggregated data sets of questionnaires with participants' names. The data from the survey platform was downloaded and stored on a password protected, encrypted device.

Measures

Interoceptive Awareness

Interoceptive awareness was measured using the Multidimensional Assessment of Interoceptive Awareness-version 2 (MAIA-v2; Mehling et al., 2018). The MAIA-v2 is a self-report questionnaire composed of 37 items to be rated on a six-point Likert scale from 0 (never) to 5 (always), with higher scores indicating a higher level of interoceptive awareness. The MAIA-v2 is a multidimensional measure composed of eight subscales including: *Noticing, Not-Distracting, Not-Worrying, Attention Regulation, Emotional Awareness, Self-Regulation, Body Listening,* and *Trusting*; it has been translated into more than 20 languages and validated in nearly half of these translations. The subscales have demonstrated adequate to excellent internal consistency with Cronbach alphas ranging from 0.64 to 0.83 (Mehling et al., 2018). Test-retest validity for the MAIA-v2 has only been conducted in translated versions, and has been found to be moderate to good in Chinese and Portuguese (Lin et al., 2017; Machorrinho et al., 2018), and

high in German and Japanese (Bornemann et al, 2015; Fujino, 2019). In the current study, internal consistency reliability across timepoints remained high with Cronbach alpha scores of 0.90 at baseline, 0.88 at midpoint 1, 0.95 at midpoint 2, and 0.89 at post-therapy.

Emotion Regulation

Emotion regulation was measured with the Difficulties in Emotion Regulation Scale - 18 (DERS-18; Victor & Klonsky, 2016)—a self-report questionnaire composed of the strongest 18 questions taken from the widely used and more lengthy original Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The original long-form DERS (Gratz & Roemer, 2004) and the DERS-18 were designed to assess trait-level perceived emotion regulation ability in a clinical-contextual framework (Hallion et al., 2018). Questions are rated on a five-point Likert scale from 1 (almost never) to 5 (almost always), with higher scores indicating higher levels of emotion dysregulation. The DERS is comprised of six subscales: *Awareness, Clarity, Goals, Impulse, Nonacceptance,* and *Strategies*. Similar to the original DERS, the DERS-18 demonstrated high internal consistency reliability for the total score with an alpha of 0.91, as well as the subscales with alphas ranging from 0.77 (awareness) to 0.90 (goals and impulse) (Victor & Klonsky, 2016). In the current study, the instrument demonstrated moderate to high internal consistency reliability, with overall alpha scores of 0.84 at baseline, 0.89 at midpoint 1, 0.87 at midpoint 2, and 0.72 at post-therapy.

Emotional Disorders

Symptoms of major depressive disorder were measured with the Patient-Reported Outcomes Measurement Information System – Depression – Short Form (PROMIS –

Depression; Pilkonis et al., 2011;), an 8-item self-report questionnaire with five answer options from never (1) to always (5), with higher scores signalling greater presence of depression symptoms. The PROMIS – Depression has high internal consistency with a reliability score of 0.83 in the original publication of the short-form (Pilkonis et al, 2011), and 0.974 in a more recent study (Nolte et al., 2019). The present study found high Cronbach alpha scores across data collection timepoints for the PROMIS - Depression: 0.87 at baseline, 0.96 at midpoint 1, 0.91 at midpoint 2, and 0.96 at post-therapy.

Symptoms of anxiety were measured with the Patient-Reported Outcomes Measurement Information System – Anxiety – Short Form (PROMIS – Anxiety; Pilkonis et al., 2011), an 8-item self-report questionnaire with five answer options from never (1) to always (5), with higher scores signalling greater presence of anxiety symptoms. The PROMIS - Anxiety has moderately high internal consistency with a reliability score of 0.79. The current study found high Cronbach alphas score across data collection timepoint for the PROMIS – Anxiety: 0.88 at baseline, 0.93 at midpoint 1, 0.95 at midpoint 2, and 0.93 at post-therapy.

Statistical Analyses

Descriptive statistics were calculated including frequencies, means, and standard deviations for each questionnaire and their subscales. The strength and direction of linear relationships between variables at baseline were explored via bivariate correlations.

Hierarchical Linear Modeling (HLM) and Residual Change Score

Hierarchical linear modelling (HLM; Singer & Willett, 2003) was used to examine trajectories of change in interoceptive awareness during the course of therapy, and to test

whether increases in interoceptive awareness in the beginning half of therapy (from baseline to session 7) are significantly associated with reductions in symptoms of depression and anxiety, as well as changes in emotion regulation. HLM is a beneficial method of analysis for the current study for several reasons: first, it allows for the examination of nested data, which is particularly useful in longitudinal research where multiple time points are nested within individual participants; second, it allows for reliable parameter estimates even when there is missing data due to participant drop-out and/or incomplete data sets—a common characteristic of longitudinal research in psychotherapy—by allowing for the use of all data gathered from participants without demanding complete data sets for each participant; and third, it allows for data to be modeled flexibly across time, so that assessments can occur at different times for each participant (Singer & Willet, 2003; Wiebe et al., 2017).

Residual changes scores for interoceptive awareness from baseline to midpoint 2 (session 7) were calculated in order to test whether change in interoceptive awareness is a significant predictor of linear changes in emotion dysregulation, and symptoms of depression and anxiety over the course of EFIT. Residual change scores were added as a predictor of change at level 2 in HLM for each of the linear models examining change in emotion dysregulation, anxiety and depression scores. The residual change scores are a reliable estimation of the amount of change demonstrated from pre-therapy to midpoint 2, accounting for expected change due to measurement error. Higher residual change scores demonstrate greater reductions in these variables than what can be accounted for by scores at baseline. Residual change scores are a more reliable indicator of change between time points as compared to a simple difference score (Gollwitzer et al., 2014).

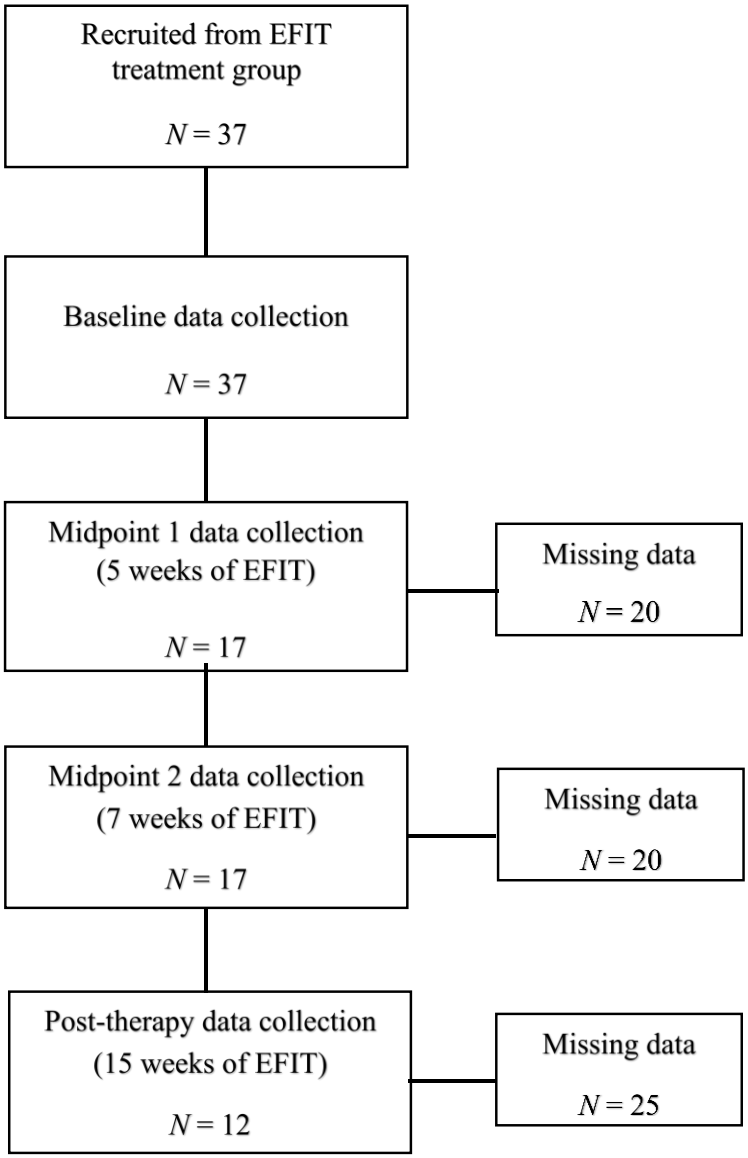
In HLM, it is recommended that higher-level models be built from lower-level models (Raudenbush & Bryk, 2002; Singer & Willett, 2003). Intercepts-only models were run for each of the dependent variables, as well as linear models factoring in change over time. Parameters were added in a step-wise process and deviance statistics were compared to determine whether additional parameters contributed to a better fit with the data. If, when using a chi-square significance test, the deviance statistic of a more complex model is found to be significantly lower than a simpler model, the complex model is determined to be a better fit to the data.

Missing data

There were increasing amounts of missing data at each progressive data collection point in the study, given that many participants were still receiving the treatment condition at the time of data analysis due to delays caused by the Covid-19 pandemic. Missing data were investigated using pattern-mixture models (Hedeker & Gibbons, 1997), assessing whether MAIA-v2, DERS-18, PROMIS – Depression and PROMIS – Anxiety scores are dependent on missing data by modeling for the pattern of missing data in the second level models. Non-significance in these analyses indicates that data are missing at random (MAR). Missing data at each time point are outlined in Figure 1. All analyses were performed using SPSS Version 27 and HLM 8.

Figure 1

Participant Data at Study Data Collection Timepoints



Results

Preliminary Data Screening and Cleaning

A total of 37 participants were recruited into this study from a larger randomized-controlled study. Prior to analysis, the data were examined for errors, outliers and deviations from normal distribution (Berkman & Reise, 2012). The raw scores extracted from Qualtrics and transformed in SPSS into meaningful scores according to the scoring rubric for each questionnaire were later compared against raw scores extracted from Qualtrics into an SPSS output data file to ensure accuracy and eliminate errors. No discrepancies were detected.

The process for examining the data for outliers involved reviewing the minimum and maximum scores via histogram for each item; no errors were found. Outliers in the mean scores for each variable at each timepoint were screened using box plots. Outliers were found in the DERS-18 baseline mean score (N = 2), and at midpoint 2 in the PROMIS – Depression (N = 1), DERS-18 (N =2), and MAIA-v2 (N =3). Despite the presence of these few extreme outliers, normal distributions were found for all variables at all timepoints. Normality was examined through inspecting the standardized skewness and standardized kurtosis scores for the mean scores for each variable at all timepoints. Following the normality test outlined in Berkman and Reise (2012), distributions are not significantly different from normal if skewness and kurtosis are within twice their respective standard errors from zero. Skewness and kurtosis scores for all mean variables at every timepoint passed the test for normality.

In an effort to determine whether missing scores had a systematic pattern or were missing at random (MAR), a pattern mixture model was used (Gallop & Tasca, 2009). Results indicated that missing data at any timepoint did not significantly influence outcomes for interoceptive

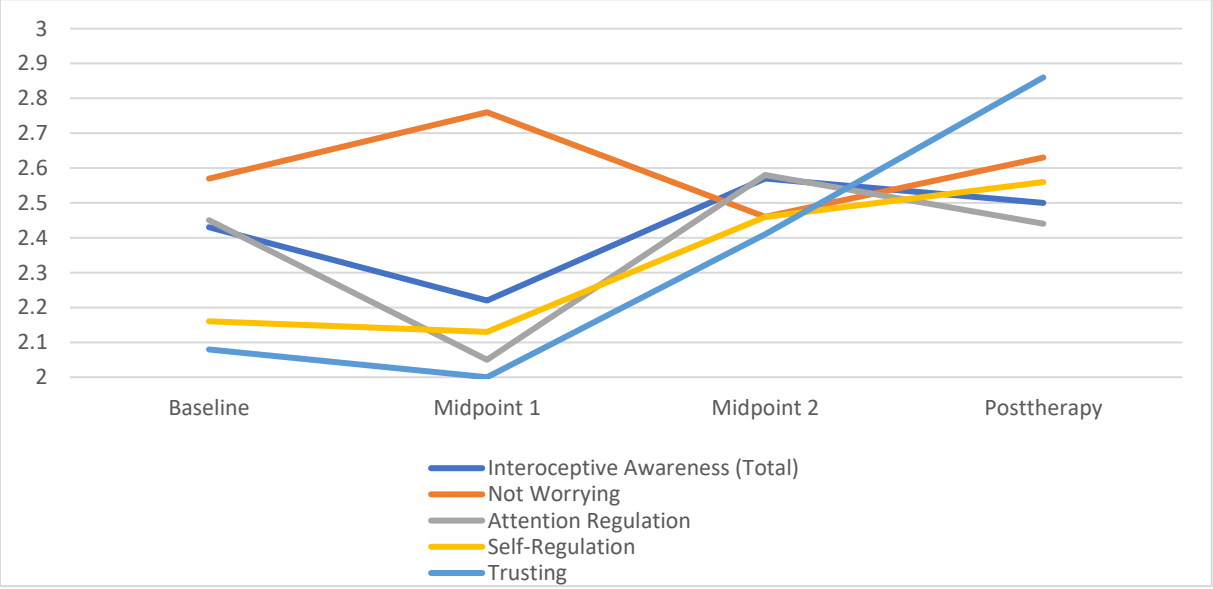
awareness, emotion regulation, depression, or anxiety (p >.05), in spite of the substantial amount of missing data at each of these timepoints.

Preliminary Analyses

Baseline scores for interoceptive awareness were low to moderate with a mean score of 2.43 (*SD* = 0.59). Interoceptive awareness scores decreased slightly at midpoint 1 to 2.22 (*SD* = 0.52), increasing at midpoint 2 to 2.57 (*SD* = 0.82) and remaining relatively constant in post-therapy scores at 2.50 (*SD* = 0.56). The change in self-reported interoceptive awareness across the treatment condition is graphed in Figure 2, as well as the changes in four MAIA subscales (*Not Worrying, Attention Regulation, Self-Regulation, and Trusting*) that showed significant correlational results with anxiety and emotion dysregulation at baseline.

Figure 2

Interoceptive Awareness Mean Scores Across Treatment



Mean scores on the PROMIS – Depression decreased over time, with a baseline score of 3.29 (*SD* = 0.68), 2.77 (*SD* = 0.93) at midpoint 1, 3.02 (*SD* = 0.79), and 2.26 (*SD* = 0.86) at the post-condition. Anxiety scores as measured by the PROMIS – Anxiety also decreased over time indicated a mean score of 3.23 (*SD* = 0.70) at baseline, 2.74 (*SD* = 0.74) at midpoint 1, 2.97 (*SD* = 0.87) at midpoint 2, and 2.10 (*SD* = 0.60) at post-condition. Mean scores on the DERS-18 measuring emotion dysregulation decreased linearly across the treatment condition, with a baseline mean score of 2.63 (*SD* = 0.58), 2.49 (*SD* = 0.63) at midpoint 1, 2.45 (*SD* = 0.61), and 2.28 (*SD* = 0.45) at post-therapy. Means and standard deviations for dependent variables are provided in Table 2 and graphed in Figure 3.

Table 2

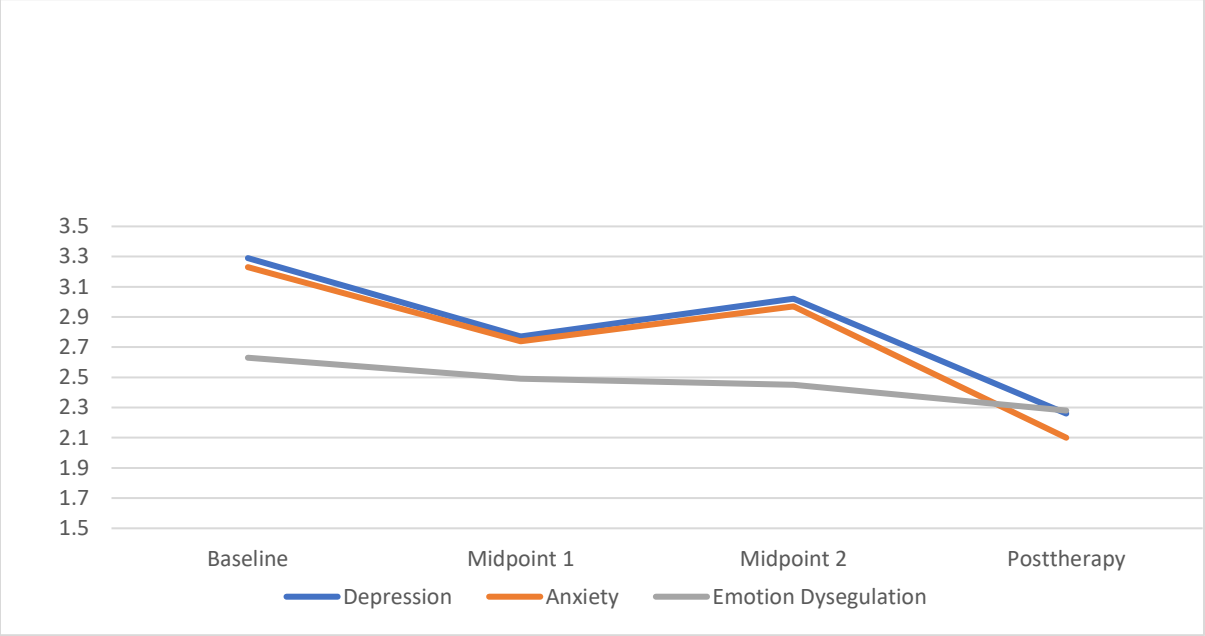
Means and Standard Deviations of Variables Across Treatment (N = 37)

	N	Pretherapy *M* (*SD*)	*N*	Midpoint 1 *M* (*SD*)	*N*	Midpoint 2 *M* (*SD*)	*N*	Posttherapy *M* (*SD*)
Interoceptive awareness	37	2.43 (0.59)	16	2.22 (0.52)	17	2.57 (0.82)	12	2.50 (0.56)
Emotion dysregulation	37	2.63 (0.58)	17	2.49 (0.63)	17	2.45 (0.61)	12	2.28 (0.45)
Depression	37	3.29 (0.68)	26	2.77 (0.93)	25	3.02 (0.79)	10	2.26 (0.86)
Anxiety	37	3.23 (0.70)	26	2.74 (0.74)	25	2.97 (0.87)	10	2.10 (0.60)

Note. N = individuals

Figure 3

Depression, Anxiety and Emotion Dysregulation Mean Scores Across Treatment



Hypothesis 1: Baseline Correlations Between Interoceptive Awareness and Depression, Anxiety and Emotion Dysregulation

A series of Pearson correlations were run to assess the relationship at baseline between interoceptive awareness (including the eight subscales) and depression, anxiety and emotion dysregulation. A summary of findings can be found in Table 3.

Table 3

Baseline Correlation Scores between Interoceptive Awareness (total score and subscales), Depression, Anxiety, and Emotion Dysregulation

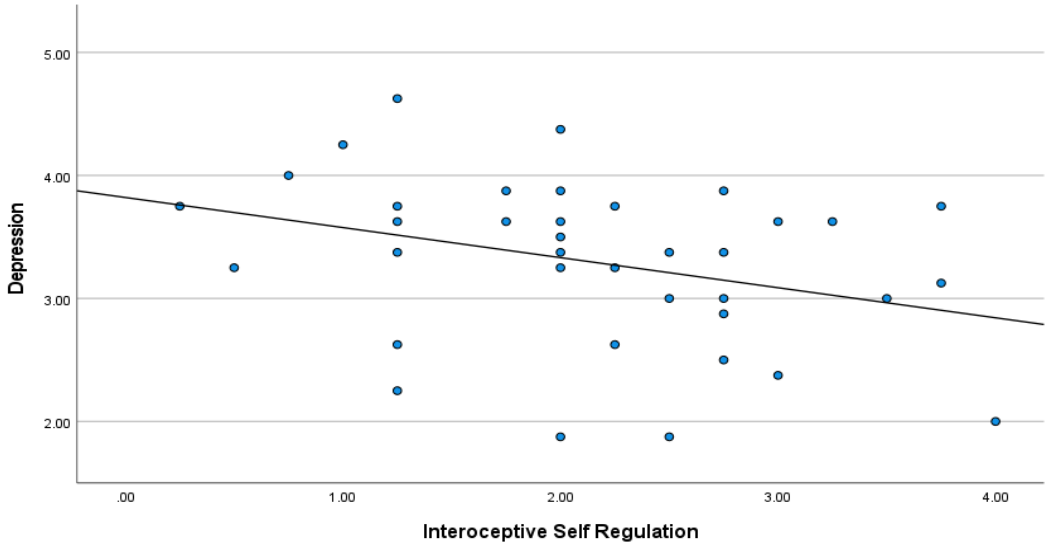
	PROMIS-Depression	**PROMIS-Anxiety**	**DERS-18**
Interoceptive Awareness Total	-0.171	-0.301	-0.208
Interoceptive *Noticing*	0.114	0.094	-0.059
Interoceptive *Not Distracting*	-0.020	-0.168	0.028
Interoceptive *Not Worrying*	-0.294	-0.510**	-0.246
Interoceptive *Attention Regulation*	-0.055	-0.191	-0.356*
Interoceptive *Emotional Awareness*	-0.045	0.015	0.079
Interoceptive *Self-Regulation*	-0.331*	-0.220	-.070
Interoceptive *Body Listening*	-0.121	-0.068	-0.081
Interoceptive *Trusting*	-0.146	-0.350*	-0.185

Note. * $p < 0.05$ level (2-tailed). ** $p < 0.01$ level (2-tailed).

Although there is a negative correlation between levels of interoceptive awareness (total score) and severity of depression, no significant relationship was found, $r = -0.171$, $p = 0.311$. All of the interoceptive awareness subscales except for *Noticing* report a negative correlation with depression, however, only the correlation between interoceptive *Self-Regulation* and depression was significant, $r = -0.331$, $p = 0.045$ as shown in Figure 4

Figure 4

Scatterplot Showing the Relationship Between Interoceptive 'Self-Regulation' and Depression at Baseline.



Although there is a negative correlation between levels of interoceptive awareness (total score) and severity of anxiety, it was not statistically significant, $r = -0.301$, $p = 0.070$. All of the interoceptive awareness subscales except for *Noticing* report a negative correlation with anxiety. The negative correlations between two interoceptive awareness subscales—*Not Worrying* and *Trusting*—and anxiety reported significant results, with $r = -0.510$, $p = 0.001$ (*Not Worrying*) and $r = -0.350$, $p = 0.034$ (*Trusting*), as shown in Figures 5 and 6, respectively.

Figure 5

Scatterplot Showing the Relationship Between Interoceptive 'Not Worrying' and Anxiety Symptoms at Baseline

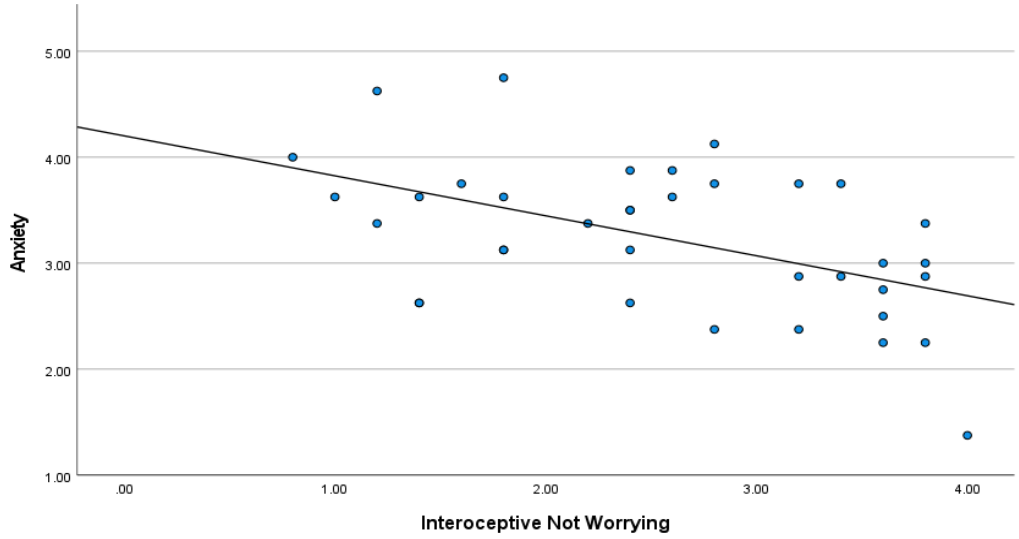
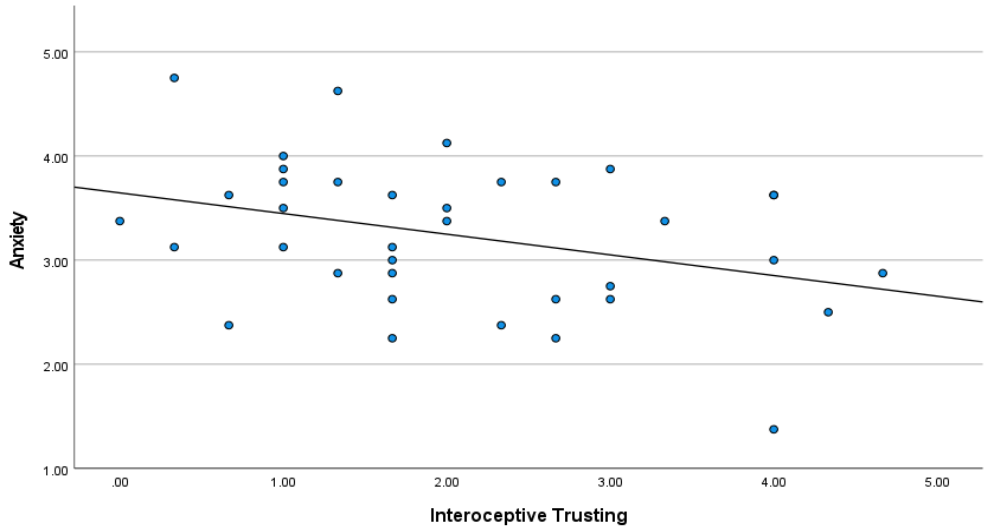


Figure 6

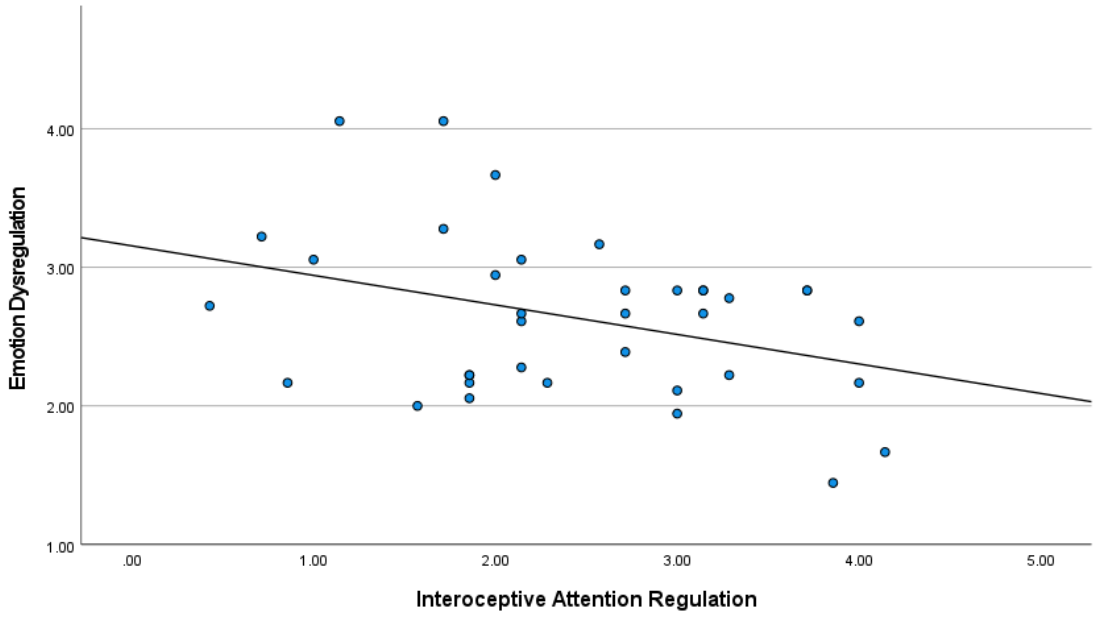
Scatterplot Showing the Relationship Between Interoceptive 'Trusting' and Anxiety at Baseline



Although there is a negative correlation between levels of interoceptive awareness (total score) and emotion dysregulation, it was not statistically significant, $r = -0.208$, $p = 0.216$. All of the interoceptive awareness subscales except for *Not Distracting* and *Emotional Awareness* report a negative correlation with emotion dysregulation, however, only the negative correlation between interoceptive *Attention Regulation* and emotion dysregulation was significant, $r = -0.356$, $p = 0.030$, as shown in Figure 7.

Figure 7

Scatterplot Showing the Relationship Between Interoceptive 'Attention Regulation' and Emotion Dysregulation at Baseline



Hypothesis 2: Hierarchical Linear Modelling (HLM) of Linear Changes in Depression, Anxiety, Emotion Dysregulation and Interoceptive Awareness

Scores on the PROMIS-Depression from baseline to midpoint 1, midpoint 2, and post-therapy indicate a significant decrease in reported depression where $\gamma = -0.24$, $t\ (36) = -3.81$, $p = <0.001$. Scores on the PROMIS-Anxiety from baseline to midpoint 1, midpoint 2, and post-

therapy indicate a significant decrease in reported anxiety where $\gamma = -0.27$, t (36) = -4.32, p = <0.001**.** Scores on the DERS-18 from baseline to midpoint 1, midpoint 2, and post-therapy indicate a non-significant decrease in reported emotion dysregulation where $\gamma = -0.09$, t (36) = -1.42, $p = 0.17$. Hypothesis 2c therefore, cannot be supported. Scores on the MAIA-v2 from baseline to midpoint 1, midpoint 2, and post-therapy indicate a non-significant increase in reported interoceptive awareness where $\gamma = 0.03$, t (36) = -0.46, $p = 0.65$. Hypothesis 2d therefore, cannot be supported. Data on all intercepts and slopes are detailed in Table 4.

Table 4

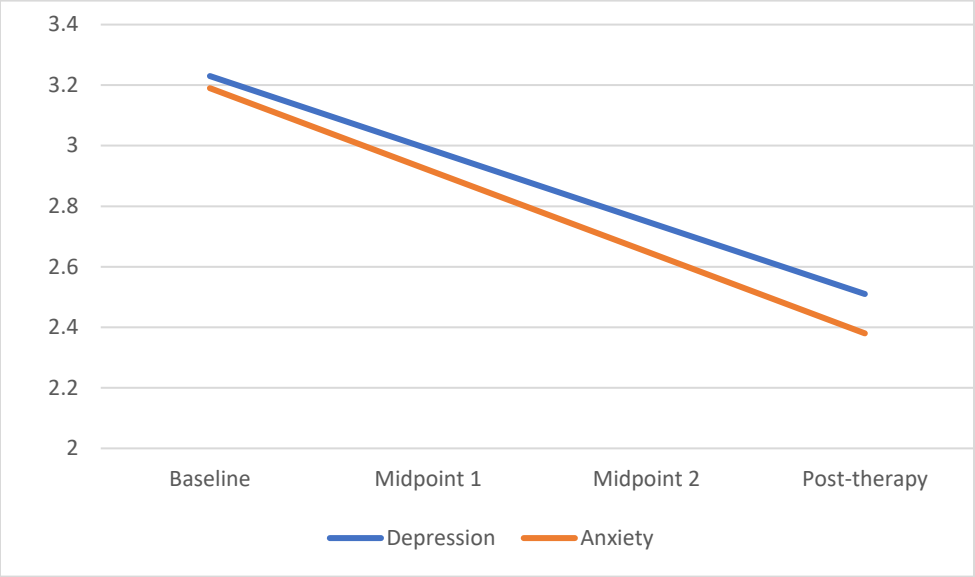
Change in Depression, Anxiety and Emotion Dysregulation Across Treatment

	Coefficient	***SE***	***t***	***df***	***p***	**Deviance**
Depression						
Intercept	3.23	0.12	27.59	36	<0.001	
Linear slope	-0.24	0.06	-3.81	36	<0.001**	212.69
Anxiety						
Intercept	3.19	0.11	27.97	36	<0.001	
Linear slope	-0.27	0.06	-4.31	36	<0.001**	210.66
Emotion Dysregulation						
Intercept	2.63	0.10	27.10	36	<0.001	
Linear slope	-0.09	0.06	-1.42	36	0.165	124.64
Interoceptive Awareness						
Intercept	2.39	0.10	24.70	36	<0.001	
Linear slope	0.03	0.06	0.46	36	0.652	135.03

Note. * $p < 0.05$ and ** $p < 0.01$.

Figure 8

Linear Change in Depression and Anxiety Symptoms Across Treatment



Hypothesis 3: Hierarchical Linear Modelling (HLM) Using Interoceptive Awareness as Predictor for Linear Changes in Depression, Anxiety and Emotion Dysregulation

Results showed that changes in interoceptive awareness from baseline to session 7 as measured by the interoceptive awareness residual change score were not significantly related to changes in depression across treatment, as $\gamma = -0.21$, t (15) = -1.41, $p = 0.179$. Hypothesis 3a therefore cannot be supported. According to the deviance statistics calculations, this model better accounts for variance in PROMIS-Depression scores than the intercepts-only and linear change models, as χ^2 (2) = 108.34, $p < 0.001$.

Results showed that changes in interoceptive awareness from baseline to session 7 as measured by the interoceptive awareness residual change score were not significantly related to changes in anxiety across treatment, as $\gamma = -0.05$, t (15) = -0.31, $p = 0.761$. Hypothesis 3b therefore cannot be supported. According to the deviance statistics calculations, this model better

accounts for the PROMIS-Anxiety data than the intercepts-only and linear change models, as χ^2 (2) = 92.49, $p < 0.001$.

Results showed that changes in interoceptive awareness from baseline to session 7 as measured by the interoceptive awareness residual change score was significantly related to changes in emotion dysregulation across treatment, $\gamma = -0.37$, t (15) = -3.12, $p = 0.007$. According to the deviance statistics calculations, this model better accounts for the data than the intercepts-only and linear change models, as χ^2 (2) = 48.94, $p < 0.001$.

Follow-up analyses were conducted by entering residual change scores for each of the interoceptive awareness subscales into separate models as a predictor of change in emotion dysregulation. Residual change scores for three of the eight interoceptive awareness subscales demonstrated significant results, namely interoceptive *Attention Regulation* ($\gamma = -0.22$, t (15) = -3.02, $p = 0.009$), interoceptive *Self-Regulation* ($\gamma = -0.22$, t (15) = -2.57, $p = 0.02$), and interoceptive *Trusting* ($\gamma = -0.22$, t (15) = -3.65, $p = 0.002$). The deviance statistics for all three interoceptive awareness subscales indicate that the more complex models with the predictor variable of residual change better accounts for the data than the simpler models of intercepts-only and linear change, as χ^2 (2) = 48.28, $p < 0.001$ (interoceptive *Attention Regulation*), χ^2 (2) = 45.44, $p < 0.001$ (interoceptive *Self-Regulation*), and χ^2 (2) = 49.13, $p < 0.001$ (interoceptive *Trusting*).

Results for the interoceptive awareness residual change score with other dependent variables are outlined in Table 5 below, while results for the interoceptive awareness subscale residual change scores with the dependent variable of emotion dysregulation are outlined in Table 6.

Table 5

Change in Interoceptive Awareness Predicting Depression, Anxiety and Emotion Dysregulation Linear slopes across Treatment

	Coefficient	*SE*	*t*	*df*	*p*	Deviance
Depression						
Intercept	3.23	0.12	27.59	36	<0.001	
Linear slope	-0.24	0.06	-3.81	36	<0.001	
Interoceptive awareness change	-0.21	0.15	-1.41	15	0.179	104.35
Anxiety						
Intercept	3.19	0.11	27.97	36	<0.001	
Linear slope	-0.27	0.06	-4.31	36	<0.001	
Interoceptive awareness change	-0.05	0.16	-0.31	15	0.761	118.16
Emotion Dysregulation						
Intercept	2.63	0.10	27.10	36	<0.001	
Linear slope	-0.09	0.06	-1.42	36	0.165	
Interoceptive awareness change	-0.37	0.12	-3.12	15	0.007**	75.71

Note. * $p < 0.05$ and ** $p < 0.01$.

Table 6

Change in Emotion Dysregulation Across Treatment with Interoceptive Awareness Subscales Residual Change Score as Predictor

	Coefficient	SE	*t*	*df*	*p*	Deviance
Emotion Dysregulation						
Intercept	2.63	0.10	27.10	36	<0.001	
Linear slope	-0.09	0.06	-1.42	36	0.165	
Interoceptive awareness A-R^+ change	-0.22	0.07	-3.02	15	0.009**	76.36
Emotion Dysregulation						
Intercept	2.63	0.10	27.10	36	<0.001	
Linear slope	-0.09	0.06	-1.42	36	0.165	
Interoceptive awareness S-R^+ change	-.022	0.09	-2.57	15	0.021**	79.21
Emotion Dysregulation						
Intercept	2.63	0.10	27.10	36	<0.001	
Linear slope	-0.09	0.06	-1.42	36	0.165	
Interoceptive awareness Trusting change	-.022	0.06	-3.65	15	0.002**	75.51

[+]*Note*: A-R is the interoceptive awareness subscale of *Attention Regulation,* and S-R is the interoceptive awareness subscale of *Self-Regulation*; and * $p < 0.05$ and ** $p < 0.01$.

Discussion

The current study examined the relationship between interoceptive awareness and depression, anxiety and emotion dysregulation among individuals with emotion disorders across 15 sessions of Emotionally-Focused Individual Therapy (EFIT). Baseline and linear changes were examined followed by an investigation of change in interoceptive awareness in the first half of therapy as a predictor of overall reductions in emotion dysregulation, and symptoms of depression and anxiety.

The baseline results indicated that lower levels of anxiety symptoms were significantly correlated with higher levels of interoceptive *Not Worrying* and interoceptive *Trusting*, lower levels of depressive symptoms were significantly correlated with higher interoceptive *Self-Regulation*, and lower levels of emotion dysregulation were significantly correlated with greater interoceptive *Attention Regulation*. These results indicate that in this sample of participants with emotional disorders, those who reported less severe anxiety symptoms at baseline tended to have less worry about and greater trust in their interoceptive experience at baseline. Whereas participants who reported less severe depression symptoms at baseline tended to have a greater ability to regulate distress by paying attention to their interoceptive experience at baseline. And last, participants who reported lower on emotion dysregulation at baseline tended to have a greater ability in interoceptive attention at baseline.

In terms of changes in depression, anxiety, emotion dysregulation, and interoceptive awareness across EFIT sessions, the results showed a significant linear decrease in depression

and anxiety, as well as decreases in emotion dysregulation and increases in interoceptive awareness that did not reach statistical significance.

Hierarchical linear modelling (HLM) analyses revealed that changes in interoceptive awareness from baseline to midpoint 2 (session 7) did not significantly predict changes in depression and anxiety. However, changes in interoceptive awareness from baseline to midpoint 2 (session 7), particularly increases in bodily attention regulation, self-regulation using bodily cues, and bodily trusting, significantly predicted decreases in emotion dysregulation. Given that the overall linear decreases in emotion dysregulation were not significant, however, these results must be interpreted with caution.

Interoceptive Awareness and Emotional Disorders

Somatic symptoms often accompany emotional disorders: in depression, this includes appetite, sleep, energy, and libido changes, and an increase in aches and pains; and in anxiety, a there is a multitude of potential symptoms including but not limited to increased bodily tension, heart palpitations, sweating, trembling, nausea, dizziness, and chest pain (American Psychiatric Association, 2013). The way in which an individual is aware of and subjectively interprets these bodily experiences via their interoceptive awareness, as has been thus far discussed in the literature, may contribute to maintaining or worsening such presenting symptoms of the emotional disorder (Mallorqui-Bague et al., 2016).

The current study found significant correlations in the baseline data between various subscales of interoceptive awareness and symptoms of depression and anxiety. First, lower levels of interoceptive *Self-Regulation* were significantly correlated to higher levels of depression at baseline. Interoceptive *Self-Regulation* is the ability to regulate attention and distress by attending to the body's sensations with a mindful (as opposed to an anxious, ruminative or

dismissive) attitude (Mehling et al., 2012). This finding in the current study aligns with earlier studies where overall lower interoceptive awareness was found among individuals with depression (Avery et al., 2014; De Jong et al., 2016; Dunn et al., 2007; Dunn et al., 2010; Eggart et al., 2019; Furman et al., 2013; Mussgay et al., 1999; Paulus & Stein, 2010; Pollatos et al., 2009; Terhaar et al., 2012). Results of the aforementioned studies suggest that individuals with depression have a general disregard for bodily signals of strain, discomfort and other forms of overburdening (Mussgay et al., 1999); a tendency toward negative biases from negative moods in interpreting interoceptive states (Paulus & Stein, 2010); and lower levels of activity in the insula—the region of the brain responsible for interoceptive processing (Avery et al., 2014). In this context, the present finding may suggest that individuals with depression have a tendency to blunt interoceptive cues, therefore making it difficult to use interoceptive processes as a source of information to regulate distress. It also may suggest that, given the tendency toward negative biases in interpreting interoceptive states among individuals with depression, interoceptive awareness in this frame of mind cannot help regulate distress but rather maintains or exacerbates it. Furthermore, from a neurobiological perspective, the current finding may suggest that individuals with depression have a reduced capacity for interoceptive processing, and consequently face limitations in using interoceptive information to regulate distress.

The baseline data also revealed significant correlations in interoceptive awareness and anxiety. Specifically, the tendency to worry or experience emotional distress with sensations of pain or discomfort, as well as low levels of bodily trust were significantly correlated with higher levels of anxiety. These findings resonate with the literature on the interoceptive experiences among individuals with anxiety, in that heightened attention to internal bodily sensations often evoke a threat response (Boswell et al., 2013; Domschke et al., 2010; Ehlers & Breuer, 1996;

Mallorqui-Bague et al., 2016; Paulus & Stein, 2010). Individuals with anxiety, therefore, appear to have a low tolerance for bodily discomfort, as benign bodily sensations are interpreted as a threat and can lead to reactions such as panic attacks (Mussgay et al., 1999) or severe avoidant behaviour based on the fear of experiencing triggering unpleasant bodily sensations (Mallorqui-Bague et al., 2016), as may be seen in agoraphobia. Lowering tendencies to worry and experience emotional distress, as well as fostering greater trust in the body as a safe and trustworthy source of information among individuals with anxiety also aligns with common approaches to treating anxiety disorders via interoceptive exposure (Boswell et al., 2013).

The results of the current study demonstrated that although there were significant decreases in both depression and anxiety, these changes were not significantly predicted by the marginal increases seen in interoceptive awareness from baseline to midpoint 2 (session 7). Relative to other studies that reported significant results linking increased interoceptive awareness to symptom improvement across the treatment condition with individuals with depression and anxiety, it should be noted that the treatment interventions in those studies were more explicitly contemplative or body-based (Boswell et al., 2013; De Jong et al., 2019; Farb et al., 2015; Fissler et al., 2016), and interoceptive awareness may have been more intentionally attended to throughout the course of therapy than in the current study condition. Furthermore, the population samples of the abovementioned studies treated depression and anxiety separately, which may have presented directional changes in interoceptive awareness with greater clarity than was possible in the current study. Finally, it is also possible that higher levels of interoceptive awareness as an indictor of improving symptoms in emotional disorders may arise later in treatment, beyond the baseline to 7-week timeframe considered in the present study.

Interoceptive Awareness and Emotion Regulation

Emotion regulation is the process by which individuals are able to identify, accept and manage their emotional experiences, including both regulating responses to stimuli that evoke emotions as well as the ability to influence which emotions are experienced and how they are expressed (Gross & Muñoz, 1995; Victor & Klonsky, 2016). Following this definition, successful emotion regulation includes the ability to change emotional experience based on goals and the ability to control behaviour in the face of negative emotions (Gratz & Roemer, 2004). As noted earlier, difficulties in emotion regulation are a hallmark feature of emotional disorders, specifically including the tendency to exert excessive control over both positive and negative emotions, and to make efforts to suppress, hide or ignore emotions (Barlow et al., 2004; Gross & Muñoz, 1995; Mennin, 2006).

As reported in several studies cited in the previous sections, interoceptive dysregulation is an element of emotion dysregulation, which may serve to maintain or exacerbate symptoms of emotional disorders—hypervigilance and experiential avoidance in cases of anxiety and the blunting of negative affect in cases of depression. Aligning with these earlier cited studies, the current study found that lower scores on the ability to sustain and control attention to body sensations (i.e., interoceptive *Self-Regulation*) was correlated with higher scores in emotion dysregulation at baseline. This finding is not surprising in that it can be argued, based on Gross and Muñoz's (1995) abovementioned definition of emotion regulation, that the variables in question are similar enough to one another and may be measuring a common phenomenon—the deficit in the ability to identify, accept and manage a specific aspect (i.e., the interoceptive/bodily component) of emotional experience.

The current study demonstrated that increases in interoceptive awareness in the first half of therapy significantly predicated reductions in emotion dysregulation from baseline to post-therapy. Specifically, increases in three subscales of interoceptive awareness—*Attention Regulation, Self-Regulation,* and *Body Trusting*—significantly predicted decreases in emotion dysregulation from baseline to post-therapy. Given that the overall reductions in emotion dysregulation across the treatment condition did not reach statistical significance, these findings must be interpreted with caution. However, though these results require further examination with a full dataset, these preliminary results align with attachment and neuroscience research on the role of relationships in affect and interoceptive regulation (Geller & Porges, 2014; Porges, 2011; Siegel, 2020), that with an attachment-based psychotherapeutic intervention like EFIT clients may learn to regulate their nervous system, heightening the ability to pay attention to, accept, and use adaptive skills to modulate the physiological component of emotions, while building greater trust in the experience of their body. All of these changes that could be occurring in and beyond therapy may contribute to an overall expansion of awareness of bodily states connected to emotions with an increased tolerance for unpleasant emotions states, which would contribute to improved emotion regulation.

Emotionally-Focused Individual Therapy: Interoceptive Awareness, Emotion Regulation and the Social Engagement System

The current study demonstrated increases in interoceptive awareness across the 15 EFIT sessions, but the linear slope did not reach statistical significance. Although the pattern of change for this variable showed an overall increase from baseline to posttherapy, the trajectory was non-linear in that overall interoceptive awareness appeared to drop slightly from baseline to midpoint 1 (session 5). A possible explanation for the decrease at the beginning of treatment is that the

increased attention brought to emotions and their accompanying physiological changes occurring in the beginning stage of EFIT—stabilization—may have led to a temporary increase in experiential avoidance or heightened interoceptive anxiety resulting in lower scores. An increased difficulty in recognizing, tolerating, and accepting the interoceptive experience in the beginning stages of therapy aligns with findings in Boswell and colleagues' (2013) study, which reported similar changes in interoceptive anxiety sensitivity from pre-therapy to the first data collection point. For individuals with emotional disorders who have developed strategies to control and suppress unpleasant emotional experiences, it is not surprising that increased attention to emotional experience, including the physiological arousal of difficult emotions, is experienced as uncomfortable and even distressing (Boswell et al., 2013), which may temporarily heighten long-held patterns of avoidance or anxiety. The overall trend from baseline to midpoint 2 (session 7), however, shows increasing levels of interoceptive awareness.

The current study also showed that symptoms of depression and anxiety significantly decreased with the therapeutic intervention of EFIT, which aligns with earlier outcome studies on the benefits of EFT for couples with depression (Denton & Coffey, 2011; Denton et al., 2012; Dessaulles et al., 2003; Wiebe & Johnson, 2017; Wittenborn et al., 2019). As mentioned above, no direct relationship was found between increases in interoceptive awareness in the first half of therapy and the reductions in symptoms of emotional disorders from baseline to post-therapy. The results, however, indicated a significant relationship between increases in interoceptive awareness and increases in emotion regulation, specifically, increases in the ability to sustain and control attention to bodily sensations, to regulate distress by this attention, and to trust in the experience of one's body as safe and trustworthy. Again, it should be noted that the overall decreases in emotion dysregulation did not reach statistical significance, so these results must be

interpreted with caution. These preliminary results however could be seen to align with the theory of EFIT in that given that emotion regulation is a key therapeutic element in all stages of the EFIT approach, the results of the current study that link increased interoceptive awareness to increased emotion regulation may also indicate an indirect relationship to the overall symptom improvement in depression and anxiety. Through focusing on the client's emotional experience, EFIT as a therapeutic approach aims to widen the tolerance for intense emotions through the exploration of arising emotions, to foster corrective emotional experience and to heighten attachment security in the client's relationships (Johnson, 2019). Slowly and gradually, this process is thought to promote a growing emotion regulation capacity and interoceptive awareness, as seen in this study, specifically the ability to attend to bodily sensations and use these bodily sensations as a tool to regulate distress, rather than turning to patterns of avoidance and numbing or experiencing the sensations as threatening. Furthermore, given the foundational assumption in EFIT that all emotions are functionally adaptive, the EFIT process also fosters trust in one's own emotional experience, which necessarily includes the bodily felt sense of the emotion, and aligns with the results in the current study.

The therapeutic changes albeit from preliminary results that indicated increased interoceptive awareness and emotion regulation across the EFIT intervention, although not statistically significant, may also be understood from a polyvagal perspective. According to polyvagal theory, when the individual's nervous system perceives an environment of safety through supportive interactions with the therapist such as a warm facial expression, open body posture, vocal tone and prosody, the ventral vagal nerve and thus the social engagement system becomes activated (Geller & Porges, 2014). When this happens, the client may experience a calm internal visceral state as well as co-regulation with the therapist (Dana, 2018; Geller &

Porges, 2014). The social engagement system in polyvagal theory is made possible by the secure base in attachment theory, and is the main objective of the stabilization stage in an EFIT intervention, the first stage and the foundation for all other therapeutic work (Johnson, 2019).

Throughout therapy, the EFIT therapist fosters co-regulation (i.e., engagement of the social system) as the client explores difficult experiences and feelings. A polyvagal interpretation of the EFIT process might view this co-regulation as the EFIT therapist accompanying the client in their navigation of the autonomic nervous system states (i.e., fight, flight, freeze) associated with difficult emotions, holding the space with a supportive presence, offering validating reflections and suggestions to heighten affective experience, and ultimately offering the client a corrective emotional experience that fosters a more secure attachment style and more socially engaged autonomic nervous system.

As Porges (2011) noted, physiological state is an implicit component of psychological subjective experiences, as all emotion states require physiological changes to achieve their respective goal of fight, flight, freeze or prosocial behaviour. Bringing attention to interoceptive states is therefore integral in the therapeutic process of exploring the spectrum of autonomic states. With therapist accompanying client in exploring all aspects of emotional states, EFIT fosters the gradual experiential development of emotion regulation skills in and beyond therapy (Johnson, 2019), which help the client self-regulate their autonomic state or, as Porges (2011) describes, develop greater vagal flexibility and strength expanding the range of emotional experience and expression, and the ability to regulate emotion.

Clinical Implications

The preliminary findings in the current study may contribute to the growing field of literature regarding the relationship between interoceptive awareness and emotion regulation,

and is the first known study to consider these variables among individuals grouped transdiagnostically with emotional disorders. Given the exploratory nature of the study combined with the mixed results regarding statistical significance, the results should be interpreted with caution. Some of the significant findings, however, may have important implications for integrated therapeutic approaches and the type of interventions selected for individuals with emotional disorders.

Emotion regulation and difficulties accessing the social engagement system are fundamental challenges for those living with depression and anxiety (Dana, 2018; Johnson, 2019). The preliminary findings show that increasing awareness of the body's felt sense, particularly with respect to the ability to attend to bodily sensations, regulate stress via attention to bodily sensations, and developing trust in one's body as safe and trustworthy, may have beneficial impacts on improving emotion regulation among individuals with emotional disorders, albeit gradually over the course of EFIT sessions. Attention regulation to and self-regulation of the body's sensations, as well as developing bodily trust of these experiences may therefore be an impactful target of intervention to help increase emotion regulation and indirectly decrease symptoms of anxiety and depression.

EFIT as a transdiagnostic treatment modality demonstrated efficacy in reducing symptoms of anxiety and depression from baseline to post-therapy. Introducing interoceptive-based interventions as an adjunct to EFIT or other experiential-based therapies help move beyond treating disorder-specific symptoms and serve as a useful element in a transdiagnostic approach to treating emotional disorders. Interventions that focus on expanding interoceptive awareness may include Emotionally-Focused Therapy (Johnson, 2019), cognitive-behavioural oriented therapies like mindfulness-based cognitive therapy (MBCT; Segal et al., 2013) and

interoceptive exposure (Craske & Barlow, 2007), and experiential and somatic-oriented therapies such as Focusing (Gendlin, 1978, 1998; Cornell, 2013), Somatic Experiencing (Levine, 1997), and dance/movement therapy (Levy, 2005). Therefore, the findings in this study tentatively support fostering interoceptive awareness as an important part of improving emotion regulation in therapy.

Strengths

One of the strengths of this study is that it is the first to focus specifically on the somatic changes at play in an Emotionally-Focused Individual Therapy intervention. The focus on interoceptive awareness as part of the change process in EFIT has shed new light on how increasing body awareness may be related to positive clinical outcomes such as reduced emotion dysregulation. Based on previous research, reducing emotion dysregulation may in turn help reduce symptoms of depression and anxiety (Berking et al., 2008; Ehring et al., 2010). The results of this study, therefore, contribute to the growing process study literature for EFIT, as well as other knowledge areas such as emotion regulation and mind-body interventions. Another strength of the study is that it is draws data from one of the first outcome studies on the efficacy of Emotionally-Focused Individual Therapy, a relatively new adaptation of Johnson's well-established EFT for couples technique (Johnson, 2019). Several earlier studies have already demonstrated the efficacy of EFT for couples with depression (Denton & Coffey, 2011; Denton et al., 2012; Dessaulles et al., 2003; Wiebe & Johnson, 2017; Wittenborn et al., 2019). Therefore, the current study holds promise for being an effective intervention for individuals with depression.

In addition to enriching the literature on Emotionally-Focused Individual Therapy and emotion regulation given the special attention to the role of interoceptive awareness within these

subject areas (i.e., a 'bottom-up' approach), this research may act as a bridge to support common somatic-oriented approaches found across emotion-, cognitive, and somatic-based therapies, all of which include elements of attending to the bodily experience of emotion. The unifying element in adopting a common focus on the body, helps to relieve some of the complexity for clinicians and clients alike given the numerous and wide-ranging treatment modalities for individuals with emotional disorders.

Limitations

This study had several limitations. The first limitation is with respect to study design. The current study was the first known study to measure interoceptive awareness among a population defined transdiagnostically with emotional disorders, including individuals with depression and anxiety in one sample population, whereas previous studies treated individuals with depression and anxiety separately noting different results for each population. One of the mandatory participant inclusion criteria for the present study was the need to meet DSM-5 criteria for either major depressive disorder or persistent depressive disorder, while reporting symptoms or meeting criteria for any anxiety disorder was optional. The participant pool of the present study is therefore heterogeneous with respect to the presence and severity of comorbid anxiety, and could have influenced the significance of the correlational analyses between interoceptive awareness and depression and anxiety at baseline, as well as confounded the results in the ability of changes in interoceptive awareness to predict changes in depression and anxiety across the treatment condition. A further limitation to study design is the collection of data via self-report measures, which while capturing the subjective experience of the variables of interest is nonetheless subject to response bias and social desirability.

Second, limitations exist with regard to interpreting the current findings. Since this study did not make use of a control group, any linear changes reported across the treatment condition cannot with certainty be considered a result of participants receiving a treatment of Emotionally-Focused Individual Therapy. Moreover, since the cultivation of an awareness of the body's felt sense when experiencing emotions is only one aspect of the change process in an EFIT intervention, improvements in emotion regulation, or in symptoms of depression and anxiety may only be partially attributed to improvements in interoceptive awareness.

The third limitation is with regard to the generalizability of the findings due to the heterogeneity within the sample population of variables that may potentially influence interoceptive awareness, as well as the low gender and racial diversity of the sample itself. The sample population in the study was heterogeneous with regard to medication status, as the only exclusion criterion was no medication change in the previous six weeks. Therefore, even though there was no medication change significant enough to exclude a participant from the study, symptoms of emotional disorders and thus interoceptive awareness could be mediated by antidepressant or anti-anxiety treatment and its side effects (Denninger et al., 2006). Furthermore, the population was heterogeneous with respect to previous experience with psychotherapy as well as potentially to previous mind-body practices, such as yoga, meditation, tai chi, conscious dance/movement practices, etc., and thus may be entering the study with varying baseline levels of interoceptive awareness. This potential variance in experience may affect the baseline results reported for interoceptive awareness, as well as the rate of change and predictive value of interoceptive awareness over the course of the intervention. Furthermore, two-thirds of the sample identified as women and one-third as men, and three-quarters identified

as Caucasian. The sample population therefore lacked gender and racial diversity, and therefore faces limitations in the generalizability of the findings.

Last, midway through the EFIT treatment intervention, the COVID-19 pandemic prevented the continuation of in-person therapy. All therapy that had started was shifted to a virtual environment, which may have temporarily affected the therapeutic alliance and the overall experience of attending therapy. Participants recruited after March 2020 received virtual therapy exclusively. The virtual environment may affect the somatic experience of the therapy for the client (Reay et al., 2020). Furthermore, the global crisis with the accompanying uncertainty and fear may have also posed a large intervening variable on overall mental health in the sample population (Rudenstine et al., 2020; Voitsidis et al., 2020). These unavoidable circumstances amid the data collection phase of the project may be reflected in the self-report questionnaires assessing depression, anxiety, emotion dysregulation, and interoceptive awareness.

Moreover, the uncertainty and upheaval of the pandemic is likely cause of substantial amounts of missing data after baseline. While very little missing data is attributable to participant dropout, the uncertainty of the pandemic situation may have been a barrier for individuals completing the entire online questionnaire package. Furthermore, the shift to online therapy caused unforeseen delays in participants beginning the treatment condition, and is therefore the main reason for the substantial amount of missing data at later data collection timepoints. Although the pattern mixture model found the data to be missing at random, the small sample size at later time points (ex. midpoint 2 and post-therapy) reduces the power to predict change, and may have also affected the ability to detect significant linear changes across time for the variables in this study.

Future research

First, future studies on the relationship of interoceptive awareness and emotion regulation could address the limitations faced by this study, including securing a larger sample size, a more complete data set allowing for greater power to predict change, and greater diversity in the sample population. Researchers may also wish to consider interoceptive awareness and its role in emotion regulation in depression and anxiety separately rather than transdiagnostically as in the current study, given that previous studies found that individuals with depression and anxiety may have very different experiences of interoceptive awareness at baseline. Treating these populations separately may allow for greater clarity in how interoceptive awareness changes in therapy, as well as how these changes may impact particular emotion regulation strategies. Moreover, future studies could attempt replication of results and compare against the findings of the current study.

Future studies could also adopt a rigorous objective measure as an indicator of autonomic nervous system reactivity level, such as a biofeedback device or a device that measures vagal tone, as suggested by Porges (2001). This data could be triangulated with self-reported variables of interoceptive awareness, emotion regulation, depression and anxiety, to determine the potential relationships and also reveal the level of accuracy and/or discrepancy between physiological arousal and self-report. Studies of this nature could help further inform potential therapeutic interventions that help modulate an individual's nervous system activity and vagal tone with the beneficial effect of increasing ability to regulate emotions and potentially decrease unwanted symptoms of emotional disorders. Interventions could be proposed that either dampen the sympathetic tone or support the individual to move to environments less likely to trigger the increased reactivity of the sympathetic nervous system or the shutdown states of the dorsal vagal

nerve (Porges, 2011). Relatedly, future studies that explore changing interoceptive awareness over time from a polyvagal perspective may also want to include the Body Perception Questionnaire (Porges, 1993a) alongside other instruments, as this questionnaire was developed by Porges to gather self-report data on perceptions of ANS functioning. This data may be interesting to compare with data from physiological monitoring such as the respiratory sinus arrythmia (RSA), as well as to similar self-report measures for interoceptive awareness and emotion regulation such as the MAIA-v2 and the DERS-18 respectively.

Future studies on the efficacy of Emotionally-Focused Individual Therapy may also explore emotion regulation and interoceptive awareness among differing clinical populations, such as those who have experienced trauma and/or those who display borderline traits or have received a diagnosis of borderline personality disorder. These clinical populations may benefit from EFIT given that it works directly with emotions and aims to establish adaptive emotion regulation, as well as fosters a more secure attachment orientation through co-regulation with the therapist, thus addressing the hallmark symptoms characteristic of trauma survivors and individuals with a borderline personality disorder diagnosis.

Future studies examining interoceptive awareness and emotion regulation among individuals with depression and anxiety could employ more somatically- or contemplative-based therapeutic treatments. A similar study design may be adapted to explore the effectiveness of therapeutic modalities, such as Somatic Experiencing (Levine, 1997), Sensorimotor Psychotherapy (Ogden & Fisher, 2015), Acceptance and Commitment Therapy (Hayes et al., 2012), and dance/movement therapy (Levy, 2005), for example. As these therapies are more explicitly body-based, data reporting the changes in interoceptive awareness and its relationship

with emotion regulation, depression, and anxiety may present with greater clarity and statistical significance.

Finally, future studies of a similar design could explore in more depth the relationship between the interoceptive awareness and emotion regulation with regard to the several subscales on the Multidimensional Assessment of Interoceptive Awareness-Version 2 and the Difficulties in Emotion Regulation instruments. Furthermore, other related interesting research areas could include measuring interoceptive awareness and emotion regulation alongside self-reported attachment tendencies measured by a dimensional scale such as the Experiences in Close Relationships Scale (Brennan et al., 1998) among individuals with depression and anxiety. These research directions may shed light on whether there are any significant differences in interoceptive awareness and emotion regulation among secure, anxious, avoidant, and disorganized attachment styles, and how individuals with each of these attachment orientations responds to therapy with respect to changes in interoceptive awareness and emotion regulation. Greater knowledge in this area may help inform which therapeutic interventions are most effective with respect to improving interoceptive awareness and emotion regulation for a particular attachment orientation.

Conclusion

The current exploratory study supports the suggestion that increased interoceptive awareness helps improve emotion regulation—acquired self-regulation capacity, which may, in the long-term, also help improve symptoms of emotional disorders such as depression and anxiety. Although previous studies as well as the results of the current study suggest that the conceptual model of the interoceptive experiences and thus the desired direction of therapeutic

change of individuals with depression and anxiety differ, a shared component is the utility and potential benefit in somatically-oriented interventions that target an improved connection between mind and body.

The findings in this research contribute to the growing body of knowledge and practice of somatic-, and mindfulness-based treatments, as well as the integration of the interoceptive interventions of these treatments into other therapeutic modalities, for the improvement of emotion regulation among individuals with emotional disorders. Deepening our understanding of how greater attention to the body via interoceptive awareness in an adaptive, mindful and self-accepting way may provide benefits in any therapeutic context, though specifically highlight this particular beneficial aspect in an Emotionally-Focused Individual Therapy intervention. Improving our understanding of interoceptive awareness and the role of interoceptive awareness change in the process of therapy can help clinicians optimize treatments for people engaging in therapy to alleviate symptoms of emotional disorders.

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