

Mechanisms of Regulation: Profiling the Impact of Emotion Regulation on Posttraumatic Stress Symptoms

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MECHANISMS OF REGULATION: PROFILING THE
IMPACT OF EMOTION REGULATION ON
POSTTRAUMATIC STRESS
SYMPTOMS

by

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ABSTRACT
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Trauma survivors are at a high risk for developing symptoms of posttraumatic stress (PTS) and often experience difficulties with emotion regulation. However, there is no clear understanding of how multiple strategies may be used to effectively regulate PTS. The current study evaluates participants' use of six different strategies and investigates whether a specific *profile* of emotion regulation (i.e., the individual's default pattern of regulation, determined by the frequency with which s/he uses different strategies from a regulation inventory) is related to PTS. Results of a hierarchical cluster analysis indicated that four profiles of emotion regulation were present in the current sample: *Adaptive Regulation*, *Active Regulation*, *Detached Regulation*, and *Maladaptive Regulation*. Each profile was characterized by distinctly different use of the six emotion regulation strategies. Further analyses indicated that an individual's regulatory profile had the power to differentiate and predict PTS symptom severity. However, the regulatory profiles did not moderate the relationship between the frequency of past trauma and PTS severity. Some implications are discussed for understanding how a larger constellation of regulatory strategies, and the relationships between them, might serve as risk or protective factors in the development and treatment of PTS symptoms.

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Introduction

For many, the topic of posttraumatic stress (PTS), or the clinical diagnosis of posttraumatic stress disorder (PTSD), will immediately evoke thoughts of active and former soldiers, military combat, and war. None will argue the detrimental effects that military-related trauma could have on soldiers' well-being; however, it is essential to broaden the scope of our attention regarding these constructs because they are a serious concern for both soldiers and civilians alike. Indeed, the National Comorbidity Survey, a nationwide study of 15-54 year old civilians, estimated the lifetime prevalence of experiencing at least one traumatic event (e.g., involvement in a life-threatening accident or natural disaster or experiencing rape, sexual molestation, or physical assault) to be 60.7% for men and 51.2% for women (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Recent reports indicate that prevalence in certain populations may be even higher, with studies finding that up to 68% of women in inner-city, urban areas experience at least one event of traumatic stress in their life (Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993; Schumm, Stines, Hobfoll, & Jackson, 2005), and some college undergraduate populations report prevalence rates of trauma between 67-84% (Vrana & Lauerbach, 1994; Bernat, Ronfeldt, Calhoun, & Arias, 1998).

Trauma survivors are at a high risk for developing comorbid psychopathology, including anxiety disorders, depressive disorders, and substance abuse disorders (Breslau, Chilcoat, Kessler, & Davis, 1999; Campbell, 2002; Cogle, Timpano, Sachs-Ericsson, Keough, & Riccardi, 2010; Felitti et al., 1998, Kendler et al., 2000; Widom, 1999). Undeniably, the most well-defined sequela of trauma is PTS, a distinct symptom pattern that may result from any number of traumatic event types (American Psychiatric

Association, 2000). This hallmark pathology is described as the intersection of three symptom clusters: re-experiencing symptoms (i.e., suddenly acting or feeling as if the traumatic event were reoccurring, having recurrent, distressing dreams of the trauma), avoidance/numbing symptoms (i.e., avoidance of activities, places, people, or thoughts that arouse recollections of the trauma, feelings of detachment from others), and hyperarousal symptoms (i.e., irritability, exaggerated startle response, difficulty concentrating). The DSM-IV-TR requires three re-experiencing symptoms, one avoidance/numbing symptom, and two hyperarousal symptoms to be present for at least one month after a traumatic event for an individual to meet clinical criteria for PTSD (American Psychiatric Association, 2000).

Since PTS symptoms are the defining features of a PTSD diagnosis, the research examining the corollaries of trauma is primarily focused on these symptoms. Unfortunately, trauma research often uses the clinical cutoff for PTSD to determine who should be included in research. When researchers include only those individuals with a PTSD diagnosis, they disregard a large number of trauma survivors. The proportion of trauma survivors who meet criteria for PTSD ranges anywhere between 8-60%, depending on a variety of population demographic factors such as age and gender (Kessler et al., 1995). Therefore, reporting on only those individuals with a PTSD diagnosis would exclude between 40-92% of trauma survivors who may be experiencing PTS symptoms on a subclinical level that is nevertheless causing distress. Additionally, limiting sample selection disregards the substantial variability in symptom presentation following trauma. For example, long standing research demonstrates the high rates of comorbidity in psychopathology following trauma, and PTS is often reported in

conjunction with a variety of depressive, anxious, dissociative, and substance abuse symptoms (Kessler, Chiu, Demler, Walters, 2005). Therefore, while they are related, PTS and PTSD are not the same, and limiting the study of trauma to individuals with a PTSD diagnosis excludes important information about how PTS may affect the larger population of individuals with a trauma history.

Recent trauma research investigating PTS argues that a key factor in the development and maintenance of symptoms is difficulty with emotion regulation (Campbell-Sills & Barlow, 2007; Eftekhari, Zoellner, & Vigil, 2009; Ehring & Quack, 2010). Emotion regulation describes the ways that individuals manage, experience, and express their emotional responses to internal or external stimuli (Gross, 1998b). These processes include conscious and unconscious responses to emotion, or an emotion-eliciting environmental demand (Campbell-Sills & Barlow, 2007; Gratz & Roemer, 2004; Gross, 1998a). Regulatory strategies are used to control the magnitude and the type of emotions individuals have, as well as in which situations they have them. They can also control how the emotions are experienced internally and how they are expressed to others (Gross, 1998a). Importantly, longitudinal studies have shown that even a single traumatic event is enough to significantly change the way individuals use different regulatory strategies to manage their emotions (Bardeen, Kumpula, & Orcutt, 2013). This change can be maladaptive, since regulatory strategies have the ability to maintain symptoms or decrease functioning. Under these circumstances, the regulatory process becomes an ongoing cycle of impairment that is implicated in many forms of psychopathology, including PTS (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Ehring & Quack, 2010; Gross & Thompson, 2007; Tull, Barrett, McMillan, & Roemer, 2007).

To understand what constitutes impaired emotion regulation, it is critical to first clarify that regulation occurs at a variety of points along the course of emotion generation, and that regulation at any one of these points may be primarily adaptive or primarily maladaptive (Campbell-Sills & Barlow, 2007; Gross, 1998a; Gross & Thompson, 2007). Emotion regulation strategies can be theoretically organized according to Gross' widely accepted process model of emotion regulation (Figure 1; Gross, 1998a). This model states that there are five families of emotion regulation processes, which are distinguished by their temporal order in the emotion-generative process. Sequentially, the families are: situation selection, situation modification, attentional deployment, cognitive change and response modulation. Typically, strategies focused on regulating emotional experiences at the beginning of the emotion-generative process are considered more adaptive. Empirical studies of the individual strategies that are involved in the earlier processes, such as acceptance, problem solving, and cognitive reappraisal, demonstrate that they are related to numerous positive outcomes (see reviews by Aldao et al., 2010 and Garnefski & Kraaij, 2006a). Alternatively, strategies focused on regulation processes at the end of the emotion-generative course are considered more maladaptive. Strategies that tend to focus on later processes (e.g., during the response modulation step), such as avoidance, rumination, and expressive suppression, have a wide range of negative outcomes and are consequently considered to be maladaptive (see reviews by Aldao et al., 2010 and Campbell-Sills & Barlow, 2007). However, despite these theoretical guidelines, emotion regulation has the potential to be adaptive or maladaptive at any one of these points, and therefore additional research is necessary to understand the contextual protective and risk factors associated with different strategies of regulation.

Notably, individuals endorsing PTS symptoms often misuse a variety of regulatory strategies (such as relying too much on rumination and expressive suppression), which leads to the maintenance of pathology and affects many other aspects of well-being (Campbell-Sills & Barlow, 2007; Seligowski, Lee, Bardeen, & Orcutt, 2014). This finding underscores the association that emotion regulation has with health and suggests that it is important to further identify how functioning might differ depending on how individuals choose to regulate their emotions. In the following paragraphs, I will define and review six of the most well-studied emotion-regulation strategies and summarize their impact on functioning. They are classified into adaptive and maladaptive strategies based on the amount of research linking each strategy to positive or negative outcomes. As one may expect, some exceptions to these broad classifications exist (e.g., Kashdan, Young, & McKnight, 2012; Le & Impett, 2013); however, there is agreement in the field regarding the typical benefit (or harm) of using each strategy.

Adaptive Strategies

Acceptance. Psychological acceptance is a strategy in which individuals cease attempts to change cognitions and emotions regarding past experiences. Instead, they are aware and actively embrace cognitions and emotions, without judgment or unnecessary attempts to defend against them (Hayes, 1994; Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Acceptance is therefore the tendency *not* to experience secondary negative emotions in response to one's own, initial emotional reactions (Gratz & Roemer, 2004).

Research on the psychological correlates of acceptance indicates that a low level of acceptance is a key construct in many psychosocial problems such as depressive

disorders (Garnefski & Kraaij, 2006a; Nolen-Hoeksema, 2000), borderline personality disorder (Gratz & Gunderson, 2006), dysfunctional interpersonal relationships (Jacobson, 1992), generalized anxiety disorder (McLaughlin, Mennin, & Farach, 2007; Roemer, Orsillo, & Salters-Pedneault, 2008), panic disorder (Tull & Roemer, 2007), and caretaker stress (Biglan, 1990). Acceptance training appears to be beneficial for individuals with mood and anxiety disorders, such that individuals who received training prior to a distressing task reported significantly less negative affect and had lower physiological arousal during the task than individuals who did not receive training (Campbell-Sills, Barlow, Brown, & Hofmann, 2006).

Moreover, frequent use of acceptance is supported as a clinically relevant and adaptive method of emotion regulation (Hayes, Strosahl, & Wilson, 1999; Paivio & Greenberg, 1998). With regards to trauma, two of the hallmark aspects for diagnosis of PTSD and maintenance of PTS are avoidance of trauma-related stimuli and numbing of emotional responsiveness (American Psychiatric Association, 2000). Therefore, treatment working to counteract these symptoms by increasing the use of acceptance-based strategies has potential for improving PTS (Batten, Orsillo, & Walser, 2005; Orsillo & Batten, 2005). A number of empirical studies have also demonstrated the benefit of acceptance training for PTS. For example, Ehring and Quack (2010) demonstrated a significant, positive correlation between difficulties with acceptance and levels of overall PTS, as well as individual clusters of re-experiencing, avoidance, and hyperarousal symptoms (Ehring & Quack, 2010; Tull et al., 2007). In a study of intrusive thoughts, researchers showed that thought-suppression was significantly more distressing for individuals who were not given a brief acceptance training prior to the task (Marcks &

Woods, 2005), indicating that acceptance training may beneficially alter regulation of thought and emotion in trauma survivors. Given that physiological hyperarousal is associated with PTS, it is worth noting that participants faced with an anxiety-provoking social task were also able to demonstrate significant physiological control and effectively moderate their physiological stress response when using acceptance as a regulatory strategy (Hofmann, Heering, Sawyer, & Asnaani, 2009).

Problem solving. Regulation through problem solving consciously focuses on altering a stressful situation or minimizing its negative consequences with cognitions (e.g., brainstorming solutions, planning, thinking about what steps to take) or behaviors (e.g., seeking information, trying multiple possible solutions to a problem, taking action; Aldao et al., 2010; Billings & Moos, 1981; Folkman & Lazarus, 1985). This regulatory strategy is focused on instrumentally coping with a situation and, depending on an individual's level of control, can reduce psychological distress in most stressful episodes (Folkman and Lazarus, 1980, 1985; Lazarus, 1993). Early stress and regulation theories suggest that this strategy should be adaptive for a number of circumstances (Billings & Moos, 1981; Carver, Scheier, & Weintraub, 1989), since problem solving can encourage positive emotional effects by reducing stressors and increased use of problem-solving strategies is associated with significant increases in positive affect (Folkman & Moskowitz, 2000).

Accordingly, cognitive-behavioral psychotherapy successfully incorporates problem-solving training for disorders such as depression and anxiety: two psychological disorders for which a lack of problem solving is associated with increased symptom intensity (Beck, Rush, Shaw, & Emery, 1979; Billings & Moos, 1981; Chang, Downey,

& Salata, 2004). Difficulties using problem-solving and goal-driven behavior during distress are also positively associated with levels of PTS symptoms (Tull et al., 2007), and there is substantial literature supporting the theory that problem-focused regulation is superior to emotional coping when recovering from PTS (Folkman & Moskowitz, 2000; Wilson & Raphael, 1993; Zeidner & Endler, 1996). A prospective study showed that low levels of problem-focused regulatory style after a traumatic event predicted the development of PTSD six months post-trauma (Gil, 2005).

Cognitive reappraisal. Cognitive reappraisal is the process of altering the meaning attached to sensory perceptions to change their emotional impact (Gross, 1998a; Lazarus & Alfert, 1964 *in* Gross & John, 2003). This regulatory strategy occurs early in the process model of emotion regulation, and therefore does not require continued self-monitoring during an emotional event (Gross, 1998b; Gross & John 2003). Research investigating the mental health correlates of reappraisal show that individuals who typically use cognitive reappraisal report fewer symptoms of depression and are more satisfied with life, more optimistic, and have higher self-esteem (Garnefski & Kraaij, 2006a; Gross & John, 2003). Reappraisal is also associated with increased positive affect and decreased negative affect (DeSteno, Gross, & Kubzansky, 2013). However, those who suffer from chronic PTSD are significantly differentiated from those who do not by a variety of appraisal variables: 1) more intense negative appraisals of the traumatic event and PTS symptoms; 2) the inability or unwillingness to reappraise the trauma and PTS symptoms; and 3) a negative appraisal of one's personality and outlook on life (Ehlers, Maercker, & Boos, 2000; Ehlers, Mayou, & Bryant, 1998; Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). Additionally, there is some evidence that high levels of reappraisal are

associated with lower levels of PTS (Eftekhari et al., 2009). Further, cognitive reappraisal does not continually tax resources like some other regulation strategies and thus does not impair memory function; rather, some studies have demonstrated improved nonverbal memory for individuals instructed to use this strategy during emotionally-charged tasks (Gross, 1998a; Richards & Gross, 2000). Therefore use of this strategy is adaptive and clinically relevant in common treatments where trauma survivors must explicitly process the memory of a trauma to promote recovery from PTS (e.g., exposure therapy).

Reappraisal also has beneficial physiological outcomes related to psychopathology, including less hyperactivity of both the autonomic nervous system and emotion-related brain regions (i.e., amygdala; DeSteno et al., 2013; Hofmann et al., 2009).

Maladaptive Strategies

Avoidance. Avoidance is a regulatory strategy involving cognitive and behavioral efforts that center on denial or minimization of an emotion-eliciting situation and allow an individual to refrain from directly dealing with a stressor (Cronkite & Moos, 1995; Holahan, Moos, Holahan, Brennan, & Schutte, 2005). Cognitive avoidance focuses on averting psychological stressors such as thoughts, emotions, or memories (Hayes et al., 1999). Behavioral avoidance compliments cognitive avoidance since an individual will physically evade a situation in which there is a feared stressor.

Psychopathological consequences of avoidance include increases in depressive symptoms in populations of community adults (Blalock & Joiner, 2000) and college students (Penland, Masten, Zelhart, Fournet, & Callahan, 2000), as well as increased risk for relapse into a depressive episode (Cronkite, Moos, Twohey, Cohen, & Swindle, 1998). Reliance on avoidance is also associated with withdrawal symptoms after

substance abuse (Baker, Piper, McCarthy, Majeski, & Fiore, 2004), increased risk of substance abuse relapse (Chung, Langenbucher, Labouvie, Pandina, & Moos, 2001), as well as binge eating and compensatory behaviors in individuals with eating disorders (Heatherton & Baumeister, 1991; Polivy & Herman, 2002). Additional literature shows that increases in negative affect are predicted by higher levels of avoidance (Billings, Folkman, Acree, & Moskowitz, 2000), and cognitive consequences of avoidance include increases in negative thoughts about the trauma or stressor (Wenzlaff & Wegner, 2000). Considering PTS more globally, avoidance-focused regulation is a significant predictor of posttraumatic morbidity, generalized PTS symptom development, and PTSD severity (Bryant & Harvey, 1995; Bryant, Marosszeky, Crooks, Baguley, & Gurka, 2000; Chang et al., 2003; Charlton & Thompson, 1996). An additional study showed that experiential avoidance (defined as an unwillingness to experience thoughts, memories, emotions, and physiological sensations) partially mediated the relationship between interpersonal trauma and PTS (Orcutt, Pickett, & Pope, 2005).

Rumination. In the aftermath of a stressful life event, individuals often engage in rumination: recurrent and repetitive thoughts and actions that focus on past failures and difficulties, center on negative emotion states, and fixate on the causes and consequences of those negative emotions. This antecedent-focused strategy targets the process model of emotion-regulation during attentional deployment and often includes destructive self-evaluations related to recurrent negative emotion states (Campbell-Sills & Barlow, 2007; Nolen-Hoeksema & Morrow, 1991; Segerstrom, Tsao, Alden, & Craske, 2000).

Rumination is one of the diagnostic symptom clusters of PTS; however, additional psychopathological correlates of rumination include increased depressive

symptoms, generalized anxiety symptoms, and mixed anxiety/depressive symptoms (Garnefski & Kraaij, 2006a; Nolen-Hoeksema, 2000). In fact, rumination can effectively mediate the relationship between experience of a stressful life event and symptoms of both depression and anxiety (Michl, McLaughlin, Shepherd, & Nolen-Hoeksema, 2013). In addition to these symptoms, substantial literature on trauma demonstrates that rumination is one of the strongest predictors of the maintenance of general PTS symptoms (Clohessy and Ehlers, 1999; Ehlers et al., 1998; Steil & Ehlers, 2000). Therefore, although individuals use rumination to attempt to deal with their symptoms, the characteristics of rumination (i.e., consistent unproductive thoughts, compulsion to continue rumination, compulsion to ask “why” and “what if” questions) have the reverse effect and are positively associated with concurrent, prospective, and long-term PTS symptoms (Nolen-Hoeksema & Morrow, 1991). Studies indicate that use of rumination can actually trigger intrusive memories of the traumatic experience with which an individual is trying to cope (Michael, Halligan, Clark, & Ehlers, 2007), and frequent use of rumination is linked to sustained elevations in negative affect and decreases in positive affect (Brans, Koval, Verduyn, Lim, & Kuppens, 2013).

Expressive suppression. Expressive suppression occurs late in the process model of emotion regulation (i.e., during the final step of response modulation) and is defined as the practice of consciously modulating one’s behavioral responses to an emotion-eliciting situation by inhibiting subsequent emotion-expressive behaviors (Gross, 1998a, 1998b).¹ Psychopathology related to expressive suppression include increased levels of depression, anxiety, and anxiety-related disorders (i.e., phobias, obsessive-compulsive disorder; Campbell-Sills, Barlow, Brown, & Hofmann, 2006; Garnefski & Kraaij, 2006a; Gross &

John, 2003; Hofmann et al., 2009). Other psychosocial consequences of suppressing emotional expression include correlations with less positive affect and more negative affect (Brans, et al., 2013; DeSteno et al., 2013), as well as decreased rapport in relationships, lower social support, lower peer-rated likability, and increased negative feelings about interpersonal interactions (Butler et al., 2003; Gross & John, 2003; John & Gross, 2004). Since suppression requires continual self-monitoring and self-modulation of behavioral responses, use of this strategy is highly taxing on cognitive resources and negatively impacts memory performance (Richards & Gross, 2000).

Expressive suppression also demonstrates a direct relationship with frequency of PTS symptoms, such as intrusive memories (Shipherd & Beck, 1999). Suppression-related regulation strategies, including dissociation and emotional numbing, are considered by some experts to be some of the better predictors of the development and chronicity of PTS symptoms (Clohessy & Ehlers, 1999; Foa, Riggs, & Gershuny, 1995; Ozer, Best, Lipsey, & Weiss, 2003; Roemer, Litz, Orsillo, & Wagner, 2001). Further, individuals who do not suppress the memory of a past traumatic event, but instead confront and express it, show improvements in physical and psychological symptoms and less subjective distress (King, 2001; Sloan & Marx, 2004), though there is some controversy surrounding this finding (Mogk, Otte, Reinhold-Hurley, & Kröner-Herwig, 2006).

Studies of PTS and Multiple Regulatory Strategies

Although a large body of research supports the various roles of regulatory strategies as either adaptive or maladaptive, empirical studies have typically limited their investigation of emotion regulation strategies within a single population (Aldao, 2013).

The vast majority of investigators use a single measure of overall difficulties in emotion regulation (e.g., a total Difficulties in Emotion Regulation [DERS] score; see Goldsmith, Chesney, Heath, & Barlow, 2013). Many other studies compare one or two specific emotion regulation strategies, most typically including reappraisal and/or suppression (e.g. Gross, 1998b), or construct composite variables (e.g., adaptive vs. maladaptive; see Aldao & Nolen-Hoeksema, 2012a). Although there is benefit to be gained from understanding the use of adaptive versus maladaptive strategies, there is a critical lack of standardization for these constructs, resulting in a variety of regulatory strategies being used to define “adaptive” and “maladaptive”, and making it difficult to compare results between studies.

To our knowledge, less than a dozen studies exist that report empirical findings on three or more strategies of emotion regulation. The majority of these studies examined the impact of regulation strategies on a given emotion (Aldao & Nolen-Hoeksema, 2012b, 2013; Brans et al., 2013; Quoidbach, Berry, Hansenne, & Mikolajczak, 2010; Szasz, Szentagotai, & Hofmann, 2011). A handful of studies examined the use of multiple individual strategies in relation to psychopathology such as depression and anxiety (D’Avanzato, Joormann, Siemer, & Gotlib, 2013; Desrosiers, Vine, Klemanski, & Nolen-Hoeksema, 2013; Hofmann et al., 2009; Nolen-Hoeksema & Aldao, 2011; Werner, Goldin, Ball, Heimberg, & Gross, 2011), but very few have yet examined PTS outcomes (e.g., Wisco, Sloan, & Marx, 2013). Despite being limited and nascent, research investigating how individuals use multiple strategies of emotion regulation in the context of PTS is demonstrating promising results.

One highly relevant study from Wisco and colleagues (2013) investigated use of multiple emotion regulation strategies in PTSD. As is common in this body of literature, the strategies investigated by these authors were labelled and defined slightly differently than many other studies. Nevertheless, results showed that both reappraisal and putting-into-perspective (e.g., “I think that it hasn’t been too bad compared to other things.”) strategies are associated with reductions of symptoms over time, and that written exposure therapy significantly reduced the use of rumination (consequently reducing PTS in this symptom cluster; Wisco et al., 2013). An earlier study conducted by Amstadter and Vernon (2008) investigated multiple ways of dealing with PTS symptoms, including thought control, emotion regulation, and forms of emotion- and problem-focused coping. Although this study did not assess many well-defined, individual strategies of emotion regulation, some strategies were indicated as being related to the emotion regulation process. The authors reported that PTS symptoms were positively correlated with thought suppression, emotion-focused avoidance coping, and emotion-focused approach coping, but did not show a significant relationship with emotion suppression or emotion reappraisal (Amstadter & Vernon, 2008). These two studies investigating PTS outcomes are notably limited in their lack of standardization regarding how they defined the emotion regulation strategies that were assessed. This global issue in the field of emotion regulation deserves significant attention moving forward, and, if resolved, could have a meaningful effect on how we understand the risk and protective factors of certain regulatory mechanisms (Aldao, 2013).

A better understanding of the ways in which individuals choose to engage in the use of different types of emotion regulation strategies may allow us to pinpoint

mechanisms of PTS symptom reduction, in turn enhancing current treatments and facilitating treatment personalization. Perhaps the most empirically and theoretically compelling treatment for PTS is exposure therapy. Exposure therapy encourages individuals to focus on and describe the details of a traumatic event so that they can experience the emotions associated with the memory. The rationale behind this therapy argues that repeated exposure to the feared traumatic memory in a safe environment promotes habituation of emotional responses, decreased anxiety, and reduction of avoidance behavior (Foa & Kozak, 1986; Mowrer, 1960; Orsillo & Battan, 2005). Exposure therapy has more empirical support than any other treatment designed for PTS, and its efficacy is generally considered superior for a wide variety of trauma clients (see review by Rothbaum & Schwartz, 2002). However, there are some limits of exposure treatments where integration of treatment focused on emotion regulation could improve outcomes. For example, certain patterns of emotional responding common to PTS diminish the efficacy of exposure therapy (e.g., high levels of anger [Foa, Riggs, Massie, & Yarczower, 1995] and guilt [Pitman et al., 1991]). Therefore, it is possible that integrating training on adaptive emotion regulation strategies would allow the client to be more capable of having an effective emotion response to treatment. Additionally, trauma survivors are often unwilling to emotionally engage with their traumatic memories and typically have a negative opinion about the expression of emotion (Joseph et al., 1996; Nightingale & Williams, 2000). Thus, individuals with PTS are habitually avoidant and unable to effectively process emotions, yet the treatment of choice for PTS works best with clients who are emotionally engaged. To address this, treatment should include a well-informed discussion about how certain strategies of emotion regulation may

optimally benefit a client seeking treatment for PTS. Given that emotion regulation strategies have a significant impact on psychological symptoms, a better understanding of how these strategies relate to one another to form a potentially advantageous pattern of emotion regulation strategies would work to inform future psychological interventions.

The Current Study

There is no clear understanding of how a range of multiple strategies may be used to effectively regulate PTS. Although meta-analysis and review papers (see Aldao et al., 2010 and Koole, 2009) have attempted to identify the most effective emotion regulation strategies (e.g., acceptance, cognitive reappraisal, problem solving), this leaves a gap in the literature where empirical comparisons should exist. Since connections exist between difficulties in emotion regulation and PTS, future research must respond to questions about trauma survivors' use of multiple different strategies, and investigate how they may exhibit *profiles* of emotion regulation. A profile can be understood as the individual's default pattern of regulation, determined by the frequency with which s/he uses multiple different strategies from a regulation inventory. Many possibilities for regulatory profiles exist, each falling on a spectrum from very little use of a given strategy to very frequent use of all known strategies. More likely, individuals use some strategies more than others, and will have a profile that falls somewhere in the middle of the two extremes. To our knowledge, only one study has clustered participants to examine profiles of emotion regulation. This study examined only cognitive reappraisal and suppression, and found that participants' patterns of regulation could be identified as one of four groups: 1) high reappraisers/high suppressors; 2) high reappraisers/low suppressors; 3) moderate reappraisers/low suppressors; and 4) low reappraisers/low suppressors. Importantly,

individuals who were grouped as high reappraisers/low suppressors reported the lowest levels of depressive, anxiety, and PTS symptoms, indicating that this pattern of emotion regulation might be most adaptive (Eftekhari et al., 2009). The relationships among more than two emotion regulation strategies is not yet empirically established, and therefore larger profiles of regulatory strategies can only be speculative in nature (Aldao, 2013). One might expect, however, since individuals have many emotion regulation strategies from which to choose and typically use more than one (Brans et al., 2013), the selection of one strategy is apt to influence the selection of another and creates a default pattern of strategy usage—a *profile of emotion regulation*—that likely influences the maintenance of pathological symptoms.

Therefore, the current study assessed participant's use of six different emotion regulation strategies: acceptance, avoidance, problem solving, reappraisal, rumination, and suppression. We chose these strategies according to a recent meta-analysis (Aldao et al., 2010), which identified them as the most well defined strategies at the current time. Symptoms of PTS were also assessed in order to examine the relationship between these symptoms of trauma and potential difficulties in emotion regulation. We investigated four innovative aims:

Aim 1. To better understand how individuals use multiple emotion regulation strategies, we will determine whether groups of people within our sample have distinct profiles of emotion regulation. A profile will characterize the extent to which a participant uses each of the six strategies on a standard scale. Based on the previously discussed findings of Eftekhari and colleagues (2009), we anticipate that there will be at least two profiles of emotion regulation: those who report infrequent use of very few

regulatory strategies (i.e., low regulators) and those who report frequent use of multiple regulatory strategies (i.e., high regulators). However, a full analysis of our sample will allow us to determine if additional profiles exist.

Aim 2a. To determine whether survivors of trauma are more likely to have a certain emotion regulation profile, we will examine the profile(s) for individuals who have experienced trauma in comparison to the profile(s) for those who have not. Given that traumatic events have been shown to change methods of emotion regulation, we hypothesize that those individuals with a trauma history will have different profiles of emotion regulation strategies. More specifically, it may be that individuals without a trauma history will have less need for frequent regulation and will endorse a regulatory profile that includes relatively infrequent use of regulation (as compared to individuals with a trauma history and higher regulatory need).

Aim 2b. To determine whether individuals with clinical levels of PTS are more likely to have a certain emotion regulation profile, we will examine whether there are differences in the profile(s) that are endorsed by trauma survivors who are experiencing clinically elevated symptoms as compared to those who are experiencing subclinical symptoms. Theoretically, each participant in our sample could be categorized into four² possible groups that describe the presence of trauma and a clinical level of PTS (Figure 2). Therefore, we will compare Group 1 and Group 2 to determine if a regulatory profile can differentiate individuals according to level of PTS and allow us to draw conclusions about how strategy selection may contribute to the maintenance of PTS symptoms or assist with posttraumatic coping. We hypothesize that those individuals with clinically elevated levels of PTS will have profiles that endorse more frequent use of regulation

(likely through maladaptive strategies) in a distinctly different manner from those individuals not endorsing clinical levels of PTS.

Aim 2c. We will determine whether using a specific profile of regulatory strategies can predict PTS severity in trauma survivors. This will allow us to understand how a regulatory profile might impact the entire continuum of PTS symptoms. Given that some emotion regulation strategies are typically more adaptive than others, we hypothesize that the proportion of adaptive and maladaptive strategies in an individual's regulatory profile will significantly predict severity of PTS.

Aim 3. To determine whether certain patterns of emotion regulation strategies are key in the mechanism through which traumatic events are related to symptoms of PTS, we will determine whether a specific profile of emotion regulation can moderate the relationship between trauma and level of PTS (proposed moderation model; Figure 3). Given that some patterns of emotion regulation strategies may be more adaptive than others, we hypothesize that the extent to which an individual experiences PTS after a traumatic event will depend on an individual's regulatory profile.

Method

Participants

Participants included 72 individuals recruited from four Milwaukee community sites and 30 participants recruited from an online marketplace (Craigslist). Technical errors in data collection occurred for a small proportion of the online participants, and two participants' data had to be excluded. A final analytic sample of 100 participants were recruited from the following locations: 33.0% CORE/El Centro, 28.0% Craigslist,

18.0% general community participants (i.e., heard through word-of-mouth, saw a flyer), 11.0% Psychology students at Marquette University, and 10% clients at Marquette University's Center for Psychological Services. Participants were informed that the inclusion criteria included having attained psychotropic medication stabilization (stable dose for greater than six weeks) and ability to read in English at the 8th grade level or higher (to be able to comprehend study assessments).

Mean age for participants was 39.51 years ($SD = 15.18$, range = 18-76), and 58% were female. The racial and ethnic distribution of the sample was similar to the 2011 US Census data for the Milwaukee County, and resulted in the following: 46% Caucasian, 26% African American, 12% Hispanic, 12% multiracial, 2% Asian and 2% Native American/Alaska Native. Latino ethnicity was endorsed by 18% of the sample. Thirty-one percent of participants reported having equal to, or less than, a high school education level. Participants that had some college education, or had earned an associate's degree or technical certification, comprised 38% of the sample. The remaining 31% of participants reported earning a bachelor's or post-graduate degree. The majority of participants (55%) reported part- or full-time employment, whereas 26% of participants were unemployed. Disability/social security income, retirement, occasional employment, and full-time students accounted for the remaining 19% of participants. Average annual household income was approximately \$35,000, but varied greatly ($SD = 47461.51$, range = 0 - 250,000). Sixty-two percent of participants were single, 28% were married, and 10% were either divorced or widowed.

Materials

A recent meta-analysis (Aldao et al., 2010) was used to identify the most valid and reliable self-report measure to use for each strategy. The self-report used to assess each strategy is outlined below. Table 1 includes self-report measure means, standard deviations, ranges, and Cronbach's α (when applicable).

Trauma History Questionnaire (THQ; Green, 1996). The THQ is a 24-item measure that is designed to screen for exposure to various types of trauma including crime related events, general disasters, physical abuse, and sexual abuse. Participants were asked to identify the frequency of each event's past occurrence in their life. Item responses were summed to create two composite scores of total trauma experience. The first score was a sum of item frequencies (i.e., 0 = *Never*, 1 = *Once*, 2 = *A few times*, 3 = *Many times*) across all 24 items to create a metric of total past trauma frequency. A second score was a count of the number of different traumatic events endorsed by an individual (i.e., item responses of 1 or greater event frequency).

Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). The DERS is a measure designed to assess six factors of emotion regulation. Responses to the Nonacceptance of Emotional Responses subscale served as the measure of *Acceptance* strategies. Items on this subscale assessed one's ability to accept an emotional response, and not become angry, embarrassed, ashamed, or guilty for feeling that way (e.g., *When I'm upset, I become angry at myself for feeling that way*). Respondents were asked to report the extent to which they believe each item applies to them using a scale ranging from 1 = *almost never, 0-10%* to 5 = *almost always, 91-100%*. Items were scored as intended (i.e., a higher score indicating *less* acceptance) for this input variable in the cluster analysis. However, in an effort to increase the clarity of the results, this subscale

was reverse scored (i.e., a higher score indicating *more* acceptance) to report resulting means, standard deviations, and mean standardized scores of the clusters. Previous studies indicate good reliability for this subscale, Cronbach's $\alpha = .85$ (Gratz & Roemer, 2004). Cronbach's α for the current sample was .90.

Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). The ERQ is a measure that is used to assess a respondent's ongoing, routine use of cognitive reappraisal and expressive suppression. Respondents were asked to report how much they agree or disagree with 10 statements regarding aspects of their emotional life. This study utilized both the reappraisal (previously established Cronbach's $\alpha = .79$) and suppression (previously established Cronbach's $\alpha = .73$) subscales to examine these mechanisms of emotion regulation (Gross & John, 2003). As measured by the items on these subscales, *Cognitive Reappraisal* behaviors included changing one's thought processes when wanting to feel more or less positive or negative emotion; *Expressive Suppression* behaviors were defined as keeping both positive and negative emotions to oneself and being careful not to express them (even though they may be experiencing them internally). The current sample had a Cronbach's $\alpha = .84$ for the reappraisal subscale and a Cronbach's $\alpha = .76$ for the suppression subscale.

Coping Responses Inventory (CRI; Moos, 1993). The CRI is a measure used to assess coping strategies. Following previous research on avoidance as a predictor of psychopathology (Holahan, Moos, Holahan & Brennan, 1995, 1997; Holahan et al., 2005), this study evaluated use of *Avoidance* strategies by summing the Cognitive Avoidance and Emotional Discharge subscales. Previous studies reported that Cronbach's α for these subscales were .71 and .60, respectively (Holahan et al., 1995). Cronbach's α

for the current sample was .80 (Cognitive Avoidance) and .46 (Emotional Discharge). This composite index indicated how often a respondent has made cognitive attempts to avoid thinking about a stressor (e.g., tries not to think about the problem) and how often a respondent has made behavioral attempts to reduce distress through expression of negative feelings instead of dealing directly with a stressor (e.g., exhibits strong, emotional behaviors). The composite scale had a Cronbach's $\alpha = .74$ in the current sample. We will also use the Problem Solving subscale of this measure to evaluate the use of *Problem Solving*. Items for this subscale include techniques such as making a plan (and following through), trying multiple ways to solve a problem, and understanding what has to be done before trying hard to resolve the issue. Cronbach's α for the Problem Solving subscale in the current sample was .76.

Cognitive Emotion Regulation Questionnaire (CERQ; Garnefki & Kraaij, 2006b). The CERQ is a measure used to understand how respondents cope with negative or unpleasant events. This study used the rumination subscale to evaluate *Rumination* in the current sample. Past studies indicated good reliability for this measure (Cronbach's $\alpha = .83$; Garnefki & Kraaij, 2006b), and the Cronbach's α for the current sample was .54. Participants indicated how often they generally think about items on a scale ranging from 1 = (*almost*) *never* to 5 = (*almost*) *always* to assess how often a respondent was thinking about, being preoccupied with, and wanting to understand how he/she feels about his/her experiences.

PTSD Checklist-Civilian Version (PCL-C; Weathers, Litz, Huska, & Keane, 1994). The PCL-C is a 17-item measure that evaluates each cluster of PTSD symptoms and is used to assess overall level of PTS in both clinical and nonclinical populations

(Tull et al., 2007; Weathers et al., 1994). Previous literature has demonstrated that the PCL-C has strong internal consistency (Cronbach's $\alpha = .97$; Weathers et al., 1994). Cronbach's α for the current sample was .94.

Procedure

Participants were recruited via flyers (community/university sites) and online advertisements (Craigstlist) for research involving “emotions and well-being”. Measures were completed in one, 60-minute session using either an online survey program (Google Forms) or paper forms. An advanced psychology undergraduate or graduate research assistant administered the informed consent process and the assessment measures; all research assistants received training on administration of the measures so that they were prepared to discuss sensitive topics with the participants. Compensation for participants recruited from the Marquette University Psychology subject pool was 60 minutes of course credit and compensation for community participants was \$20, given as cash or a gift card. To ensure confidentiality, all research material with identifying information (e.g., consent forms) was stored separately from the participants' completed research assessments. A randomly assigned subject identification number was used to identify participants' data.

Results

All study variables underwent screening prior to analyses to ensure that skew and kurtosis confirm statistical normality (Tukey, 1977). All analyses were conducted with SPSS (Version 20.0) and use a .05 alpha level.

Descriptives and Zero-order Analyses

Nearly all (97%) participants reported the experience of at least one traumatic event in their lives; 91% reported multiple traumatic events. Specifically, 40% of the sample reported the experience of at least one sexual trauma event, 46% experienced physical trauma, 70% experienced a crime-related trauma, and 93% experienced a general disaster/traumatic event (most commonly receiving news of sudden death/serious injury of a loved one or experiencing a serious accident or other event in which the individual feared being killed). The mean number of different trauma event types experienced was 7.04 ($SD = 4.23$, range = 0-18), and was positively correlated with PTS severity ($r = 0.44$, $p < .001$). Past frequency of each traumatic event type was rated on a scale of 0 – 3 (resulting in a possible frequency range between 0 and 72). Mean frequency for past traumatic events was 10.72 ($SD = 7.57$, range = 0-32), and was positively correlated with PTS severity ($r = 0.47$, $p < .001$).

Given that previous studies have demonstrated relationships between trauma variables and individual characteristics, all demographics were assessed for a relationship with current symptom severity of PTS (Table 2). Preliminary analyses indicated that the only demographic variable related PTS severity was marital status, $F(4, 95) = 2.79$, $p = .03$, $\eta_p^2 = .11$. Using the Bonferroni correction for multiple comparisons, post hoc analyses indicated that no significant pairwise differences existed. As PTS severity is our dependent variable in Aim 2c, marital status was controlled for in this regression analysis predicting PTS.

Demographic variables were also assessed for possible relationships with total number of previous trauma types and frequency of past traumatic events (Table 2). Significant group differences were found for marital status with regards to number of past

trauma types, $F(4, 95) = 3.02, p = .02, \eta_p^2 = .11$. Post hoc pairwise comparisons using the Bonferroni correction indicated that individuals who were divorced reported significant more traumatic event types than individuals who were single or married. Significant group differences were also seen with race and number of trauma types experienced, $F(5, 94) = 2.77, p = .02, \eta_p^2 = .13$; however, after correcting for multiple comparisons, no significant pairwise differences existed. A significant negative correlation was found between income and number of trauma types experienced ($r = -.23, p = .03$), as well as frequency of past traumatic events ($r = -.22, p = .04$). Other demographic variables (i.e., age, gender, highest education level attained, employment status) failed to show a significant relationship with trauma history and PTS variables (all $p > .05$).

Aim 1 – Determining Profiles of Emotion Regulation

Data analysis. A hierarchical cluster analysis was performed to statistically group participants according to their reported use of the six emotion regulation strategies (acceptance, cognitive reappraisal, problem solving, avoidance, rumination, and expressive suppression). To group individuals, scores on emotion regulation subscales were used as grouping variables, thus identifying clusters of cases with similar emotion regulation patterns. As recommended by Aldenderfer & Blashfield (1984), the clustering variables were chosen according to theory and evidence supporting the classification of the sample (see Aldao et al., 2010). Unfortunately, there is not a universal standard for determining the necessary sample size for a cluster analysis. However, a related methodology recommends a sample size of at least 2^k , where k equals the number of clustering variables (Formann, 1984). Since the current study used six clustering variables, the current sample exceeded the minimum requirement of 64 cases.

A hierarchical agglomerative method of clustering analysis was performed, which quantified the distance between each pair of cases to create a proximity matrix based on use of emotion regulation. The matrix created is an $N \times N$ dissimilarity matrix, where N refers to the number of cases being clustered. The proximity matrix for the current study was 100×100 , and the agglomerative process sequentially merged the cases in 99 steps ($N-1$) to cluster all cases. Thus, on the first step, all cases are individual clusters; on the final step, all cases are merged into one, all-inclusive cluster. To conduct the hierarchical cluster analysis, this study used a squared Euclidean distance measure and Ward's method of agglomeration as a clustering algorithm. Use of the squared Euclidean distance as a measure of dissimilarity is widely supported by social science research (Aldenderfer & Blashfield, 1984) and is also supported by the only previous publication on emotion regulation clusters (Eftekhari et al., 2009). Further, due to computation algorithms within the SPSS program, squared Euclidean distance is the preferred distance metric for use with Ward's method when conducting a cluster analysis with this software. Ward's method of clustering was chosen because it follows a schedule that combines cases whose merger minimizes the within-cluster variance, thus minimizing the error sum of squares (Ward, 1963). Additionally, previous research indicates that if all cases are to be clustered, and the data have relatively few outliers, Ward's method provides excellent recovery of known cluster structure (Kuiper and Fisher, 1975; Mojena, 1977 in Aldenderfer & Blashfield, 1984). In the present study, emotion regulation subscales used as clustering variables were mean standardized by subtracting the mean score from each individual's score (i.e., standardized score = raw score - mean) to ensure that each emotion regulation strategy would equally contribute to classification, while also

retaining original subscale variance (Moisl, 2010). Additionally, standardization is strongly encouraged when using specific distance measures, such as squared Euclidean distance (Aldenderfer & Blashfield, 1984).

Cluster solution. Since these methods produce clusters that are nested, such that each cluster is part of a larger, more inclusive cluster, cluster solutions ranged anywhere from 99 clusters to 1 cluster. A variety of methods have been described for determining the most “accurate” number of clusters for a certain sample (e.g., the variance ratio criterion method [Mooi & Sarstedt, 2011] and the agglomerative schedule method [Verma, 2013]). However, the data can only offer broad guidelines for choosing a cluster solution. Therefore, experts argue that investigators should instead depend on the goals of the classification and take into consideration *a priori* theory about the classification variables, the fact that the results must be interpretable for the hypotheses, and that clusters must be relatively balanced in size (i.e., large enough for statistical analysis but small enough to be manageable; Aldenderfer & Blashfield, 1984; Mooi & Sarstedt, 2011). These criteria, though based on subjective expertise, remain the most common method for determining a cluster solution (Baxter, 1994; Everitt, Landau, Leese, & Stahl, 2011).

The current study’s goal was to maximize between-groups differences, while also maintaining group sample sizes that were adequate for the proposed analyses. Additionally, theoretical considerations regarding what is known about emotion regulation and PTS were taken into account. After examining the agglomeration schedule, the variance method criterion, and the dendrogram result, a four-cluster solution optimized these prerequisites. The mean standardized subscale scores for each profile are

shown in Figure 4. Cluster 1 ($n = 17$) consisted of participants who reported high levels of adaptive strategies (i.e., acceptance, cognitive reappraisal, and problem solving) and low levels of maladaptive strategies (i.e., avoidance, expressive suppression, and rumination). Therefore, this pattern is hereafter characterized as the *Adaptive Regulation* pattern. Cluster 2 ($n = 38$) consisted of participants who reported moderately high levels of all strategies, with the exception of lower levels of expressive suppression. Thus, this cluster's pattern is characterized as *Active Regulation*. Cluster 3 ($n = 31$) also reported moderately high levels of most strategies, with the exceptions of low problem solving and high expressive suppression. The pattern exhibited by this cluster is termed *Detached Regulation*. Cluster 4 ($n = 14$) showed a pattern opposite to that of the *Adaptive* cluster, such that they reported low levels of adaptive strategies and high levels of maladaptive strategies. This cluster is hereafter termed the *Maladaptive Regulation* profile. Thus, the combination of a priori theory and data-driven results indicated four interpretable and meaningful patterns of emotion regulation in this sample.

Aim 2a – Emotion Regulation Profiles and Trauma History

To determine whether survivors of trauma are more likely to have a certain emotion regulation profile, we proposed a Pearson Chi-square analysis to examine the possibility of profile categorization differences for those who have experienced trauma as compared to those who have not. Participants were identified as having experienced trauma if they endorsed one or more items on the THQ as having happened to them at least once. The current sample included only three individuals who denied all items on the trauma history questionnaire; thus the proposed analysis to compare group differences for those with a trauma history ($n = 97$) and those without ($n = 3$) was inappropriate.

Instead, the sample was split into quartiles based on frequency of past traumatic experience and the highest-incidence quartile was compared to the lowest-incidence quartile in a Pearson Chi-square analysis. Results indicated that the analysis produced expected counts of less than 5 in 50% of the cells, with a minimum expected cell count of 2.95. Fisher's exact test was used to correct for this violation. Results were nonsignificant, indicating that frequency of past trauma experience does not influence the probability of an individual having any of the established emotion regulation profiles (Fisher's exact test statistic = 3.13, $p = .39$). Since frequency of past trauma does not appear to relate to profiles of emotion regulation, it is important to consider additional factors related to trauma, including PTS.

Aim 2b – Emotion Regulation Profiles and Clinically Elevated PTS

To determine whether individuals with clinical levels of PTS are more likely to have a certain emotion regulation profile, we examined the likelihood of clinical PTS within each profile. Clinically significant PTS was defined by a response pattern on the PCL that follows DSM-IV-TR criteria for PTSD. Specifically, at least one symptom from the re-experiencing items, three symptoms from the avoidance/numbing items, *and* two symptoms from the arousal items must be endorsed at a score of 3 or more. We excluded the three individuals without a trauma history and dichotomized the remainder of the sample into clinical levels of PTS ($n = 25$) and sub-clinical levels of PTS ($n = 72$). Pearson's chi-square test indicated that the analysis produced expected counts of less than 5 in 25% of the cells, with a minimum expected cell count of 3.61. As with the previous analysis, Fisher's exact test was used to correct for this violation and results showed that it was significantly more probable than expected for individuals categorized with the

Maladaptive emotion regulation profile to report clinical levels of PTS (Fisher's exact test statistic = 21.46, $p < .001$). Individuals categorized with any of the other three emotion regulation profiles were less likely to report clinical levels of PTS than expected (Figure 5).

Aim 2c – Emotion Regulation Profiles Along the Spectrum of PTS Severity

Determining whether using a specific profile of regulatory strategies can predict PTS severity in trauma survivors will allow us to understand how a regulatory profile might influence the entire continuum of PTS symptoms. Given that marital status was significantly related to PTS severity in the zero-order analyses, it was used as a covariate in the model. A multiple regression analysis was conducted and marital status was entered in the first block, followed by a dummy coded variable of profile classifications in the second block. Results indicated that an individual's emotion regulation profile significantly predicted PTS levels, even after accounting for marital status, $\beta = .44$, $R^2 = .20$, $F(1, 97) = 23.38$, $p < .001$ (Table 3). Follow-up analyses indicated PTS severity was incrementally different for each profile: mild levels of PTS in the *Adaptive* pattern regulators (mean PCL-C = 26.07), mild-moderate PTS in the *Active Regulation* group (mean PCL-C = 33.67), moderate-severe PTS in the *Detached Regulation* group (mean PCL-C = 37.61), and severe PTS in the *Maladaptive* regulators (mean PCL-C = 50.01).

Aim 3 – Emotion Regulation Profile as a Moderator

To determine whether certain patterns of emotion regulation strategies form a key mechanism of action through which a traumatic event leads to symptoms of PTS (proposed moderation model; Figure 3), we determined whether a specific profile of

emotion regulation moderates the relationship between frequency of past trauma and severity of PTS symptoms. The main predictor of interest, trauma history, was calculated as a sum of the frequencies reported for each traumatic event listed in the THQ (see methods), and showed a significant zero-order relationship with PTS severity. Since our main predictor (trauma frequency) was a continuous variable and our potential moderating variable (emotion regulation profile) was a categorical variable, we used multiple regression analysis to test this aim (Table 4).

Trauma frequency and regulatory profile variables were entered in the first block of the regression. Results indicated that these variables explained 36.5% of the variance in PTS symptom severity. Congruent with preliminary analyses, past trauma frequency ($\beta = .42, p < .001$) and emotion regulation profiles ($\beta = .38, p < .001$) were both associated with PTS symptom severity. An interaction term was calculated to represent trauma frequency x emotion regulation profile and entered into the second block of the multiple regression analysis. The interaction term was non-significant, indicating that the effect of past trauma frequency on PTS symptoms did not depend on an individual's emotion regulation profile, and a significant moderation effect does not exist ($\beta = .54, p = .07$).

Discussion

The current study is the first to examine whether profiles of emotion regulation could be established based on individuals' use of six different regulatory strategies (i.e., acceptance, cognitive reappraisal, problem solving, avoidance, expressive suppression, and rumination). The results indicated that four different emotion regulation profiles (*Adaptive, Active, Detached, and Maladaptive*) were present in a predominantly community sample. Given the existence of these profiles, the secondary aims were to

evaluate whether emotion regulation profiles could go beyond findings in the existing literature to explain differences in PTS. While having a certain regulatory profile significantly predicted a person's PTS symptom severity, the regulatory profiles did not moderate the relationship between the frequency of past trauma and their PTS severity.

These findings offer a new perspective on the relationship between emotion regulation and PTS, and thus expand on the current literature in a meaningful way. Research has established that certain strategies (e.g., cognitive reappraisal) are associated with decreased PTS (Wisco et al., 2013), depression, and social anxiety (D'Avanzato et al., 2013), whereas other strategies (e.g., thought or expressive suppression, rumination) appear to contribute to these psychopathologies (Amstadter & Vernon, 2008; D'Avanzato et al., 2013). Clinical research outcomes are typically limited to depression and anxiety (D'Avanzato et al., 2013; Hofmann et al., 2009; Werner et al., 2011); very few have thoroughly focused on PTS, despite the evidence linking misuse of emotion regulation to PTS symptoms (Campbell-Sills & Barlow, 2007; Ehring & Quack, 2010). Further, although individuals often rely on multiple strategies of emotion regulation (Brans et al., 2013), much of the literature supporting the benefits or risks of regulation is limited to studies that explore only one or two strategies (Aldao, 2013). Expanding on these well-established findings, the current study was the first to present the nuanced relationships between six common emotion regulation strategies, and then go beyond to offer an explanation for how numerous strategies come together to impact PTS.

Emotion Regulation Profiles

Participants reported their typical use of six emotion regulation strategies, and these quantitative evaluations alone were used to group participants according to their

patterns of emotion regulation (Aim 1). A hierarchical cluster analysis provided a way to understand the relationships among the strategies. Four emotion regulation profiles were identified and then labeled according to the pattern of regulatory strategies that was present in each: *Adaptive*, *Active*, *Detached*, and *Maladaptive*. The *Adaptive* and *Maladaptive* profiles are perhaps the most intuitive. The *Adaptive* group endorsed frequent and nearly equal use of acceptance, cognitive reappraisal, and problem solving; this group very infrequently used any maladaptive strategy. To the contrary, the *Maladaptive* group endorsed frequent use of avoidance, expressive suppression, and rumination, with very little use of any adaptive strategy. Thus, these profiles are endorsing nearly opposite patterns of regulation and are differentiated by their inverse use of traditionally adaptive and maladaptive strategies. The remaining two profiles offer insight regarding the nuances of the relationships between strategies. The *Active* profile of emotion regulation was characterized by moderately high, and nearly equal, use of all strategies except for expressive suppression, which was relatively unendorsed. The *Detached* group also reported frequent use of nearly every strategy, but could be differentiated by their exceptionally high use of expressive suppression and low use of problem solving.

Eftekhari and colleagues (2009) published the only previous cluster analysis of emotion regulation strategies, grouping participants according only to their use of expressive suppression and cognitive reappraisal. Although the current study supports the argument that individuals can be clustered according to their frequency and type of emotion regulation, it goes beyond this to address additional facets of emotion regulation. For example, Eftekhari and colleagues (2009) identified a group of participants who they

termed “low regulators” because they used very little of the two measured regulatory strategies. Our results indicated that all participants endorsed using multiple forms of emotion regulation. Therefore, this study was able to show that participants are indeed regulating in some way, and perhaps the term “low regulators” is an inaccurate assumption based on the limitations of the emotion regulation assessment. Thus, measuring only two strategies does not appear to adequately represent the many strategies that individuals may use to regulate their emotions. Further, the previous study was limited in that it did not have any individuals who reported high levels of expressive suppression and it presented a lack of generalizability associated with their all-female, undergraduate sample (Eftekhari et al., 2009). Therefore, although Eftekhari and colleagues were able to show that low levels of an adaptive strategy (i.e., cognitive reappraisal) were indicated in more severe psychopathology, they were unable to assert whether high levels of a maladaptive strategy (i.e., expressive suppression) were also indicated in psychopathology. The current study allowed for a more comprehensive representation of adaptive *and* maladaptive regulation by assessing additional strategies in a diverse sample that was more likely to regulate their emotions in a variety of ways. Therefore, the current results take into account multiple aspects of variability, including additional strategies and a diverse population, to allow for a better understanding of the relationships among regulatory strategies and the intersection with mental health outcomes.

Emotion Regulation Profiles and PTS

Although the emotion regulation profiles were established based on assessments of emotion regulation alone, they also demonstrated the power to differentiate

individuals' PTS symptom severity (Aim 2b, 2c). Participants reported varying levels of PTS, ranging from no (or very mild) symptom levels to severe, clinical symptom levels. The substantial symptom variability exhibited by individuals with PTS is consistent with previous literature (Baldwin, 2013; Lanius et al., 2003) and confirms the importance of investigations into factors differentiating severity.

Participants with the *Adaptive* profile of regulation, who predominantly rely on acceptance, cognitive reappraisal, and problem solving to regulate their emotions, were significantly more likely to have non-clinical, mild levels of PTS symptoms. This is congruent with previous literature demonstrating the positive mental health outcomes associated with using these “adaptive” strategies, including less severe psychopathology (e.g., anxiety, depression, and PTS; Billings & Moos, 1981; Ehring & Quack, 2010; Garnefsky & Kraaij, 2006a; Gross & John, 2003; Tull et al., 2007), lower distress (Folkman & Lazarus, 1980, 1985), and less negative affect (Campbell-Sills et al., 2006; DeSteno et al., 2013). Participants who report using potentially ineffective strategies over and above more adaptive ones showed the reverse PTS outcomes. This was observed in the results that indicated only participants with the *Maladaptive* profile, whose regulatory strategies were predominantly avoidance, expressive suppression, and rumination, were significantly more likely to have clinical levels of PTS, and were the group with the highest mean levels of PTS symptom severity. This is consistent with the literature indicating that these three strategies are generally maladaptive and associated with negative health outcomes, including increased psychopathology (e.g., depression, generalized anxiety, increased substance use, and PTS; Blalock & Joiner, 2000; Chung et al., 2001; Clohessy & Ehlers, 1999; Bryant & Harvey, 1995; Charlton & Thompson,

1996; Garnefski & Kraaij, 2006a), increased negative affect (Billings et al., 2000; Brans et al., 2013), and perceived distress (King, 2001; Sloan & Marx, 2004).

The nuances in strategy use displayed by the remaining two profiles of regulation may aid in clarifying the emotional trajectory from a healthy mental state to an increasingly dysregulated mental state. In the *Active Regulation* pattern, individuals had a mild-moderate level of PTS, and were distinct from other groups because of their relatively high use of all emotion regulation strategies, except expressive suppression. Therefore, much of their emotion regulation is achieved via adaptive strategies that have been shown to ameliorate PTS. For example, acceptance (Ehring & Quack, 2010) and reappraisal (Eftekhari et al., 2009) are associated with decreased severity in multiple domains of PTS symptoms. Further, problem-focused regulation has been shown to be exceedingly effective in recovery from PTS (Folkman & Moskowitz, 2000; Wilson & Raphael, 1993; Zeidner & Endler, 1996). However, a notable proportion of the *Active Regulation* profile also involves use of avoidance and rumination. Previous research indicates that these two strategies are maladaptive, since they are strongly predictive of posttraumatic morbidity and PTS symptom maintenance (Bryant et al., 2000; Clohessy & Ehlers, 1999; Chang et al., 2003). Therefore, the PTS severity that is associated with this balance of adaptive to maladaptive regulation strategies is consistent with previous literature that suggests this pattern would lead to mild-moderate dysfunction, but not an overwhelming degree of pathology.

Individuals with the active profile may have the awareness of their increasing difficulties and rely (either consciously or non-consciously) on many available strategies to achieve regulation. While self-awareness was not directly measured in the current

study, it is possible that distress awareness is a factor worth considering in interpreting a profile's relationship to mental health. Previous research describes the problems associated with PTS disease progression as a cascading deterioration of health and psychosocial factors, including neurobiological stress systems and interpersonal difficulties (Alarcon, Glover, & Deering, 1999). With time, problems associated with symptom elevation become increasingly difficult to ignore, and individuals may begin employing a larger number of strategies in an effort to regulate their perceptible distress. This may represent one way that individuals attempt to slow PTS disease progression. Previous studies also indicate that increased self-awareness drives and improves self-regulation (Carver & Scheier, 1981, 1982). In this way, the innate increase in awareness that accompanies increasing distress is adaptive: it promotes better regulation and may allow individuals to resume an *Adaptive Regulation* pattern. However, an alternative, increasingly dysregulated trajectory must exist since not all individuals report an *Adaptive* profile.

The *Detached Regulation* profile displays a marked increase in expressive suppression and decrease in problem solving. Therefore, the balance of adaptive to maladaptive regulation in this profile shifts to become more predominantly maladaptive and is accompanied by an increase in PTS symptom severity that is congruent with the literature. Specifically, previous studies indicate that difficulties with problem solving, as well as reliance on expressive suppression, are positively associated with PTS symptom severity and maintenance (Clohessy & Ehlers, 1999; Ozer et al., 2003; Roemer et al., 2001; Tull et al., 2007). Regarding an explanation for this shift, it must be considered that, as PTS symptoms worsen, it may temporarily become more adaptive to suppress

negative emotions, rather than express them. This is supported by a framework proposed by Keltner and Kring (1998) arguing that emotional disturbances in psychopathology interferes with the goals of communication (e.g., information exchange and coordination to accomplish a goal), and undermines the functions of emotion in social interactions (e.g., provide information and motivate certain behaviors that may benefit an interpersonal relationship). Thus, there is great potential for dysregulated emotion expression to impair the necessary social networks of an individual with worsening PTS.

Despite the potential for this strategy to benefit an individual, the costs are believed to outweigh the benefits if it is used indiscriminately; it is seemingly much more favorable for an individual to be flexible in their regulation (Gross, 1998b; Bonanno & Burton, 2013). The literature has predominately focused on the negative mental and physical health effects of expressive suppression (Clohessy & Ehlers, 1999; Foa et al., 1995; King, 2001; Sloan & Marx, 2004); however, additional consequences are seen concerning the inverse relationship between expressive suppression and problem solving. Consistent with the current findings regarding the increase in expressive suppression and decrease in problem solving seen for the *Detached Regulation* profile, previous research supports that increased expressive suppression is linked to a detriment in problem solving (as well as other cognitive abilities; Richards, 2004). For example, one study indicated that participants who engaged in expressive suppression while viewing a distressing video had poorer performance on a subsequent problem-solving task (i.e., unscrambling letters to create words; Baumeister, Bratslavsky, Muraven, & Tice, 1998).

The ego-depletion view of regulation states that self-regulation—regardless of the form it takes—is supplied by a unified, limited resource that is depleted with each act of

self-regulation. Therefore, if an individual engages in expressive suppression, s/he is inescapably less capable of engaging in subsequent regulation (Baumeister et al., 1998). Importantly, this study suggests that one of the first adaptive regulatory strategies to suffer at the expense of increased maladaptive regulation is problem solving. This has significant implications for entering a pattern of maladaptive regulation that is nearly impossible to get out of. The cyclic progression towards severe PTS is likely to continue if expressive suppression, coupled with a lack of motivation to seek out solutions to their problems, isolates individuals, detaches them from their social supports, and puts them at higher risk for PTS.

Internally, increasing awareness of distress leads to attempts to reconcile how that distress is integrated into an individual's self-concept (Hull & Levy, 1979). Individuals may look to emotion regulation strategies to help them prevent developing a negative sense of self (Baumeister, 1990, 1991; Greenberg & Musham, 1981; Heatherton & Baumeister, 1991). Specifically, the increase in expressive suppression seen in the *Detached Regulation* profile might allow an individual to inhibit consideration that their own faults are contributing to the maintenance of PTS symptoms. Since effective regulation depends on awareness of distress (Baumeister, DeWall, Ciarocco & Twenge, 2005), and expressive suppression inhibits attention to, and understanding of, one's mood (John & Gross, 2004), then it is plausible that this profile will interfere with ever attaining effective regulation.

Therefore, it appears that the more severe levels of PTS are paralleled by a pattern of regulation that is likely to move increasingly towards the *Maladaptive* pattern of emotion regulation strategies, thus increasing their likelihood to meet clinical levels of

PTSD. This detrimental shift in strategy use may begin as a perceived inability to cope with increasing symptom severity, but soon becomes progressing dysfunction potentially stemming, in part, from lack of self-awareness. Notably, previous research demonstrating that increasing self-awareness offsets the negative effects of stressful situation by improving regulation (Baumeister et al., 2005) implies that awareness might be an effective tool for promoting proper emotion regulation in trauma-focused therapies (see Future Research and Implications).

Emotion Regulation Profiles and Trauma History

Despite the relationship between participants' profiles of emotion regulation and their reported levels of PTS, the likelihood that an individual uses a specific profile did not depend on frequency of past trauma (Aim 2a). The current sample is somewhat homogenous in that nearly all (97%) individuals reported experiencing at least one traumatic event. This is consistent with previous research demonstrating that urban communities are at high-risk for trauma (Switzer et al., 1999). However, previous research indicates that the experience of a single traumatic event is enough to cause significant changes in emotion regulation (Bardeen et al., 2013). Therefore, since the current results indicate that the experience of compounding traumatic events is not sufficient to determine one's emotion regulation profile, it appears that it is not the experience of multiple traumas, per se, that leads to the observed profiles. Instead, what causes an individual to regulate in a certain way may be the interaction between having experienced any past trauma and the individual appraisals that are attributed to that trauma. This is supported by previous literature that indicates additional variables, such as betrayal (Goldsmith et al., 2013) and perceived control (Folkman, 1984), mediate the

relationship between stressful experiences and post-event regulation. Therefore, the typical patterns of regulation resulting from compounding traumatic experiences may only be able to be identified after taking into consideration an individual's cognitive assessment of the situation.

Emotion Regulation Profiles as a Moderator

Although previous literature has established a relationship between the experience of a traumatic event and subsequent PTS (American Psychiatric Association, 2000), as well as relationships between emotion regulation, trauma, and PTS (Campbell-Sills & Barlow, 2007; Eftekhari et al., 2009; Tull et al., 2007), the regulatory profiles were not a moderating variable in the relationship between trauma and PTS. While this is inconsistent with what we predicted, it is reasonable given that there was no significant relationship between the regulatory profiles and frequency of past trauma. Further, it is possible that the current study had decreased power to find such an effect due to grouping individuals based on their emotion regulation profile (instead of allowing for the variability associated with a continuous moderator). In this way, the current study examined emotion regulation in a significantly different way from many other studies, which often use a continuous measure of overall difficulties in regulation. Here, both maladaptive and adaptive strategies were incorporated to provide a better understanding of the relationships between multiple strategies. Perhaps taking into consideration the “good” regulation that individuals are capable of increases the complexity of the relationships between emotion regulation and trauma such that a simple moderation is not sufficient to understand the underlying mechanisms. The current study is also different from previous studies that have controlled for the type of traumatic event that an

individual experienced. Controlling or limiting the study to a specific type of trauma may allow for moderation analyses to be more effective. Finally, the current sample might not be sufficient to answer the question of moderation. Specifically, due to limitations in recruitment, the current sample is relatively underrepresented in terms of individuals with severe levels of PTS.

Limitations

The literature on cluster analysis (e.g., Aldenderfer & Blashfield, 1984) highlights some important cautions to consider when using this type of statistical analysis. One concern is that different clustering methods and algorithms may, and very often do, generate different solutions with the same dataset. Although this may be troublesome, it is common for different statistical methods to create different results for a wide variety of applied research questions. The current study attempted to limit ambiguity in three ways. First, we used a priori statistical theory to determine the measure of similarity, standardization measure, and clustering algorithm prior to analysis. Second, the number of clusters for the solution was chosen based on a combination of emotion regulation theory, trauma theory, and necessity to answer the proposed hypotheses. Third, we used validation procedures (e.g., stability testing, validity testing, theoretical justification) to support a cluster solution as the best fit for the dataset by confirming that individuals who predominantly used traditionally adaptive regulation strategies were those who reported low levels of PTS, whereas those who endorsed predominantly maladaptive strategies also reported high levels of PTS.

Another caution of cluster analysis is that the analysis is “structure-seeking”, despite the fact that the operation itself is “structure-imposing” (Aldenderfer &

Blashfield, 1984, p. 14). Any clustering method will categorize cases into groups, and these groups may vary depending on the method. The key is to know when these groups are real (e.g., have meaningful connections with additional variables and proposed theories) and not merely imposed on the data by the method. The current study attempted to minimize this limitation by integrating the resulting regulatory profiles into the current literature and theories of emotion regulation and trauma.

Other limitations to consider are that the data were collected via self-report measures, which assumes that individuals are reliable reporters of their emotion regulation. Since the data are cross-sectional, inferences regarding temporal aspects or causality of the data could not be determined. Recruitment strategies included sampling only from urban, Milwaukee, WI, community areas. Therefore, results may not be generalizable to rural populations, or populations from other urban geographical regions. Finally, the inclusion of a heterogeneous trauma population did not allow for the power to make specific conclusions regarding the effects of different types of trauma (e.g., sexual abuse vs. natural disaster vs. combat trauma) in differences in emotion regulation strategies and symptom outcome.

Conclusions and Implications

The current study expands significantly on the understanding of the relationships between multiple strategies of emotion regulation, as well as how strategies can intersect to form default patterns, or profiles, of emotion regulation. We also showed how an individual's regulatory profile can be used as an indicator for severity of PTS. Given these contributions, several recommendations are proposed for future research on

emotion regulation patterns in the aftermath of trauma and potential development of posttraumatic illness.

Future studies may benefit from investigating additional factors, such as perceived control and self-awareness, that may further explain both a) the mechanisms of the relationship between trauma, emotion regulation, and PTS, and b) the profiles of emotion regulation. Additionally, given the neurobiological dysregulation that is often seen in association with PTS, future studies may also benefit from investigate the ways in which an emotion regulation profile may be related to neurobiology.

The clinical literature would benefit from investigating how factors described above (e.g., profiles of emotion regulation, self-awareness, and perceived control) may act as risk or protective factors in the development of psychopathologies. Studies may confirm that the nuanced changes seen for emotion regulation associated with the shift from mild-moderate PTS (*Active Regulation*) to moderate-severe PTS (*Detached Regulation*) are a critical turning point in the development of clinical PTSD. If this is true, then preventative or posttraumatic treatment might focus on specific emotion regulation strategies (i.e., reducing the drop in problem solving and increase in expression) that may be protective against PTS.

Regardless of treatment efficacy, clinicians should at least be aware of the differences in these strategies for individuals at different places along the spectrum of PTS symptom severity and consider their potential to be warning signs for treatment. Clinicians may also use the cyclical relationship between regulation and self-awareness to target increases in emotion regulation strategies that will foster awareness and, in turn, promote effective regulation.

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FOOTNOTES

¹It is important to distinguish expressive suppression from thought suppression, which occurs at the point of attentional deployment. The use of thought suppression is also considered maladaptive and is correlated with increased emotional and physiological arousal (Campbell-Sills & Barlow, 2007; Wegner, Broome, & Blumberg, 1997). However, for the purposes of this study, we focus on the better-developed construct of expressive suppression.

²The fourth group may have appeared in this sample due to idiosyncratic interpretations of the self-report measures or reluctance to disclose past traumatic events. PTS, in the most accurate definition of the term, is not possible without experiencing a traumatic event (American Psychiatric Association, 2000).

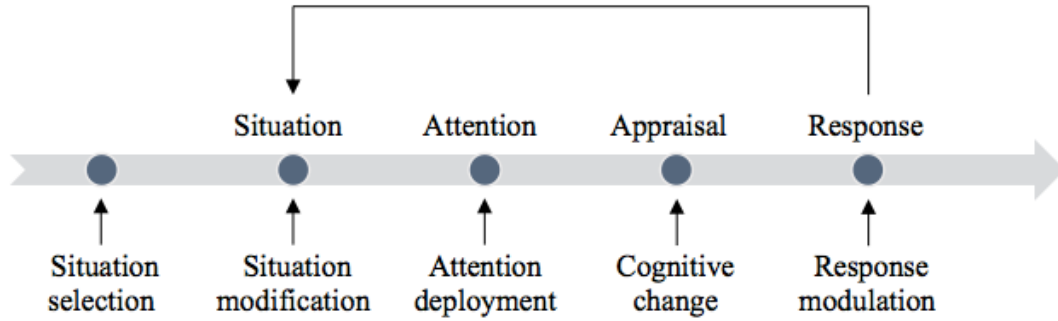


Figure 1. The process model of emotion regulation encompassing five families of emotion regulation strategies. Adapted from Gross & Thompson, 2007.

		Past Trauma Experience	
		Yes	No
Endorsed PTS	Yes	Group 1	Group 2 ⁴
	No	Group 2	Group 3

Figure 2. Theoretical groups in which each participant could be categorized according to the presence of trauma history and/or PTS symptoms.

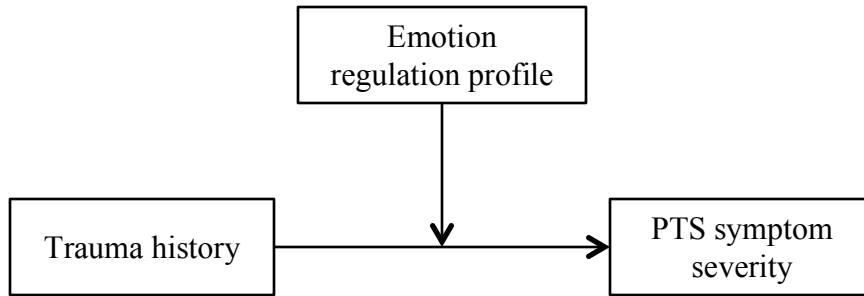


Figure 3. The proposed moderation model (Aim 3).

Table 1

Descriptive Statistics on Select Subscales and Symptom Measures (N = 100)

	<i>M</i>	<i>SD</i>	Range	Number of Items	α
Emotion regulation					
Acceptance (DERS)	23.93	5.87	6 – 30	6	.90
Cognitive reappraisal (ERQ)	29.87	7.07	6 – 42	6	.84
Problem solving (CRI)	12.03	3.62	0 – 18	6	.76
Avoidance (CRI)	14.82	6.24	0 – 36	12	.74
Expressive suppression (ERQ)	14.55	5.95	4 – 28	4	.76
Rumination (CERQ)	5.87	2.03	2 – 10	2	.54
Posttraumatic stress (PCL-C)	35.89	15.22	17 – 85	17	.94
Trauma history (THQ)					
Number of unique events	7.04	4.23	0 – 24	–	–
Frequency of events	10.72	7.57	0 – 72	–	–

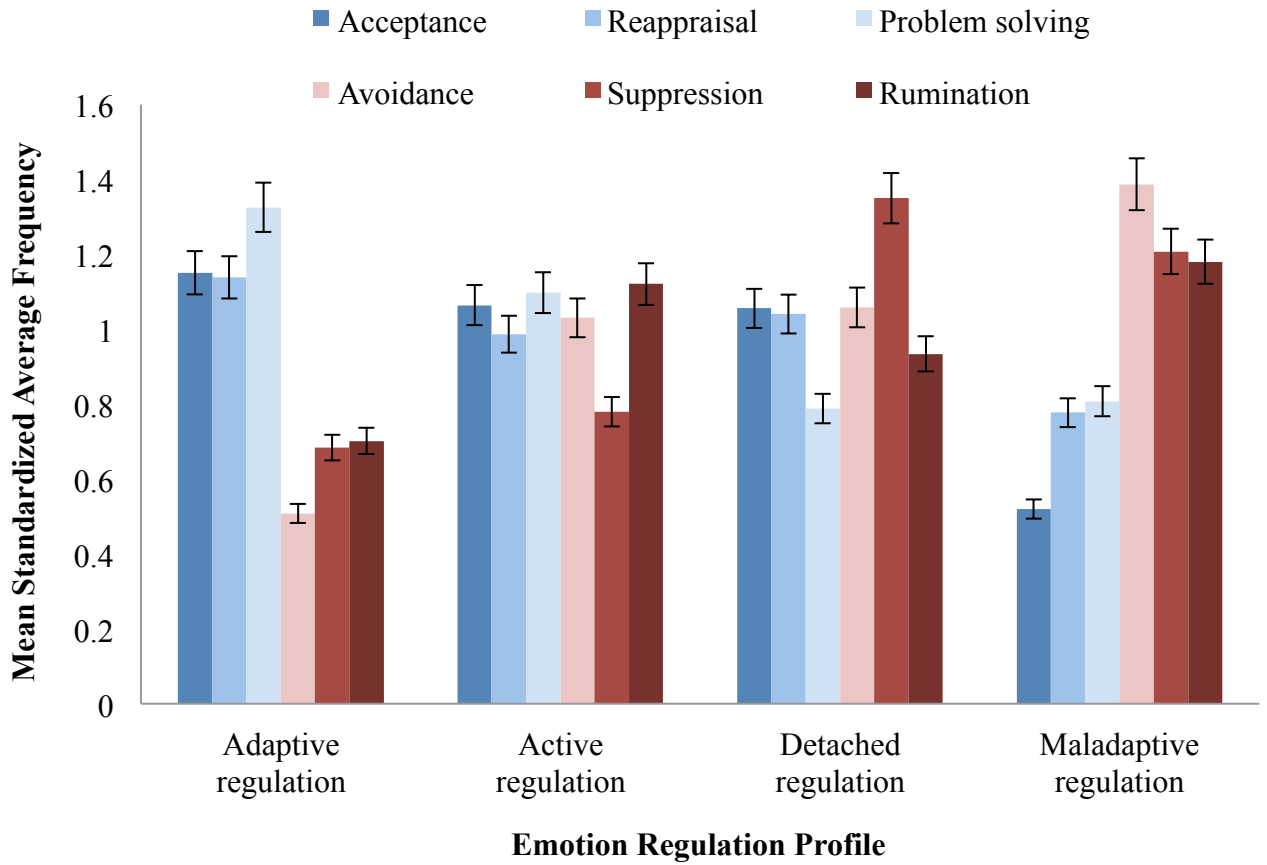
Note. DERS-Nonacceptance subscale was reverse coded such that higher numbers indicate more acceptance.

Table 2

Select Zero-order Relationships between Demographics, Trauma, and PTS (N = 100)

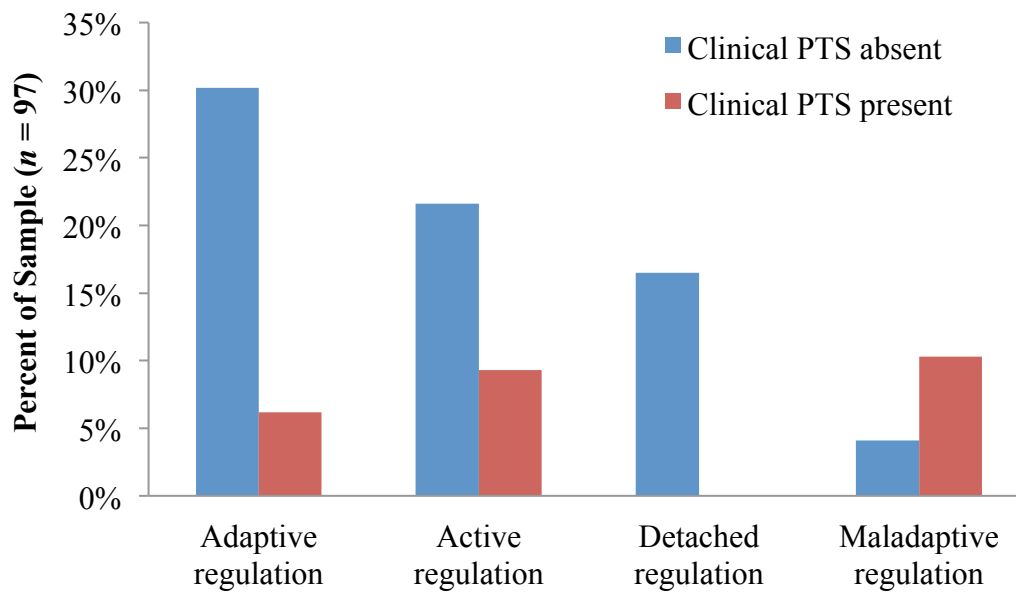
	<i>n</i>	Types of trauma <i>M (SD)</i>	PTS severity <i>M (SD)</i>
Marital status			
Single	56	6.38 (4.18) ^a	35.40 (13.50)
Married	28	7.25 (4.12) ^a	32.00 (12.39)
Divorced	9	11.33 (3.78) ^b	45.76 (19.57)
Single, living with partner	6	6.00 (2.83)	46.96 (25.68)
Widowed	1	6.00 (0.00)	17.00 (0.00)
Race			
European American/White	46	6.04 (3.50)	34.63 (15.32)
African American/Black	26	8.65 (4.09)	34.95 (12.68)
Hispanic/Latino	12	5.42 (4.64)	37.42 (16.18)
Multiracial	12	9.00 (5.46)	40.10 (20.56)
Asian	2	4.00 (1.41)	30.50 (10.60)
American Indian/Alaskan Native	2	10.00 (2.83)	48.00 (4.34)
Correlations (Pearson's <i>r</i> values)			
	Types of trauma	Frequency of trauma	PTS severity
Annual household income	-.226*	-.216*	-.093
Age	.134	.081	-.022
Education level	-.090	-.079	-.189

Note. * $p < .05$; Groups with differing superscripts showed significant group differences at the pairwise level after adjusting for multiple comparisons.



	<i>M (SD)</i>		
	PTS severity	Types of trauma	Frequency of trauma
Adaptive regulation (<i>n</i> = 17)	26.07 (8.20)	7.59 (4.29)	10.06 (6.15)
Active regulation (<i>n</i> = 38)	33.67 (15.61)	7.00 (3.77)	10.24 (6.68)
Detached regulation (<i>n</i> = 31)	37.61 (13.84)	6.00 (4.42)	10.10 (8.69)
Maladaptive regulation (<i>n</i> = 14)	50.01 (13.53)	8.79 (4.66)	14.21 (8.56)

Figure 4. Profiles of emotion regulation in the current sample.



Emotion Regulation Profile

Figure 5. Crosstabulation of actual percentages of probable PTSD in current sample (Aim 2b; $n = 97$); Fisher's exact test statistic = 21.46, $p < .001$.

Table 3

Multiple Regression Results for Emotion Regulation Profiles Predicting PTS (Aim 2c; N = 100)

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Marital status	0.31	1.35	.02	0.76	1.22	.06
Regulation profile				7.20	1.49	.44*
R^2		< .01			.20	
<i>F</i> for change in R^2		0.05			23.38*	

*Note: * $p < .001$.*

Table 4

Multiple Regression Results for Regulation Profiles as a Moderator (Aim 3; N = 100)

Variable	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Trauma frequency	0.84	0.16	.42*	-0.04	0.51	-.02
Regulation profile	6.25	1.33	.38*	2.46	2.44	.15
Trauma frequency x regulation profile				0.33	0.18	.54
R^2		.35			.37	
F for change in R^2		27.87*			3.38	

*Note: *p < .001.*