

**Title:** Emotion Regulation in Chronic Disease Populations: An Integrative Review

**Running Head:** Emotion Regulation Integrative Review

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## ABSTRACT

**Background and Purpose:** Emotion regulation, the experiencing, processing, and modulating of emotional response, is necessary to manage the emotional stressors common in patients with chronic illness. Overwhelming emotional demands deplete the resources needed for everyday self-care management of chronic disease, contributing to poor health outcomes. Emotion regulation is shown to impact behaviors in healthy individuals, yet a review of literature

examining evidence of associations in chronically ill populations is lacking. The purpose of this paper is to examine the state of the science relative to the impact of emotion regulation on health outcomes in chronic illness populations. **Methods:** Articles were reviewed (N=14) that focused on emotion regulation and outcomes of patients with chronic illness. **Results** indicate that the majority of the studies focused on these concepts are cross-sectional and measure emotion regulation utilizing a variety of surveys. Potential relationships exist with increased age, male gender, higher education, decreased stress, depressive and anxiety symptoms being associated with more adaptive emotion regulation. Of primary importance to patients with chronic illnesses is the potential link between greater difficulties with emotion regulation and the presence of chronic disease as well as poorer physical function. **Implications for Practice:** Care should include attention to affective regulation as well as physiologic responses of chronic illness.

### **Keywords**

Emotion regulation, chronic illness, health outcomes, self-management

### **Emotion Regulation in Chronic Disease Populations: An Integrative Review**

Patients with chronic diseases are burdened with complex medical regimens requiring self-management of health behaviors. Improving self-management of health behaviors for patients with chronic disease is critical to improving health outcomes and decrease costs associated with healthcare utilization. Complex self-management of health behaviors place additional challenges on cognitive and emotional processing. Such demands deplete the resources needed for everyday self-care, contributing to poor regimen adherence and increased healthcare utilization (Armstrong, Galligan, & Critchley, 2011; de Ridder, Geenen, Kuijer, & van Middendorp, 2008). Effective processing of emotional stimuli can minimize negative

psychological symptoms, which reduce patients' ability to attend to self-management (Cohen, 2015).

Emotion regulation, the experiencing, processing, and modulating of emotional responses (de Ridder et al., 2008), is necessary to manage the emotional stressors common in patients with chronic illness. Optimizing emotion regulation promotes adaptation in the presence of aversive stressors (Gratz & Roemer, 2008). Inability to effectively manage emotions triggered by a health event can diminish self-care activities and impact mental and physical health (Appleton, Buka, Loucks, Gilman, & Kubzansky, 2013; de Ridder, Geenen, Kuijer, & van Middendorp, 2008; Evers, Stok, & de Ridder, 2010).

Emotions can be regulated at various points during the processing of emotional stimuli including selecting or modifying situations, altering the attention towards or the thoughts regarding situations, and changing the responses to these thoughts (Gross, 2013). When thoughts regarding situations (such as the difficulty of managing a chronic illness) are distorted, there can be detrimental effect on physical, social, psychological, and spiritual states (Leventhal, Diefenbach, & Leventhal, 1992). Specifically, emotion regulation impacts determination of situations worth attending to, such as attending to self-management of diet or exercise. This selection of attention and the thoughts regarding stimuli impact subsequent behavioral changes (Gross, 2001; Gross & Munoz, 1995). Optimal emotion regulation allows humans to refocus and to make reality-based appraisals of threat-provoking circumstances. Further, ongoing emotion regulation will minimize the duration of cognitive dissonance and can help patients to tolerate the uncertainty of an unknown future (Hofmann, Heering, Sawyer, & Asnaani, 2009; Moser, Most, & Simons, 2010).

Differences related to personal factors such as age, and likely illness characteristics, are associated with differences in the use of emotion regulation strategies (Blanchard-Fields, Stein, & Watson, 2004; Urry & Gross, 2010). Emotion regulation has been shown to impact behaviors in healthy individuals; however, the empirical literature showing the impact in chronic illness populations has not been previously reviewed. Differences in the regulations of emotions may partially explain difficulties with self-management of health behaviors and further poor health outcomes. Thus, a critical evaluation of literature related to emotion regulation and health outcomes in patients with chronic illness is desirable to understand potential relationships with other demographic, physiologic, and emotional variables.

A literature review was conducted to examine the state of the science relative to the impact of emotion regulation in chronic illness populations. This literature review will provide a summary of the empirical literature recently available in describing the phenomena of emotion regulation specifically attending to the impact that it may have on health outcomes for patients with chronic illness.

## **METHODS**

Databases including PsychINFO and CINAHL were used to locate studies over a 15-year span. This search included the years 1999 through 2014. Keywords included “emotion regulation,” “patient,” “cardiovascular,” “physical health,” and “chronic illness.” As the numbers of research articles meeting the needs of this review are small, a longer period of time was selected and keywords included both general illness terms (physical health and chronic illness) as well as the most prominent chronic disease category (cardiovascular). Additional articles relevant to the review were added through a manual search of references cited in journals. Articles were included if they focused on adults with chronic illness, were written in

English, and targeted components of emotion regulation and health outcomes. Articles were excluded if the population did not include patients with chronic physical illnesses and if the articles focused on the emotion regulation of the care provider or family.

## **RESULTS**

The literature search yielded 263 articles. The abstracts were reviewed, and after excluding duplicates and those not meeting the inclusion and exclusion criteria, 11 articles remained. Most articles not meeting inclusion criteria addressed the emotion regulation of healthy populations or clinical populations with mental illness. An additional three articles were obtained from a manual search of citations from articles in related literature. Presentation of the results is organized into findings regarding the framework, design, methods, sample, setting, and quality. Then follows a report of findings relevant to variables of importance to emotion regulation and health outcomes.

### **Individual Studies Purpose and Findings**

Articles obtained for this integrative literature review included patient samples with chronic conditions such as rheumatic arthritis, pain, eating disorders, morbid obesity, cardiovascular diseases, Addison's disease, diabetes, and HIV. These studies are outlined in Table 1.

Each of these studies examines the important role of the impact of emotional processes in the health of individuals. Within each of the articles there were some differences in the terminology used, such as "emotion regulation," "emotional awareness," "emotional intelligence," and others. These terms all have common themes regarding the emotion regulatory process. As very few articles were discovered that examined the phenomena of emotion regulation and health outcomes, a broad inclusion of these terms was accepted.

Although these alternate terms are individually distinct, the term “emotion regulation” is used throughout this review. In sections of this review, we examine findings related to the theoretical frameworks of the studies, the designs and methods, the samples and settings, and overall quality of the research.

Quality of the health outcomes research was assessed based on the pyramid of evidence ("The periodic health examination. Canadian Task Force on the Periodic Health Examination," 1979). This is not to discount the findings of evidence in the lower tiers, but rather to provide information on the types of designs employed and the relative limitations of evidence. Randomized control trials were rated the highest, followed by case control, panel, and finally, cross-sectional studies (Ho, Peterson, & Masoudi, 2008). Sample size and sampling technique were used to determine generalizability. In addition, each article was also assessed for value (see Table 1) in terms of information regarding emotion regulation and representativeness to chronically ill populations (Whittemore & Knafl, 2005).

### **Summarized Findings**

**Theoretical frameworks.** There was a diversity in theoretical groundings across studies, with most lacking explicit theoretical premises. Three studies were guided by the Common Sense Model of illness (Karademas et al., 2011; Kucukarslan, 2012; Vilchinsky et al., 2013). One study used the process model of emotion regulation (Karademas et al., 2011), two used a cognitive behavioral framework (Baeza-Velasco et al., 2012; Gerolimos & Edelstein, 2012), one used the mental ability model of emotional intelligence (Samar, 2001), and eight papers did not clearly identify a theoretical framework.

This diversity in frameworks impacts the relationships examined within the studies. For example, only one study examined both emotion regulation and illness perceptions using the

process model of emotion regulation as the supporting framework (Karademas et al., 2011). The review of these studies suggests a need for a framework that encompasses examining cognitive and emotional processing in regards to health outcomes.

**Design and methods.** The articles examined for this review used primarily quantitative analysis except for one narrative literature review (Kucukarslan, 2012). Ten articles were cross-sectional and included survey designs (Baeza-Velasco et al., 2012; Gerolimos & Edelstein, 2012; Gianini et al., 2013; Karademas et al., 2011; Kravvariti et al., 2010; Messerli-Bürgy et al., 2012; Samar, 2001; Warmuz-Stangierska et al., 2010; Willard, 2006; Zijlstra et al., 2012). Three of these cross-sectional studies used healthy controls to compare with the illness population (Baeza-Velasco et al., 2012; Gerolimos & Edelstein, 2012; Kravvariti et al., 2010), and one used matched controls (Zijlstra et al., 2012). Two studies used longitudinal surveys in a panel design (Kubzansky & Thurston, 2007; Vilchinsky et al., 2013). Research using an emotion regulation strategy intervention was completed in one of the studies using a mixed between-within subjects design (Burns et al., 2011). Although some variety in study designs was noted in this review, there were no qualitative studies, and limited intervention and longitudinal studies. The use of predominantly cross-sectional study designs in the included articles provides information on associations rather than conclusions of causation between emotion regulation and other psychological variables, disease status, or behaviors.

The included research methods included three types of data collection. Survey measurement alone was the most commonly used method of data collection (Baeza-Velasco et al., 2012; Gerolimos & Edelstein, 2012; Gianini et al., 2013; Karademas et al., 2011; Kravvariti et al., 2010; Messerli-Bürgy et al., 2012; Samar, 2001; Vilchinsky et al., 2013; Warmuz-Stangierska et al., 2010; Willard, 2006). A mix of biopsiologic and survey

measurement was used in two studies by adding medical exam data (Kubzansky & Thurston, 2007; Zijlstra et al., 2012). An experimental behavior task was only used in one of the included studies (Burns et al., 2011). With the majority of studies collecting survey data, it is unclear if results would be replicated with objective measurement methods.

**Sample and setting.** Studies with chronically ill study participants are generally conducted in localized geographical settings. This localized sampling impacts generalizability to an international audience. Sample sizes included in this review ranged from 15 to 6,265 participants (Kubzansky & Thurston, 2007; Warmuz-Stangierska et al., 2010). The only exception to recruitment of narrow participant pools in this review was one study that used a national database (Kubzansky & Thurston, 2007). As such, results from individual studies should be considered provisional.

**Race and Ethnicity.** Five of the included studies that originated in Europe did not discuss race (Karademas et al., 2011; Kravvariti et al., 2010; Messerli-Bürge et al., 2012; Vilchinsky et al., 2013; Zijlstra et al., 2012). Even within the U.S. studies, three of the eight articles did not disclose information regarding participant race or ethnicity (Baeza-Velasco et al., 2012; Kucukarslan, 2012; Warmuz-Stangierska et al., 2010). Of those that did discuss race, Caucasians represented 67–97% of the samples (Gianini et al., 2013; Samar, 2001). In general, the studies were limited by a lack of diversity. It is unclear whether the relationships demonstrated in this review are reproducible in all populations.

**Illnesses.** In this review, a wide range of illnesses were represented (see Table 1). Some of the studies examined multiple nondisclosed conditions (Gerolimos & Edelstein, 2012; Kucukarslan, 2012), whereas others isolated a single condition such as type 1 diabetes (Samar, 2001). This diversity of illnesses within the review is helpful in identifying commonalities

between emotion regulation and health outcomes that may be true in generalized chronic illness populations. Conclusive evidence is not yet available because of the small sample sizes, limited geographical inclusion, and limited inclusion of racial and ethnic groups in the studies.

### **DISCUSSION OF PSYCHOLOGICAL VARIABLES**

With emotion regulation being strongly associated with the psychological distress indices of depression, anxiety, stress, and anger, all were prevalent in this review. Depression was addressed in six articles (Baeza-Velasco et al., 2012; Gianini et al., 2013; Messerli-Bürgy et al., 2012; Vilchinsky et al., 2013; Warmuz-Stangierska et al., 2010; Zijlstra et al., 2012), anxiety in five articles (Baeza-Velasco et al., 2012; Gerolimos & Edelstein, 2012; Messerli-Bürgy et al., 2012; Vilchinsky et al., 2013; Warmuz-Stangierska et al., 2010), stress in two articles (Gerolimos & Edelstein, 2012; Messerli-Bürgy et al., 2012), and anger in one article (Burns et al., 2011).

Many of the articles addressing psychological constructs did not discuss their connections with emotion regulation. Of those reporting associations, patients with chronic illness and with lowered capacity to regulate emotion exhibited more depressive symptoms and negative emotions than patients with higher capacity to regulate emotions (Kravvariti et al., 2010; Messerli-Bürgy et al., 2012). Generally, depressive symptoms and anxiety were found to be highly prevalent in illness populations such as patients with cardiovascular disease (CVD) (Baeza-Velasco et al., 2012; Evangelista et al., 2009; Kravvariti et al., 2010), and were more common in younger patients (Kucukarslan, 2012). Perceived stress levels specific to partner-related stress were associated with maladaptive emotion regulation (Messerli-Bürgy et al., 2012). Negative emotional consequences from stress contributed to the development of depression and anxiety, and increased demands on the individual's capacity to regulate emotions (Gross, 2001;

Saxena et al., 2011). Furthermore, a history of psychological illness was predictive of developing a chronic physical illness (Kubzansky & Thurston, 2007).

This review indicated an association between psychological factors and emotion regulation for individuals with physical illnesses. Studies also demonstrated that factors such as female gender, lower levels of education, non-White race (Kubzansky & Thurston, 2007), and greater negative affect (Kravvariti et al., 2010) were associated with greater difficulty in regulating emotions. Although these associations were identified, additional research is needed. It is particularly necessary to examine how psychological factors such as depression, anxiety, and stress are associated with emotion regulation in the presence of chronic illness.

**Emotion regulation.** There are important relationships between emotion regulation and the variables previously discussed in this review. In particular, older adults were found to use more adaptive emotion regulation than younger adults (Gerolimatos & Edelstein, 2012), women's emotion regulation capacities were found to be lower than men's (Kubzansky & Thurston, 2007; Samar, 2001), and comparatively lower capacity to regulate emotions was observed in individuals with less education (Kubzansky & Thurston, 2007). The absence of studies that measured emotion regulation in chronic illness limits understanding of behavioral responses to health stressors. Additionally, what we know about the measurement of emotion regulation and the psychometrics of these measurements is important to extending the current knowledge.

**Measurement of emotion regulation.** The measurement of emotion regulation within this review varied. Some of these measures capture emotion regulation with varied focus, from elicitation of emotion to the actual process of regulating emotions. For example, although three studies used the 6-item emotional representation subscale of the Illness Perception Questionnaire

(IPQ) (Karademas et al., 2011; Kucukarslan, 2012; Vilchinsky et al., 2013), this scale alone does not actually measure emotion regulation, but rather emotional responses such as depression and anxiety. Focusing on the regulation of emotion, Karademas et al. (2011) used the 10-item Emotion Regulation Questionnaire (ERQ) and the 5-item RAND 36 emotional well-being subscale. Again, in more broad measurement, the General Well-Being Schedule (Kubzansky & Thurston, 2007), and the Emotionality, Activity, Sociability temperament survey for Adults (Warmuz-Stangierska et al., 2010) were used to measure emotion regulation in two other studies.

Scales specifically designed to measure emotion regulation that were used most frequently included the ERQ (Gerolimos & Edelstein, 2012; Zijlstra et al., 2012), the Difficulties in Emotion Regulation Scale (DERS) (Gianini et al., 2013), Levels of Emotional Awareness Scale (LEAS) (Baeza-Velasco et al., 2012), and the Emotional Regulation Scale (EMOREG-24) (Messerli-Bürgy et al., 2012).

The ERQ measures emotion regulation strategies of suppression and reappraisal in 10 items (Gerolimos & Edelstein, 2012). The DERS has 36 items that measure dimensions of difficulty with emotion regulation, yielding a total score and six subscale scores (Gianini et al., 2013). The DERS subscales include nonacceptance of emotional responses, difficulties engaging in goal-directed behavior, difficulties with impulse control, lack of emotional awareness, limitations in accessing emotion regulation strategies, and lack of emotional clarity (Gratz & Roemer, 2004). The LEAS is a performance measure wherein participants respond to emotion-inducing vignettes (Baeza-Velasco et al., 2012). The responses to the LEAS are scored using structured criteria on a scale from 0 to 4, with a total scale and two subscales of self and other (Baeza-Velasco et al., 2012). The EMOREG-24 measures how participants cope with stress and emotions (Messerli-Bürgy et al., 2012). This measure contains subscales of control,

expression, avoidance, and distortion, and summed scales of adaptive (controlling and expression) and maladaptive (avoidance and distortion) emotion regulation (Messerli-Bürgy et al., 2012). All 24 items of this scale are participant-rated on a 6-point scale (Messerli-Bürgy et al., 2012).

Three authors used measures of emotional intelligence, defined as monitoring, discriminating, and altering actions and thoughts regarding personal and others' feelings and emotions (Kravvariti et al., 2010; Samar, 2001; Willard, 2006). The Wong and Law Emotional Intelligence Scale (WLEIS) contains 16 items and four subscales—self emotion appraisal, other's emotion appraisal, use of emotion, and regulation of emotion (Kravvariti et al., 2010). The Multifactor Emotional Intelligence Scale (MEIS) is based on measuring abilities related to perceiving, assimilating, understanding, and managing emotions. The MEIS contains 12 subscales that are combined into four larger branches including perceiving emotions (faces, music, designs, and stories), assimilating emotions (judgments and feeling bias), understanding emotions (blends, progressions, transitions, and relativity), and managing emotions (managing others and managing self) (Samar, 2001). This four-branch design is theoretically based, but has issues with intercorrelation between the assimilation and understanding branches ( $r = 0.87$ ; Samar, 2001). The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) was developed from the MEIS with the same theoretical framework. The MSCEIT uses scale items from 1 (none of the time) to 10 (all of the time), and yields a total emotional intelligence score and four subscales (perceiving emotions, facilitating thought, understanding emotion, and managing emotion) (Willard, 2006).

Burns et al. (2011) used a measurement specific to regulation of anger, the Anger Expression Inventory. This instrument measures two subscales—anger expressive style and anger inhibition style.

**Psychometrics.** Internal consistency of emotion regulation scales was varied, and in some cases, not reported. For those that were reported, the psychometric properties of the scales were moderate to good. The ERQ reported Cronbach's alphas between 0.74 and 0.89 (Gerolimatos & Edelstein, 2012; Karademas et al., 2011; Zijlstra et al., 2012). Internal consistency for the DERS total score was good, with Cronbach's alpha reported as 0.87, and 0.74–0.89 for the subscales (Gianini et al., 2013). However, the large number of items is likely responsible for some of the elevation in alpha scores. Subscales within larger inventories capturing emotion regulation (such as the general well-being schedule and IPQ-R) were reported with Cronbach's  $\alpha$  ranging from 0.55 to 0.89 (Karademas et al., 2011; Kubzansky & Thurston, 2007; Vilchinsky et al., 2013). These internal consistency values are not directly comparable, as they represent both full scales and the emotional subscales (Karademas et al., 2011; Kubzansky & Thurston, 2007; Vilchinsky et al., 2013). Scales of emotional intelligence reported internal consistency at 0.90 for the Wong-Law Emotional Intelligence Scale (Karademas et al., 2011) and 0.96 for the multifactor emotional intelligence scale (Samar, 2001). Other scales (i.e., Levels of Emotional Awareness Scale, Emotional Regulation Scale, Mayer-Salovey-Caruso Emotional Intelligence Scale, Spielberger Anger Expression Inventory) did not have reported internal consistencies (Baeza-Velasco et al., 2012; Burns et al., 2011; Messerli-Bürgy et al., 2012; Willard, 2006). Overall, measurement of emotion regulation seems to exhibit moderate to good internal consistency. Sole use of Cronbach's alpha scores to determine quality of the instruments

is insufficient. Unfortunately, deeper analysis of measures such as factor analysis were not present in the studies under review.

### **Health Outcomes**

In this review of literature, there was a general dearth of information regarding the impact of emotion regulation on health outcomes. Although each article was selected for inclusion of health outcomes, the majority of them focused on the psychological outcomes, or were not able to examine outcomes due methodological reasons.

As an important predictor of outcomes, adherence to medications, diet, and exercise regimens is a prominent theme in the study of patients with chronic illness (DiMatteo, Haskard, & Williams, 2007; Chen, 2011; Kucukarslan 2012). Adherence was mentioned in the systematic review by Kucukarslan (2012), in which negative emotional reactions to health stressors were found to decrease medication adherence. Another study examining patients with HIV did not find any associations between emotion regulation and adherence (Willard, 2006). Of the studies under review that included adherence, the level of evidence was quite low (see Table 1). In studies that evaluated self-regulation, patients who reported less difficulty with emotion regulation were better at managing their diets (Gianini et al., 2013; Samar, 2001).

The strength of the evidence evaluating associations between health outcomes and emotion regulation was generally weak. Although suggested associations between adherence and emotion regulation were present, more research is needed.

## **Illness Environment**

**Demographics.** The studies presented in this review reflect a narrow population profile, particularly in terms of income level, education, sex, and race.

**Age.** Of the studies reporting age ranges, the individuals represented were between the ages of 18 and 87 years (Gerolimos & Edelstein, 2012; Kravvariti et al., 2010). In the individual studies, a narrower scope of ages was included, largely because some illnesses that were represented are more prevalent in younger populations (Warmuz-Stangierska et al., 2010), whereas others occur more frequently in older populations (Karademas et al., 2011). Of those studies that analyzed the connection between age and emotion regulation, results suggested that older adults utilize more adaptive emotion regulation strategies than younger adults (Gerolimos & Edelstein, 2012). The age correlation is congruent with other literature on emotion regulation that indicates that the ability to regulate emotion is maintained and enhanced as individuals age (Shiota & Levenson, 2009).

**Sex.** Both men and women were included in the studies reviewed. Those reporting gender differences noted that women have lower emotion regulation abilities (Kubzansky & Thurston, 2007; Samar, 2001). The study by Kubzansky and Thurston (2007) included a large sample and seemed to be generalizable to other patients with chronic illness in the United States (see Table 1). It is unclear why this link between poorer emotion regulation and gender exists, and thus a greater understanding of the vulnerability of poor emotion regulation in women is necessary.

**Income and education.** Income level and education were poorly represented in this review. For patients with chronic illness, lower levels of income and education can make adherence challenging. It is recognized that some patients who know that they are experiencing

an exacerbation in heart failure (HF) symptoms delay seeking treatment because the financial burden is too great (Horowitz, Rein, & Leventhal, 2004). Not only is poverty a predictor of the prevalence of HF (Menash et al., 2005), it is also a predictor of hospitalizations (Roe-Prior, 2007). One of the stronger studies with a large sample size found that participants with lower education exhibited lower emotion regulation ability (Kubzansky & Thurston, 2007).

***African American participants.*** The majority of articles in this review either reported participants to be Caucasian or did not disclose the racial makeup of the sample. The only study to examine the impact of race noted that non-White individuals had greater difficulties with emotion regulation (Kubzansky & Thurston, 2007). This study grouped non-White individuals together and provided little information relative to which population had increased vulnerability relative to emotion regulation.

**Clinical factors.** In general, the articles included in this review did not examine clinical factors in-depth. The presence of chronic physical illness, for example rheumatic disease or CVD, was related to a decreased ability to regulate emotions (Baeza-Velasco et al., 2012; Kravvariti et al., 2010; Kubzansky & Thurston, 2007). A decreased ability to regulate emotions was also associated with CVD development even after controlling for demographic factors (Kubzansky & Thurston, 2007). Poorer physical function was also prevalent in those with low emotion regulation ability in one study (Karademas et al., 2011).

### **Interpretations**

Articles in this review offered key information for developing knowledge of emotion regulation in illness populations globally. In particular, it was apparent that there may be varying predictors of increased difficulties with emotion regulation (Baeza-Velasco et al., 2012; Gerolimatos & Edelstein, 2012; Kubzansky & Thurston, 2007; Messerli-Bürgy et al., 2012) and

there was support for difficulties with emotion regulation impacting health (Gianini et al., 2013; Kravvariti et al., 2010; Kubzansky & Thurston, 2007; Kucukarslan, 2012; Samar, 2001). With the limited number of articles and the wide range of illness populations included, only general themes can be discussed.

### **Implications for Practice and Research**

Patients with chronic illness are burdened by physiological and psychological challenges (Baeza-Velasco et al., 2012; de Ridder et al., 2008). Adaptive psychological functioning is necessary to manage the myriad demands associated with chronic illness. To maintain optimal cognitive functioning and emotional balance, it is essential that cognitive resources are both conserved and restored (de Ridder et al., 2008; Folkman & Moskowitz, 2004). The recognition and understanding of the role of emotion regulation in illness management is essential to making gains in improving behavioral outcomes for patients with chronic illness (de Ridder et al., 2008; Folkman & Moskowitz, 2004; Gross & Munoz, 1995).

Practitioners may be able to identify at risk individuals based on mental health and demographic factors. In particular this review indicates that individuals who are younger, are female, have a lower education, and those that are non-white may be at a greater risk for difficulties with emotion regulation (Gerolimatos & Edelstein, 2012; Kubzansky & Thurston, 2007; Samar, 2001). These combined vulnerabilities may be contributing to difficulties with emotion regulation and further emotional distress. This is particularly relevant as individuals with chronic illness often experience abrupt changes in behavioral expectations that can add to the emotional distress of self-management behaviors associated with their illness. The directionality of the relationship is not clear, but the review indicates that those patients with emotional distress may also be experiencing difficulties with emotion regulation (Kravvariti et

al., 2010; Messerli-Bürgy et al., 2012). Unfortunately, patient interventions for emotion regulation were not identified in this review. As such, clinicians should be mindful of the potential associations between emotion regulation, emotional distress, and physical health outcomes and be sensitive to both mental and physical needs. Additionally, research needs to continue to expand the knowledge of relationships between emotion regulation and health outcomes. Specifically, studies exploring the impact of emotion regulation on health outcomes such as adherence and physical functioning longitudinally are critically needed to move forward toward the development of meaningful interventions targeting emotion regulation.

### **CONCLUSION**

Various relationships are suggested within this review. In particular, increased age (Gerolimatos & Edelstein, 2012), male gender (Kubzansky & Thurston, 2007; A. Samar, 2001); higher education (Kubzansky & Thurston, 2007); absence of chronic disease (Baeza-Velasco et al., 2012; Kravvariti et al., 2010; Kubzansky & Thurston, 2007); increased physical function (Karademas et al., 2011); and decreased stress, depressive symptoms, and anxiety (Gross, 2001; Messerli-Bürgy et al., 2012; Saxena et al., 2011) are associated with more adaptive emotion regulation. These relationships are not well understood because there are so few research studies demonstrating each relationship. Additionally, the research available is quite heterogeneous, making synthesis difficult. As such, the knowledge of the interaction between emotion regulation and illness perceptions is not well understood. Further study should explore each of these relationships with emotion regulation in order to understand more fully the impact of this concept on patients with chronic disease. Of primary importance is focusing on patient outcomes such as adherence or physical functioning in relation to emotion regulation.

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Table 1.

*Review of Emotion Regulation Literature*

Author, Year	Framework	Design	Age range (mean $\pm$ SD)	Race/Ethnicity	Patient Population, Sampling Technique, n = (% female)	Emotion and Emotion Regulation Measures	Major Findings	Overall Value Statement
Baeza-Velasco et al. 2012	Theory of cognitive-emotional development	Cross-sectional	Case NR (52 $\pm$ 9) Control NR (54 $\pm$ 8)	NR	Rheumatologic diagnosis NR 61 (100)	Levels of Emotional Awareness Scale (LEAS) The Toronto Alexithymia Scale (TAS-20) State-Trait Anxiety Inventory (STAI) The Beck Depression Inventory, Second Edition (BDI-II)	Patients had a decreased emotional awareness and had higher depression and trait anxiety scores than controls.	Valuable information regarding emotion regulation, depression, and anxiety between case and control.  Low generalizability.
Burns et al. 2011	NR	Randomized Control Trial	NR (39 $\pm$ 10)	67.2% Caucasian 15.5% African American 10.3% Hispanic 1.7% Asian 5.2% Native American	Chronic low back pain patients Convenience Sampling 58 (52)	State-Trait Anger Expression Inventory	Overall, patients attempting to suppress anger showed more pain behaviors (grimacing) during pain induction than those not told to suppress.  Patients who preferred to express anger and who attempted to suppress during provocation exhibited more sighing than similar patients not told to suppress.  Patients who preferred anger suppression and who attempted to suppress during provocation exhibited more guarding and bracing than similar patients not told to suppress.	Valuable information regarding emotion regulation and objective responses to induction of anger.  Low generalizability.

Table 1 (cont'd)

Author, Year	Framework	Design	Age range (mean $\pm$ SD)	Race/ Ethnicity	Patient Population, Sampling Technique, n = (% female)	Emotion and Emotion Regulation Measures	Major Findings	Overall Value Statement
Gerolimos et al., 2012	Cognitive– behavioral model for understanding the development and maintenance of health anxiety	Cross- sectional	86 older adults 60–90 (NR)  119 young adults 18–30 (NR)	94% Caucasian	Non- differentiated health problems  NR Sampling  205 (52)	The Short Health Anxiety Inventory  The Anxiety Sensitivity Index  The Intolerance of Uncertainty Scale  The Emotion Regulation Questionnaire  The Anxiety Control Questionnaire	Younger adults had higher levels of health anxiety, anxiety sensitivity, and intolerance of uncertainty than older adults.  Older adults reported higher perceived anxiety control and use of reappraisal than younger adults.  Anxiety sensitivity significantly contributed to perceived negative illness consequences for older adults, but not young adults.  Anxiety sensitivity and reappraisal significantly contributed to perceived illness likelihood.	Valuable information regarding the associations between some illness perception components (illness likelihood and consequences) and emotion regulation.  Low generalizability.
Gianini et al. 2013	NR	Cross- sectional	19-65 (45 $\pm$ 11)	67.2% White 21.2% Black 6.7% Hispanic 0.9% Asian 4.0% Other	Treatment- seeking obese adults with binge eating disorder  Convenience Sampling  326 (76)	Difficulties in Emotion Regulation Scale (DERS)  Beck Depression Inventory (BDI)	Difficulties in emotion regulation and negative affect significantly predicted emotional overeating.  DERS subscales of emotion regulation strategies and lack of emotional clarity were the best predictors of emotional overeating.	Valuable information regarding dietary behaviors and emotion regulation, particularly emotion regulation strategies and clarity.  Low generalizability.

Table 1 (cont'd)

Author, Year	Framework	Design	Age range (mean $\pm$ SD)	Race/ Ethnicity	Patient Population, Sampling Technique, n = (% female)	Emotion and Emotion Regulation Measures	Major Findings	Overall Value Statement
Karademas et al. 2011	CSM  Process model of ER	Cross-sectional	NR (62 $\pm$ 11)	Greek participants	Cardiac outpatients  Convenience Sampling  135 (32)	IPQR – emotions subscale  RAND 36 – physical functioning and emotional well-being subscales  Emotion regulation questionnaire (ERQ)	Suppression and wishful thinking diminished emotional well-being. Reappraisal of emotions enhanced well-being.  Higher intensity of perceived negative emotions related to their illness (from the IPQR) were associated to the worst physical functioning.  Emotion suppression mediated the relationship between illness-related negative emotions and physical functioning.	Associations regarding emotion regulation, emotion related illness perceptions, and physical function provide good value.  Low generalizability.
Kravvariti et al. 2010	NR	Cross-sectional	21-87 (NR)	Greek participants	56 Coronary Heart Disease (CHD) patients  56 control patients  Convenience Sampling  112 (30)	Wong and Law Emotional Intelligence Scale	Self-emotion appraisal, use of emotions, regulation of emotions, as well as frequency of negative expressiveness, were all significantly associated with greater odds of having CHD.  Individuals with CHD reported less ability to regulate emotions and express negative emotions more frequently than those without CHD.	This article is valuable in providing information regarding emotion regulation in those with and without CHD.  Low generalizability.

Table 1 (cont'd)

Author, Year	Framework	Design	Age range (mean $\pm$ SD)	Race/ Ethnicity	Patient Population, Sampling Technique, n = (% female)	Emotion and Emotion Regulation Measures	Major Findings	Overall Value Statement
Kubzansky et al. 2007	NR	Panel (17-year follow-up time period)	25-74 (48 $\pm$ 14)	86.6% White 13.4% non-White	Individuals without heart disease at baseline  Probability Sampling  6,265 (55)	General Well-Being Schedule combining items from the subscales of vitality, positive well-being, and emotional self-control to measure emotional vitality.	Low emotional vitality was more prevalent in individuals who were female, widowed, divorced or separated, non-White, or with lower reported levels of education.  Those with higher levels of emotional vitality had a decreased odds of developing CHD.  History of undifferentiated psychological problems is associated with an increased risk of developing CHD.  Emotional vitality was associated with development of CHD even after controlling for health behaviors, metabolic factors, and blood pressure.	Value in the information presented that ties emotion regulation, psychological problems, and risk of developing CHD.  Good generalizability.
Kucukarslan 2012	CSM	Literature review	NR (NR)	NR	asthma (3) hypertension (3) diabetes (1) heart failure (1) glaucoma (1) chronic pain (1) tuberculosis (1)  Varied sampling  11 studies (NR)	Revised Illness Perception Questionnaire (IPQ-R)	Inconsistent results comparing emotional representation and medication adherence.  Studies with younger patient populations reported more significant positive relationships between emotional representations and medication adherence.	Value regarding general information about perceived emotional implications related to illness and medication adherence.  Low generalizability.

Table 1 (cont'd)

Author, Year	Framework	Design	Age range (mean $\pm$ SD)	Race/ Ethnicity	Patient Population, Sampling Technique, n = (% female)	Emotion and Emotion Regulation Measures	Major Findings	Overall Value Statement
Messlerli- Bürgy et al. 2012	NR	Cross- sectional	NR (60 $\pm$ 11)	Swiss participants	Cardiac outpatients  Convenience Sampling  163 (17)	Emotional Regulation Scale (EMOREG-24)  Hospital Anxiety and Depression Scale  Participant-rated perceived stress level	Maladaptive (avoidance and distortion) emotion regulation, perceived partner-related stress, and depressed mood are related to type D (distressed) personality.  Adaptive (controlling and expression) emotion regulation is associated negatively with social inhibition, negative affectivity, depressed mood, and partner- related stress.	Valuable information present regarding emotion regulation, depression, and stress.  Low generalizability.
Samar 2001	Mental Ability Theory of Emotional Intelligence	Cross- sectional	18-70 (38 $\pm$ 40)	96.7% Caucasian 2.2% Spanish 1.1% Asian	Patients with type I diabetes  Convenience Sampling  90 (77)	Multifactor Emotional Intelligence Scale (MEIS)	Assimilation of emotions is positively associated with reported self- management; this association is strongest with self-management of exercise and with blood glucose testing.  Management of emotions is positively associated with general diet self- management.  Understanding emotions is negatively associated with foot care self-management.  In males, emotional intelligence was negatively associated with glycemic control.	Value in the connections between emotion regulation indices, self-management, and adherence.  Low generalizability.

Table 1 (cont'd)

Author, Year	Framework	Design	Age range (mean $\pm$ SD)	Race/ Ethnicity	Patient Population, Sampling Technique, n = (% female)	Emotion and Emotion Regulation Measures	Major Findings	Overall Value Statement	
Vilchinsky et al. 2013	Common Sense Model and attachment theory	Panel (6-month follow-up time period)	39-74 (57 $\pm$ 7)	Jewish Israelite participants	Acute coronary syndrome patients	Brief Symptom Inventory (depression and anxiety)	Generalized poor illness perceptions are associated with greater attachment-related anxiety, depression, and anxiety.	Valuable information regarding general illness perceptions, attachment-related anxiety, depression, and general anxiety.	
					Convenience Sampling	Brief Illness Perception Questionnaire (Brief IPQ)			Low generalizability.
Warmuz-Stangierska et al. 2010	NR	Cross-sectional	20-49 (34 $\pm$ NR)	NR	Patients with Addison's disease	Temper questionnaires Emotionality, Activity, Sociability for Adult (EASA)	Perceived ability to use emotions to solve problems was reported as low in 6 participants, average in 8 participants, and high in 1 participant.	Limited value indicates these Addison's disease patients may have elevated difficulty with emotion regulation.	
					NR	State-Trait Anxiety Inventory for Adults (STAI)			Low generalizability.
					15 (87)	Beck Depression Inventory (BDI)			
Willard 2006	NR	Cross-sectional	NR (NR)	15% White 81% Black 3% other	Patients with HIV	Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT)	No differences in emotional intelligence between genders and no associations between emotional intelligence and medication adherence were found.	Value of information provided regarding a lack of associations between emotion regulation and medication adherence.	
					NR				Low generalizability.
					52 (40)		Participants had significantly lower emotional intelligence scores than those seen in general populations.		

Table 1 (cont'd)

Author, Year	Framework	Design	Age range (mean $\pm$ SD)	Race/ Ethnicity	Patient Population, Sampling Technique, n = (% female)	Emotion and Emotion Regulation Measures	Major Findings	Overall Value Statement
Zijlstra et al. 2012	NR	Case-control	21-68 (46 $\pm$ 10)	Dutch participants	(102) Women with morbid obesity applying for bariatric surgery	Positive and negative affect schedule (PANAS)  Berkeley Expressivity Questionnaire (BEQ)	Patients with morbid obesity reported significantly less positive affect, more negative affect, more difficulty identifying feelings, and greater suppression of emotions than controls.	Valuable inferences regarding self-management and distinct components of emotion regulation (identifying feelings, describing feelings, and emotion regulation strategies).
					(102) Matched controls from the general population	Toronto Alexithymia Scale 20 (TAS-20)  Emotion Regulation Questionnaire (ERQ)	No differences were reported in describing feelings, affect intensity, or expression of negative or positive emotions.	Low generalizability.
					Convenience Sampling			
					204 (100)		More negative affect and difficulty identifying feelings are associated with more emotional eating and more external eating behavior.	
							Emotion regulation strategies were not significantly associated with emotional eating, external eating, or restrained eating.	

Note. NR = Not Reported