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Moderators of the effects of anger awareness and expression training and relaxation training to improve chronic headache symptoms

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**MODERATORS OF THE EFFECTS OF ANGER AWARENESS AND EXPRESSION
TRAINING AND RELAXATION TRAINING TO IMPROVE CHRONIC HEADACHE
SYMPTOMS**

by

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THESIS

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of Wayne State University,

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Chapter 1: Introduction

Headaches are often painful and disabling and are quite common among young adults. According to the National Institutes of Health (NIH), headache is one of the most common pain complaints (NINDS, 2009); 45 million Americans suffer from chronic headaches (Headaches, 2010). Furthermore, headaches account for 3% of office visits to primary care offices each year (Torre, Lamb, Van Ruiswyk, & Schapira, 2008). Headache pain is most often experienced as discomfort in the head or face region, and the two most common subtypes are tension-type headaches and migraine headaches (Parinet, 2006). Migraine headaches afflict 13% of the population (Meeks, 2004) whereas the prevalence of tension-type headaches has been reported from 30% to 80% (Solomon, 2002). However, headaches vary widely in frequency, duration, and intensity both across and even within patients. Therefore, it is important to consider the factors that influence the development of headaches for each individual, to establish optimal preventative approaches and treatments. Yet responses to interventions for headache are quite variable, and it remains unclear for whom which interventions are most effective.

Recent investigations have focused on the factors that are involved with headache pain, especially psychological factors such as psychiatric comorbidity, coping styles, and stress. In general, individuals with either tension type or migraine headaches have more depression and anxiety, compared to headache-free controls (Bag, Hacıhasanoglu, & Tufekci 2005; Mongini et al., 2006). Other studies have demonstrated that stronger coping skills, such as a high internal locus of control, might reduce depression among headache sufferers (Health, Saliba, Mahmassani, Major, & Khoury, 2008; Nicholson, Houle, Rhudy, & Norton, 2007). Furthermore, the link between stress and headaches is well established. For instance, one review indicated that stress is a predisposing factor that contributes to headache disorder onset, accelerates the

transformation of headache disorder into a chronic condition, and aggravates individual headache episodes (Nash & Theborge, 2006).

If stress contributes to headache onset, intensity, and chronicity, then managing or reducing stress might improve headache status. There are many different approaches to stress management (Ong, Linden, & Young, 2004), but these approaches might be viewed as along a continuum that ranges from avoidance or minimization of negative emotions, to approach or experiencing and processing of negative emotions. In order to manage psychological distress and consequent headaches, many emotion-reduction interventions have been developed, tested, and have empirical support. For instance, relaxation training (RT) is a well-established treatment for headaches (Buse & Andrasik, 2009), and it minimizes negative emotions.

On the other end of the continuum, emotional awareness and expression interventions utilize an up-regulation approach, in which negative emotions are purposefully elicited and experienced. This approach may also have positive health benefits; however, with respect to headaches, this area has not been well investigated. Nonetheless, there has been some interest in testing the health benefits of emotional expression through the technique of written emotional disclosure. For instance, written disclosure has been demonstrated to decrease both stress-related health problems as well as visits to health centers (Pennebaker & Francis, 1996). Another intervention, assertiveness training, also facilitates emotional processing and may be a beneficial pain management technique. For instance, Williams and Stout (1985) suggested that people who are assertive and internally controlled experience fewer and less severe health symptoms than people who are low in assertiveness. In addition, subjective reports from clients who participated in assertiveness training supports the view that assertion inhibits anxiety (Rimm & Masters, 1979), which is a common psychological factor implicated in headache patients. Yucel

et al. (2002) found that individuals with headaches had lower scores on assertiveness as compared to healthy controls. In addition, as a group treatment, assertiveness training was found to be effective for patients with tension-type headache (Doering, Erhan, & Yegul, 2006). These findings are not surprising, given that both stress and pain are enhanced by suppressing negative emotions. One such negative emotion that is often seen in chronic pain patients is anger.

Potential Moderators of the Effects of Relaxation Training and Anger Awareness and Expression Training

Although there is some evidence that both emotion-reducing and emotion-activating treatments have benefits for people with headaches, it is certainly the case that not everyone benefits from these interventions. For example, although research corroborates the effectiveness of relaxation training as a well-established headache intervention, investigations do not find positive outcomes for all headache sufferers; some people benefit a lot, and others benefit little or not at all. In one randomized controlled trial, only 30 to 35% of participants assigned to the two treatment conditions (self-help relaxation or a group relaxation condition) improved by 50% or more, although these participants maintained their gains through at least 1 month (Williamson et al., 1984).

With respect to emotional awareness and expression interventions, however, there is little literature on response rates. One related literature, however, is written emotional disclosure, which has been found to be effective for only a minority of people with chronic pain (Junghaenel, Schwarz, Broderick, 2008; Smyth, Stone, Hurewitz & Kaell, 1999). Thus, an intervention that targets emotional awareness and expression for people with headaches is likely to be effective for only a subset of people. Therefore, an important research direction and scientific contribution to the current literature is to investigate potential moderators of a well-

established intervention and a novel intervention.

Previously, our laboratory found that an innovative 3-session, group-based anger awareness and expression training (AAET) intervention was comparable to group RT in improving outcomes in HA, and both treatments and were more beneficial than no intervention (Slavin-Spenny, 2011). Although both of these interventions improved headache outcomes, one explanation for this finding is that the effects are due to different mechanisms. One way to test this proposal is to explore moderators, so we can determine if different people respond differently to these interventions. Therefore, the goal of the current analyses was to examine potential baseline moderators of the benefits of both relaxation training and anger awareness and expression training for young adults with headaches. A person's emotion regulation abilities and baseline levels of assertiveness likely influence their response to these interventions. Therefore, the aim of this study, was to explore how alexithymia and its facets (difficulty identifying feelings, difficulty describing feelings, and externally oriented thinking), ambivalence over anger expression, and assertiveness, moderated the effects of AAET, RT, compared with each other and no intervention.

Alexithymia

Alexithymia has been defined as multidimensional personality construct that includes: a) difficulty identifying and describing feelings; b) difficulty differentiating between feelings and bodily sensations; c) difficulty describing externally oriented thinking; and d) limited capacity for imaginary thinking (Taylor, Bagby, & Parker, 1997). Alexithymic individuals often demonstrate minimal insight into their feelings, symptoms, and motivation (Lumley, Neely, & Burger, 2007). Alexithymia is viewed as a deficit rather than as a defensive mechanism (Lumley et al., 2007). Given that these characteristics are relatively stable over time, alexithymia can best

be thought of as a personality attribute rather than a transient state.

With respect to alexithymia as a moderator or predictor of treatments, studies have shown that alexithymia predicts poorer medical, psychiatric, or behavioral treatment outcomes for individuals with depression, alcoholism, functional gastrointestinal disorders, chronic pain, and mixed psychiatric disorders (Lumley et al., 2008). However, many of these are broad-based interventions; therefore, it is important to specify the types of treatments, and determine if alexithymia might predict improvements for some treatments, but lack of improvement for others.

There is some evidence for the benefits of emotion-reducing interventions that are externally focused and/or structured for alexithymic individuals (Lumley et al., 2007). Sifneos (1975) suggested that anxiety-provoking psychotherapies produce increased frustration in alexithymic patients, and that anxiety-suppressive techniques may be best suited for the majority of these types of patients. Relaxation training, a technique that has shown to reduce anxiety, may be one such anxiety-suppression technique. Accordingly, one review demonstrated that alexithymia predicted better outcomes on several measures following relaxation training as compared to standard emotional disclosure (Lumley, 2004).

In contrast, Lumley et al. (2008) reported that alexithymia appears to be a negative prognostic indicator for many psychological treatments, especially those that are insight-oriented or that rely on emotional awareness. It is reasonable to hypothesize that alexithymic individuals may not benefit from an emotion-activating intervention such as emotional disclosure. A review by Lumley et al. (2008) described three studies demonstrating that alexithymic individuals with chronic pain responded relatively poorly to emotional disclosure interventions. For example, in a study of 68 patients with rheumatoid arthritis, individuals who struggled to identify feelings were

predicted to have less improvement in disability and joint impairment as compared to a control group. Furthermore, a study of 48 women with chronic pelvic pain, higher alexithymia scores predicted worse pain outcomes in the disclosure group and better outcomes in the control group. Lastly, in a study of 82 young adults with migraine headaches, greater alexithymia scores predicted worse outcomes in the disclosure group compared with improvements in the control group. Kraft, Lumley, D'Souza, and Dooley (2008) presented an analogous claim, suggesting that better emotional awareness predicts improvement after emotional disclosure. Their group evaluated emotional approach coping (EAC)—a construct that is considered the inverse of alexithymia because it pertains to the ability and interest in understanding and expressing emotions—in migraine sufferers as compared to healthy controls. Outcome analyses revealed that higher emotional approach coping (EAC) predicted greater improvement after written emotional disclosure but not relaxation training or control writing.

These findings suggest that alexithymia may be an important variable in understanding and predicting patient outcomes. In a sample of headache sufferers, Wise, Mann and Jani (1994) reached a similar conclusion, noting that alexithymia may be important in understanding patient perceptions of their discomfort. Given that alexithymic individuals have difficulty identifying emotions and differentiating between feelings and bodily sensations, it is reasonable to conclude that these individuals may benefit from more structured therapies that promote emotional suppression such as relaxation training. However, it is important to determine how alexithymic individuals with chronic headaches differ from individuals who are aware of their emotions but ambivalent about expressing them.

Ambivalence over Anger Expression

Ambivalence over emotional expression is defined the conscious desire to express one's

feelings, accompanied by a reluctance to do so. This construct was introduced to distinguish among individuals with similar expressive styles but differing levels of ambivalence (King & Emmons, 1990). The interplay between awareness of an emotion and the conflict over expressing that emotion can be detrimental to an individual's well-being. For instance, inhibition is not considered to be pathological; however, it is the conflict over expression that is associated with poorer adjustment and health (King & Emmons, 1990).

The construct of ambivalence over emotional expression contains two subscales: ambivalence over anger expression, and ambivalence over positive expression. Anger expression is likely to be the more important aspect of this construct for headaches. There has been a considerable amount of literature exploring the relationship between anger over-regulation and negative health outcomes. For example, one group suggested that an inability to express intense negative emotions, such as anger, plays an important etiological role in pain and disability (Kerns, Rosenberg, & Jacob, 1994). Similarly, another group suggested that individuals who have higher ambivalence over emotional expression and a tendency to hold in angry thoughts and feelings, have higher levels of evaluated and affective pain (Carson et al., 2007). Along the same lines, another group demonstrated that either too much expression or too much inhibition of anger has harmful effects leading to increased pain sensitivity and disability (Nicholson, Gramling, Ong, & Buenevar, 2003). The same group found that headache sufferers hold their anger in more than those without headaches, and it is quite possible that anger in is a manifestation of ambivalence over emotional expression, although this needs to be tested.

In a study by Larkin, Knowlton, and Alessandri (1990), anger also was evaluated as a predictor of treatment outcomes for patients with hypertension following progressive relaxation training. Results indicated that individuals who exhibited less self-reported anger benefited the

most from relaxation training (Larkin et al., 1990). However, it remains unclear if these individuals did not feel anger or were ambivalent about expressing it.

The relationship between anger expression and emotional disclosure has spurred some interest. It is likely that people who are ambivalent about expressing their emotions will benefit from a technique that encourages them to express their feelings, but in a safe venue, such as privately writing. One study examined moderators of the effects of written emotional disclosure in a randomized controlled trial among women with chronic pelvic pain (Norman, Lumley, Dooley, & Diamond, 2004). Results indicated that women who were ambivalent about emotional expression benefited the most from this intervention, compared to less ambivalent women. Also, compared to controls, the disclosure group experienced significant increases in anger from before to after writing. This finding suggests that expressing anger may be particularly useful in this population. Relatedly, Smyth and Arigo (2009) wrote a review demonstrating support for emotion-regulation interventions as useful techniques for improving health in at-risk and clinical populations. For example, they mentioned one study where patients with chronic pain were asked to write constructively about their anger. After expressive writing these participants showed increased control over pain and decreased self-rated depressive symptoms over time relative to goal writing (Graham, Lobel, Glass, & Lokshina, 2008). Furthermore, Smyth & Arigo (2009) described another study that evaluated the safety and efficacy of expressive writing in a sample of individuals with post-traumatic stress disorder (PTSD). Outcome analyses revealed that expressive writing resulted in reduced tension and anger (Smyth, Hockemeyer, & Tulloch, 2008).

Collectively, these findings suggest that individuals who have difficulty expressing anger may benefit from an emotional disclosure intervention. Similarly, individuals who are

ambivalent over anger expression but are aware of angry feelings may find this intervention useful. Given that lack of anger expression is often associated with pain etiology or exacerbation, headache sufferers specifically may fall into this category. An intervention that incorporates both emotional awareness and assertiveness training may be useful for headache sufferers who tend to inhibit anger expression. Such a technique may afford those individuals the opportunity to gain the skills necessary to communicate their anger more effectively or to overcome their inhibition and fear of anger, subsequently reducing the manifestation of headache pain. Lastly, individuals who have difficulty with emotional expression also have difficulty asserting themselves, thus we also tested whether this intervention would be most helpful to those with low levels of baseline assertiveness.

Assertiveness

Assertiveness is defined as the ability to communicate one's thoughts, feelings, and beliefs in a non-aggressive way (Yucel et al., 2002). Although assertiveness correlates with aggression, assertive behavior is most frequently conceptualized as the intermediate between nonassertive and aggressive behavior (Rakos, 1991). According to Galassi, Galassi, and Veddar (1981), assertion involves honesty and/or appropriate emotional expression and can be considered a basic human right. Given these characteristics, assertiveness can be described as a comfortable expression of one's emotions in a clear and direct manner.

As a moderator or predictor of treatment outcomes, assertiveness has not been widely investigated; however, empirical studies have supported the idea that assertiveness is linked to a variety of favorable outcomes. In a review by Rakos (1991), assertiveness training was shown to be beneficial for unassertive individuals from various populations such as individuals with depression, anxiety, and medical disorders. In addition, given that passivity or helplessness is a

common characteristic among chronic pain patients, Zelick (1984) concluded that assertiveness training was one effective technique for helping patients from this population gain control over their pain. Perhaps increased assertiveness enhances self-efficacy and the ability to reduce stress in relationships. Assertiveness has also been shown to predict reactions to stressful events. For instance, Tomaka et al. (1999) examined assertiveness as a moderator of stress reactions in a sample of 95 undergraduate women. Participants were asked to give an impromptu speech, and experimenters evaluated how high and low assertive individuals responded to and behaviorally coped with the experience. Participants high in assertiveness viewed the speech stressor as challenging, whereas those low in assertiveness saw it as threatening. After the event, participants high in assertiveness reported less stress and negative emotion and greater positive emotion than those low in assertiveness. These findings suggest that assertiveness can be both a useful and beneficial skill in a variety of patient populations.

Assertiveness was explored by Larkin, Knowlton, and Alessandri (1990) as a moderator or predictor of the effects of relaxation training. Their group examined predictors of treatment outcomes for patients with hypertension following progressive relaxation training. In this sample of 19 patients with hypertension, results indicated that individuals who exhibited more assertiveness skill benefited the most from relaxation training. This may be because these individuals may find it easy to express their emotions, but more challenging to regulate them. Based on this logic, individuals low in assertiveness may not have similar benefits. Given that unassertive individuals are often over-regulating their emotional expression, they might find a more emotional-freeing technique, such as emotional disclosure, more useful.

As a moderator or predictor of the effects of emotional disclosure, assertiveness has received virtually no attention in the literature. However, there has been some interest in social

constraints, a construct related to unassertiveness. Both constructs refer to inhibition-related reactions that may have a negative effect upon health outcomes. Zakowski, Ramati, Morton, Flanigan, and Johnson (2004) defined social constraints as negative social responses to the patients when they expressed emotions relating to their cancer. In a sample of 104 cancer patients, Zakowski et al. (2004) assessed social constraints and then randomized patients to write about emotions related to cancer or control topics. Expressive writing reduced distress, but only among patients high on social constraints. Similarly, a study by Swabon, Boyce, and Greenberg (2008) examined expressive writing in a sample of gay men with social constraints on self-expression. Consistent with the previous findings, expressive writing reduced chronic avoidance and buffered the effects of physical stress-related symptoms. Given that the emotional disclosure appears to work best for people whose environment discourages emotional expression, such interventions may also be indicated for unassertive people.

Low levels of assertiveness have consistently been identified among headache patients. For instance, Yucel et al. (2002), found that patients with tension headaches were less assertiveness and experienced more difficulty in expressing their negative emotions and wishes as compared to a headache-free control group (Yucel et al., 2002). In addition, in a study of undergraduate psychology students, unassertiveness was shown to be significantly related to headache severity (Jones & Stewart, 1986). Based on the previous findings, the role of assertiveness in determining whether headache patients may benefit from relaxation training and emotional disclosure interventions is certainly worth investigating. Given that assertiveness has previously been linked to a variety of positive outcomes and is an underdeveloped skill among some headache sufferers, an intervention that incorporates both emotional awareness and assertiveness training may be useful for this subgroup within the headache population.

Goals of This Study

This study sought to determine how three potential moderators—alexithymia, and ambivalence over anger expression, and assertiveness—predicted the outcome of a well-established intervention—relaxation training—and a novel intervention—anger awareness and expression training—for undergraduate college students with chronic headaches. Participants were asked to report their current headache frequency, intensity, and disability as well as psychological distress, and they also reported on potential moderators. Participants were randomly assigned to relaxation training, anger awareness and expression training, or no-treatment control groups. Participants were assessed for changes in headaches and adjustment 6 weeks later, and the potential moderators were tested to determine if they predicted differential effects of the interventions.

Hypotheses

This study explored three potential moderators, and made specific predictions of the directions of their effects on the outcomes of the two interventions and control group.

1. It was hypothesized that higher baseline levels of alexithymia, as measured by the Toronto Alexithymia Scale-20, would predict reduced benefits for anger awareness and expression training but increased benefits of relaxation training, as compared to the no-treatment control group.
2. It was hypothesized that higher baseline levels of ambivalence over anger expression, as measured by the Ambivalence over Emotional Expression Scale- anger subscale, would predict increased benefits of AAET, as compared to the no-treatment control group. No hypothesis was made regarding this moderator and the effects of relaxation training.

3. It was hypothesized that lower baseline levels of assertiveness, as measured by the Rathus Assertiveness Schedule, would predict greater benefits of AAET but lesser benefits of relaxation training, as compared to the no-treatment control group.

Chapter 2: Methods

Participants

We recruited 147 participants with moderate to severe chronic headaches from a population of undergraduate students at Wayne State University (WSU). However, the current analyses are on only the 127 participants who completed the follow-up (13.6%). Out of the 127 remaining participants, 40 were from the AAET group, 43 were from the RT group, and 44 were control condition participants. These participants were over 18 years of age, reported experiencing headaches at least several times per month or more frequently, and were motivated to learn about stress management techniques. Participants were excluded from the study if they did not satisfy the inclusion criteria or if their headaches were exclusively tied to a head injury or alcohol use.

Procedures

All students enrolled in Psychology courses at WSU were invited to fill out an online mass screening survey (the Research Participation website: SONA) at the start of the semester. Participants were recruited through this survey, as they were screened and contacted via email to participate in the study. Participants scheduled their initial visit on SONA. Time slots were available for up to seven students at a time. Students came the laboratory as a small group (up to 7 students), and the initial visit consisted of an introduction to the study, written consent, and completion of several baseline questionnaires. These questionnaires included outcome measurements to assess headache frequency, type, severity, and duration as well disability and physical symptoms related to headaches. Measures of potential moderators were also included: alexithymia, assertiveness, and ambivalence over emotional expression. Questionnaires were

presented and data was collected with the Remark Web Survey software on computers in the laboratory.

After completing baseline measures, the group of students was randomly assigned as a whole group to one of three experimental conditions: relaxation training, anger awareness and expression training, or a no-treatment control. The first session of the two active interventions was run the same day as the initial visit. The second session was one week later, followed by the third session one week after that. In addition, participants returned for a follow up session four weeks later. The no-treatment control group was dismissed after completing the baseline measures and asked to return in six weeks for a follow up session, which was the equivalent time to those who received an intervention.

The active intervention sessions were conducted in a group, classroom-style format and lasted 60 minutes. The sessions provided both education and skills training, followed by a group discussion. All of the sessions were run by advanced graduate students in the clinical psychology doctoral program. Homework was also assigned to provide an opportunity for participants to practice the intervention. Control participants were offered the opportunity to participate in these interventions during next semester.

Relaxation Training

Session One. Participants were introduced and welcomed to the group. A rationale for treatment was presented. The relationship between stress and pain was explored through an interactive discussion. Furthermore, participants learned how managing stress may help them reduce the frequency and severity of their headaches. After this discussion, participants engaged in a relaxation exercise, Progressive Muscle Relaxation (PMR) (Jacobson, 1938). Initially, the leader demonstrated how to do the 20-minute exercise, and then the participants practiced. Next,

participants discussed their reactions to the exercise and they were given a homework assignment. This assignment asked participants to listen to an audio recording (on CD) that guided them through a PMR practice once per day. This recording contained all relaxation exercises that participants learned throughout the research study.

Session Two. When the participants arrived, there was a discussion and a review of the homework assignment. Participants were asked for an honest report of how often they listened to the audio recording, and how helpful it was to help them to relax in their daily lives. Barriers to practice were explored. Then, the leader conducted a new 20-minute relaxed breathing technique. Participants were asked for their reactions as well as how they liked this exercise as compared to the PMR technique. A homework assignment to practice this technique and/or the PMR relaxation technique daily was given.

Session Three. The final session began with a review and discussion of the homework. Barriers to practice were explored. A 30-60 second relaxed breathing exercise was introduced to help participants find time to fit these exercises into their daily lives. Participants engaged in a guided imagery relaxation technique conducted by the leader. Afterwards, reactions to the exercise were discussed. Furthermore, reactions to the treatment as a whole were explored and future goals were discussed. Participants were asked if they think they know more about managing stress and how they think they will be able to incorporate these exercises into their daily lives. Participants were allowed to keep the audio recordings of all three of the exercises and were encouraged to continue using it to help them reach their goals.

Anger Awareness and Expression Training

Session One. Similarly to the relaxation training introduction, participants were welcomed and introduced to the group. A rationale for treatment was presented. An interactive discussion

was explored about how inhibiting emotions may be linked to stress and headaches. Participants learned about how anger is often a source of stress and how being able to express anger appropriately is an important factor in managing stress. Participants engaged in labeling and expressing anger exercises. During these three sessions, participants talked about angry feelings and how to recognize and express them assertively. Thus, this group focused on how assertive communication may be a productive way to express anger. Participants were asked for their reactions and were given a homework assignment. They were asked to daily monitor times they felt angry using a worksheet provided.

Session Two. This session began with a review of homework and a discussion about how participants monitored their own anger. They were asked what they noticed about their anger. Barriers to monitoring anger was explored. This session focused on discussing how to express anger in a way that is most effective. Assertiveness was introduced as an effective way to convey anger. A practice session followed which addressed common assertiveness issues such as expressing thoughts/feelings and/or disagreeing, asking for what you want, and saying no. The leader gave examples and group members came up with assertive communications. The group practiced together, using role-plays with the leader or the other participants to facilitate learning. A homework assignment to perform a small assertive action every day was given.

Session Three. The final session began with a review of the homework and a discussion. Participants were asked for honest reports about their attempts at assertive communication. If members were not able to carry out a practice, barriers to practice were explored. Participants were asked to engage in a new assertiveness challenge during a 25- minute practice session. Participants were given a worksheet which will be used to help participants think of a situation that challenged their ability to be assertive. The leader picked one individual and an interactive

role play was used to model their experience. Participants were asked how they felt during the role play. The leader helped members identify feelings, especially anger. The session concluded with a discussion of how expressing emotions might be beneficial for their stress and headaches. Future goals were set by the participants to use these techniques in their daily lives.

Measures

Background. Demographic information was reported on a self-report questionnaire including variables such as age, gender, ethnicity/race, academic major, year in college and contact information.

Potential Moderator Measures

Alexithymia. This construct was assessed with the 20-item Toronto Alexithymia Scale-20 which is used to assess 3-factors related to the construct of alexithymia (Bagby, Parker, Taylor, 1994). Items are rated on a 5-point Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Total scores are obtained by summing all of the items. The TAS-20 has 3 subscales: difficulty describing feelings, difficulty identifying feelings, and externally-oriented thinking. This measure was chosen because it is the gold standard of alexithymia measures, and the most commonly used. In prior research, it was found to have high reliability (Bagby et al., 1994). In this sample, this measure was highly reliable (20 items; $\alpha = .85$); the difficulty describing feelings subscale consisted of 7 items ($\alpha = .87$), the difficulty identifying feelings subscale consisted of 5 items ($\alpha = .77$), and the externally-oriented thinking subscale consisted of 8 items ($\alpha = .62$).

Ambivalence over Emotional Expression. This construct was assessed with the 14-item Ambivalence over Emotional Expression Scale (AEQ), which has been demonstrated to be an effective measure assessing the conflict over emotional expression (King & Emmons, 1990). In

prior research, the test demonstrated good internal consistency ($\alpha = 0.89$) and test-retest reliability ($r = 0.78$) (King & Emmons, 1990). The Items are rated on a 5-point Likert-type scale, ranging from 1(I have never felt like this) to 5 (I feel like this a lot). The items consist of statements that may include two thoughts. Total scores are obtained by summing all of the items. The construct of ambivalence over emotional expression contains two subscales: ambivalence over anger expression, and ambivalence over positive expression. This study will focus on the ambivalence over anger expression subscale. In this sample, this 6-item subscale had acceptable internal consistency ($\alpha = .69$).

Assertiveness. This construct was evaluated by the 30-item Rathus Assertiveness Schedule, which has demonstrated moderate to high test-retest reliability ($r = .78$; $p < .01$), and split half reliability ($r = .77$; $p < .01$) (Rathus, 1973). Items were measured on a 6-point Likert scale which ranges from +3(very characteristic of me, extremely descriptive) to a -3(very uncharacteristic of me, extremely undescriptive), with no zero in between. In this sample, this 30-item scale was highly reliable ($\alpha = .85$).

Outcome Measures

At both baseline and follow-up participants were asked to complete the following self-report questionnaires.

Headache Frequency / Severity / Duration. In a self-report questionnaire, participants were asked if they have had a headache in the last 24 hours, and how many days in the last week and the last month they have experienced a headache. They also rated their average pain on a 0 (no pain) to 10 (worst pain possible) scale. They were also asked the average duration that their headaches lasted and whether or not they take medication for their headaches.

Pain Severity. Pain severity was assessed using the short form of the McGill Pain

Questionnaire-Short Form (SF-MPQ). This questionnaire consists of 15 descriptors (11 sensory and 4 affective), which subjects rate on an intensity scale ranging from 0 (none) to 3 (severe). Subsequent pain scores are derived from the sum of these values of words for sensory and affective dimensions. Correlations of SF-MPQ scores to scores from the standard MPQ are high (Melzack, 1987). This study analyzed both the sensory and affective subscales. In this sample, the 11 items on the sensory subscale were highly reliable (baseline $\alpha = .76$; follow-up $\alpha = .88$), and 4 items on the affective subscale also had high reliability (baseline $\alpha = .71$; follow-up $\alpha = .69$).

Headache Related Disability. This was assessed using the Migraine Disability Assessment Scale (MIDAS). This questionnaire consists of five questions related to social, occupation, and daily functioning limitations. This measure has established reliability, validity, and internal consistency, which support its use in clinical practice (Stewart, Lipton, Dowson, & Sawyer, 2001). In this sample, this 5-item measure had good internal consistency (baseline $\alpha = .75$; follow-up $\alpha = .73$).

Physical Health Symptoms. Physical health symptoms were assessed using a checklist of the severity of 36 symptoms or health problems for the past week on a 0 (not at all) to 4 (extremely severe) scale. In this sample, the scale had very strong reliability (baseline $\alpha = .87$; follow-up $\alpha = .93$).

Psychological Symptoms. Psychological symptoms were assessed using a 53-item brief self-report scale, the Brief Symptom Inventory (BSI). This index seeks to quantify a respondent's severity of illness by measuring current or past level of symptoms, intensity of symptoms, and frequency of symptoms (Derogatis, 1975). Participants rate their discomfort over the past 2 weeks on a 5-point scale ranging from 0 (not at all) to 4 (extremely). In previous

research, internal consistencies and test-retest reliabilities have been high. This is a widely used and valid measure (Derogatis & Melisaratos, 1983). This study analyzed on the somatization, anxiety, and depression subscales, which had high reliability in this sample. The somatization subscale has 7 items (baseline $\alpha = .77$; follow-up $\alpha = .84$), the anxiety subscale has 6 items (baseline $\alpha = .81$; follow-up $\alpha = .79$), and the depression subscale has 6 items (baseline $\alpha = .84$; follow-up $\alpha = .82$).

Positive and Negative Affect. This was assessed with The Positive Affect Negative Affect Schedule (PANAS) (Watson, Clark, & Tellegen, 1998). This mood scale consists of 10 positive affect items and 10 negative affect items. In prior research, the test demonstrated good internal consistency for PA ($\alpha = 0.86$ to $.90$) and for NA ($\alpha = .84$ to 0.87). Items are based on how respondents have felt in the past four weeks. Items were measured on a 5-point Likert scale, which ranges from 1 (very slightly or not at all) to 5 (extremely). Averaging the positive and negative affect items independently attains two subscale scores. In this sample, good internal consistency was found for the 10 item PA subscale (baseline $\alpha = .92$; follow-up $\alpha = .93$) and the 10-item NA subscale (baseline $\alpha = .86$; follow-up $\alpha = .88$).

Data analysis

After data was collected it was entered into a SPSS 19.0 file to be analyzed. The data was screened for missing and out of range values. Frequency distributions of unstandardized residual variables were examined for outliers. The data was also examined for non-normal variables by evaluating standardized scores (z) for skewness. Variables with very large z scores beyond 3.29 ($p < .001$, two-tailed test) and whose histograms showed a nonnormal distribution were considered skewed. Two variables with z scores more extreme than 3.29 were found: headache duration and headache related disability. A log transformation was applied to the headache

duration and MIDAS scores. Demographic information was analyzed using frequency distributions and measures of central tendency. Internal consistency of the moderator and outcome measures was evaluated using Cronbach's alpha of reliability. Additionally, to test whether or not participants were effectively randomized, the three groups were compared on baseline measures.

To test the hypotheses, each of the potential moderators (alexithymia, assertiveness, and ambivalence over anger expression) was tested using hierarchical regression analyses (Baron & Kenny, 1986) to predict residualized outcomes. First, each outcome score was calculated as an unstandardized residualized variable at follow-up by covarying its baseline value. Next, each potential moderator variable was centered. Interaction terms were then created for the centered potential moderator variables and group variable. Hierarchical regression analyses were then built by entering the centered potential moderator variable, followed by the group variable, and the interaction term reflecting the group x the centered moderator variable. To facilitate interpretation, groups were compared two at a time. Finally, the interaction terms were examined for significance; significant effects signified a moderator relationship. To clarify specific group differences, post-hoc probing was conducted by running regressions between moderator scores at baseline and residualized outcome scores for each group separately.

Chapter 3

Results

Preliminary Analyses

To determine if randomization was successful in generating equivalent groups among the 127 participants, the three groups were compared on baseline scores for outcome and potential moderator measures. As shown in Table 1 and Table 2, no significant differences were found.

Table 1. *Comparisons of Participants on Outcome Measures at Baseline*

Variables	Experimental Group			F/ χ^2 value	p- value
	AAET (n=40) M (SD)	RT (n=43) M (SD)	Control (n=44) M (SD)		
Headache Frequency (past month)	9.80 (7.50)	8.44 (5.25)	1.75 (8.19)	2.39	.10
Headache Severity (past month)	6.28 (1.52)	6.49 (1.64)	6.41 (1.69)	0.18	.83
Headache Duration (past month)	5.53 (8.32)	5.76 (8.55)	9.59 (12.37)	2.24	.11
SF-MPQ-SEN	15.20 (6.22)	15.38 (5.82)	14.97 (6.32)	0.05	.95
SF-MPQ-AFF	4.93 (2.92)	4.37 (2.99)	4.73 (3.01)	0.37	.69
MIDAS	2.33 (1.72)	2.18 (1.90)	3.44 (3.91)	2.77	.07
BSI-SOM	1.14 (0.91)	1.16 (0.71)	1.18 (0.91)	0.02	.98
BSI-ANX	0.92 (0.93)	1.09 (0.90)	0.80 (0.83)	1.21	.30
BSI-DEP	0.95 (0.95)	1.10 (0.89)	0.98 (0.83)	0.31	.74

PANA-PA	3.30 (0.86)	3.02 (0.92)	2.85 (0.91)	2.64	.08
PANA-NA	2.33 (0.96)	2.36 (0.75)	2.29 (0.81)	.06	.94

Note. SF-MPQ-SEN= McGill Pain Questionnaire-Short Form Sensory Descriptors
 SF-MPQ-AFF= McGill Pain Questionnaire-Short Form Affective Descriptors
 MIDAS= Migraine Disability Assessment Scale
 BSI-SOM= Brief Symptom Inventory Somatization
 BSI-ANX= Brief Symptom Inventory Anxiety
 BSI-DEP= Brief Symptom Inventory Depression
 PANA-PA= Positive Affect
 PANA-NA= Negative Affect

Table 2. Comparisons of Participants on Potential Moderator Measures at Baseline

Variables	Experimental Group			F/ χ^2 value	p- value
	AAET (n=40) M (SD)	RT (n=43) M (SD)	Control (n=44) M (SD)		
TAS-TOT	51.36 (12.48)	49.07 (11.79)	50.64 (13.90)	0.35	.71
TAS-DIF	16.80 (6.89)	16.81 (6.45)	15.95 (7.01)	0.23	.79
TAS-DDF	15.15 (4.69)	13.58 (4.66)	14.46 (5.17)	1.09	.34
TAS-EOT	19.41 (5.78)	18.68 (4.51)	20.23 (4.38)	1.09	.34
AEQ-ENT	3.24 (0.97)	3.17 (0.69)	3.07 (0.80)	0.44	.65
RAS	2.83 (0.77)	3.22 (0.92)	3.07 (0.89)	2.04	.13

Note. TAS-TOT= Total Toronto Alexithymia Scale
 TAS-DIF= Toronto Alexithymia Scale Difficulty Identifying Feelings Subscale
 TAS-DDF= Toronto Alexithymia Scale Difficulty Describing Feelings Subscale
 TAS-EOT= Toronto Alexithymia Scale Externally Oriented Thinking
 AEQ-ENT= Ambivalence Over Emotional Expression Anger Expression Subscale
 RAS= Rathus Assertiveness Schedule

Bivariate correlations were conducted to determine the relationship among potential moderators. As seen in Table 3, bivariate correlations revealed significant, positive associations between alexithymia and its facets (difficulty identifying feelings, difficulty describing feelings, externally oriented thinking). Significant, positive correlations were also seen between alexithymia and its facets and ambivalence over anger expression. In addition, assertiveness had a significant, negative relationship with alexithymia and its facets as well as with ambivalence over anger expression. Thus, all of the moderators share meaningful amounts of variance with each other.

Table 3. *Correlations Between Potential Moderators*

Variables	1	2	3	4	5
1. TAS-TOT					
2. TAS-DIF	.83**				
3. TAS-DDF	.83**	.56**			
4. TAS-EOT	.63**	.21*	.35**		
5. AEQ-ENT	.51**	.46**	.49**	.21*	
6. RAS	-.56**	-.39**	-.50**	-.41**	-.38**

* = $p < .05$; **= $p < .01$

Note. TAS-TOT= Total Toronto Alexithymia Scale

TAS-DIF= Toronto Alexithymia Scale Difficulty Identifying Feelings Subscale

TAS-DDF= Toronto Alexithymia Scale Difficulty Describing Feelings Subscale

TAS-EOT= Toronto Alexithymia Scale Externally Oriented Thinking

AEQ-ENT= Ambivalence Over Emotional Expression Anger Expression Subscale

RAS= Rathus Assertiveness Schedule

Primary Analyses

Global or Total Alexithymia

It was hypothesized that participants who have higher baseline levels of alexithymia, as measured by the Toronto Alexithymia-20, would show reduced benefits from AAET and increased benefits from RT, as compared to participants in the control group. The results below

are arranged and presented for each outcome measure separately. They are also presented in Table 4. Overall, these findings were not consistent with the hypotheses.

Greater levels of alexithymia predicted an increase in headache frequency following RT, whereas it predicted a decrease for those in the AAET and control groups. More specifically, in prediction of headache frequency, alexithymia either significantly or marginally significantly interacted with group: AAET vs. RT, $t(79) = 2.36, p = .02, \beta = .80$; and RT vs. control, $t(82) = -1.91, p = .06, \beta = -1.04$. In the AAET ($\beta = -.23, p = .16$), and control groups, ($\beta = -.13, p = .40$), alexithymia was weakly inversely related to headache frequency at follow-up, whereas this relationship was positive in the RT group ($\beta = .29, p = .06$).

Similarly, greater levels of alexithymia predicted an increase in headache severity for individuals who engaged in RT, whereas for those in the AAET group, it predicted a decrease. In the prediction of headache severity, alexithymia significantly interacted with group: AAET vs. RT, $t(79) = 2.40, p = .02, \beta = .82$; and AAET vs. Control, $t(80) = 2.18, p = .03, \beta = .55$. In the AAET group, alexithymia was inversely related to headache severity ($\beta = -.37, p = .02$) at follow-up, whereas in the RT group, this relationship was weakly positive ($\beta = .13, p = .41$). For individuals in the control group there was almost no relationship ($\beta = .08, p = .59$).

Lastly, as expected, greater alexithymia predicted greater somatic symptoms for those who did not engage in an intervention. However, unexpectedly, for individuals who participated in AAET, greater alexithymia predicted no change. In the prediction of somatic symptoms, alexithymia marginally significantly interacted with group: AAET vs. Control, $t(80) = 1.72, p = .09, \beta = .42$. In the AAET group, alexithymia was unrelated to somatic symptoms ($\beta = -.04, p = .82$); however, in the control group this relationship was positive ($\beta = .35, p = .02$).

Table 4. *Standardized Beta Coefficients for the Relationship Between Overall Alexithymia and Each Adjustment Outcome for Each Intervention Condition, and Test of Group Differences*

Outcome Measure	Anger Awareness and Expression Training (n = 40)	Relaxation Training (n =43)	Control Group (n =44)	Group Differences
Headache Frequency (past month)	-0.23	0.29†	-0.13	AT ≠ RT RT ≠ C†
Headache Severity (past month)	-0.37*	0.13	0.08	AT ≠ RT AT ≠ C†
Headache Duration (past month)	-0.29	-0.14	0.06	
SF-MPQ-SEN	-0.08	-0.10	0.04	
SF-MPQ-AFF	-0.07	0.03	0.05	
MIDAS	-0.16	0.05	-0.10	
BSI-SOM	-0.04	-0.04	0.35	AT ≠ C†
BSI-ANX	-0.10	0.02	0.23	
BSI-DEP	0.08	0.12	0.32	
PANA-PA	-0.17	-0.19	-0.04	
PANA-NA	0.05	0.12	0.28†	

† $p \leq .10$. * $p \leq .05$. ** $p \leq .001$. *** $p \leq .001$

Note. SF-MPQ-SEN= McGill Pain Questionnaire-Short Form Sensory Descriptors

SF-MPQ-AFF= McGill Pain Questionnaire-Short Form Affective Descriptors

MIDAS= Migraine Disability Assessment Scale

BSI-SOM= Brief Symptom Inventory Somatization

BSI-ANX= Brief Symptom Inventory Anxiety

BSI-DEP= Brief Symptom Inventory Depression

PANA-PA= Positive Affect

PANA-NA= Negative Affect

Alexithymia: Difficulty Identifying Feelings Facet

The next analyses examined the three facets of alexithymia: difficulty identifying feelings, difficulty describing feelings, and externally oriented thinking. Although I made no specific hypotheses regarding the facets of alexithymia, I explored these facets as potential moderators. First, I explored the facet difficulty identifying feelings. Results are presented below and in Table 5.

Similar to overall alexithymia, greater levels of difficulty identifying feelings predicted an increase in headache frequency for individuals who engaged in RT. However, for individuals in the AAET and control groups, greater difficulty identifying feelings predicted a decrease. This was indicated by the marginally significant interaction between difficulty identifying feelings and group in the prediction of headache frequency: AAET vs. RT, $t(79) = 1.70, p = .09, \beta = .58$; and RT vs. control, $t(82) = -1.79, p = .08, \beta = -.96$. Difficulty identifying feelings was weakly inversely related to headache frequency at follow-up in the AAET group ($\beta = -.12, p = .47$) and control group ($\beta = -.14, p = .38$), whereas in the RT group, difficulty identifying feelings had a marginal positive relationship to headache frequency, ($\beta = .26, p = .09$).

Greater difficulty identifying feelings also predicted an increase in headache severity for individuals who participated in RT or no intervention, whereas it predicted a decrease for those who participated in AAET. More specifically, there was an interaction (significant) between difficulty identifying feelings and group in predicting headache severity: AAET vs. RT, $t(79) = 2.84, p = .006, \beta = .95$; and AAET vs. Control, $t(80) = 2.43, p = .02, \beta = .58$. In the AAET group, difficulty identifying feelings was inversely related to headache severity ($\beta = -.41, p = .009$). On the other hand, the relationships were in the opposite direction in the RT group ($\beta = .18, p = .09$) and control group ($\beta = .11, p = .50$).

In addition, this facet predicted a decrease in headache duration for individuals who engaged in AAET, and an increase for those who did not participate in an intervention. More specifically, our results indicated that in prediction of headache duration, difficulty identifying feelings significantly interacted with group: AAET vs. Control, $t(79) = 2.30$ $p = .02$, $\beta = .54$. In the AAET group, difficulty identifying feelings was inversely related to headache duration ($\beta = -.31$ $p = .05$), whereas this relationship was positive in the control group ($\beta = .19$, $p = .22$).

In addition, difficulty identifying feelings tended to predict reduced anxiety for those who engaged in AAET, compared to individuals in the control group, where it predicted no change. These findings were demonstrated by the marginally significant interaction between difficulty identifying feelings and group in predicting changes in anxiety symptoms, AAET vs. control, $t(80) = 1.79$, $p = .08$, $\beta = .45$. More specifically, in the AAET group, difficulty identifying feelings tended to be inversely related to anxiety ($\beta = -.14$ $p = .38$), whereas this relationship was positive in the control group ($\beta = .25$, $p = .09$).

Similarly, difficulty identifying feelings tended to predict a decrease in somatic symptoms following AAET, and an increase after no intervention. This is indicated by a significant interaction between difficulty identifying feelings and group in predicting changes in somatic symptoms, AAET vs. control, $t(80) = 2.96$ $p = .004$, $\beta = .68$. In the AAET group, difficulty identifying feelings tended to be inversely related to somatic symptoms ($\beta = -.19$ $p = .25$), whereas in the control group ($\beta = .44$, $p = .003$) this relationship was positive.

Table 5. *Standardized Beta Coefficients for the Relationship Between Difficulty Identifying Feelings and Each Adjusted Outcome for Each Intervention Condition, and Test of Group Differences*

Outcome Measure	Anger Awareness and Expression Training (n = 40)	Relaxation Training (n = 43)	Control Group (n = 44)	Group Differences
Headache Frequency (past month)	-0.12	0.26†	-0.14	AT ≠ RT† RT ≠ C
Headache Severity (past month)	-0.41**	0.18	0.11	AT ≠ RT AT ≠ C
Headache Duration (past month)	-0.31	-0.10	0.19	AT ≠ C
SF-MPQ-SEN	-0.05	-0.07	0.14	
SF-MPQ-AFF	-0.08	0.22	0.19	
MIDAS	-0.13	0.04	-0.07	
BSI-SOM	-0.19	0.14	0.44**	AT ≠ C
BSI-ANX	-0.14	0.05	0.25†	AT ≠ C†
BSI-DEP	-0.002	0.14	0.31*	
PANA-PA	-0.08	-0.09	0.03	
PANA-NA	0.06	0.15	0.28†	

† $p \leq .10$. * $p \leq .05$. ** $p \leq .001$. *** $p \leq .001$.

Note. SF-MPQ-SEN= McGill Pain Questionnaire-Short Form Sensory Descriptors
 SF-MPQ-AFF= McGill Pain Questionnaire-Short Form Affective Descriptors
 MIDAS= Migraine Disability Assessment Scale
 BSI-SOM= Brief Symptom Inventory Somatization
 BSI-ANX= Brief Symptom Inventory Anxiety

BSI-DEP= Brief Symptom Inventory Depression
 PANA-PA= Positive Affect
 PANA-NA= Negative Affect

Alexithymia: Difficulty Describing Feelings Facet

The same pattern was seen with the facet difficulty describing feelings. Results are presented below and in Table 6. Greater difficulty describing feelings tended to predict a decrease in headache frequency following AAET, whereas following RT, difficulty describing feelings predicted a slight increase. This finding is indicated by a marginally significant interaction between difficulty describing feelings and group in predicting headache frequency, AAET vs. RT, $t(79) = 1.79, p = .08, \beta = .63$. In the AAET group, difficulty describing feelings tended to be inversely related to headache frequency ($\beta = -.22, p = .18$) whereas in the RT group, difficulty describing feelings showed a slight positive trend ($\beta = .18, p = .25$).

Similarly, this facet predicted a decrease in headache severity following AAET and a tendency to increase headache severity following RT. This finding is indicated by a marginally significant interaction between difficulty describing feelings and group in predicting headache severity, AAET vs. RT, $t(79) = 2.34, p = .02, \beta = .82$. In the AAET group, difficulty describing feelings was inversely related to headache severity ($\beta = -.35, p = .03$) whereas in the RT group, difficulty describing feelings showed a slight positive trend ($\beta = .13, p = .39$).

I next examined headache duration for these individuals. Greater difficulty describing feelings predicted an increase in headache duration following AAET, a slight decrease after RT, and no change after no intervention. These findings are demonstrated by the following results. In prediction of headache duration, difficulty describing feelings either significantly or marginally significantly interacted with group: AAET vs. RT, $t(79) = 1.81, p = .07, \beta = .61$; and AAET vs. control, $t(79) = 2.07, p = .02, \beta = .50$. In the AAET group, difficulty describing feelings was

inversely related to headache duration ($\beta = -.41, p = .009$). However, there was a slight inverse relationship in the RT group ($\beta = -.19, p = .24$) and almost no relationship in the control group ($\beta = .02, p = .93$).

Difficulty describing feelings also predicted a change in somatic symptoms following the active treatment groups. There was a marginally significant interaction between difficulty describing feelings and group (AAET vs. RT) in predicting a change in somatic symptoms, $t(79) = 1.76, p = .08, \beta = .63$. In the AAET group, there was a slight inverse relationship between difficulty describing feelings and somatic symptoms ($\beta = -.24, p = .20$), whereas in the RT group, a slight positive relationship was seen ($\beta = .18, p = .25$).

In addition, difficulty describing feelings predicted changes in sensory pain after AAET compared to the control condition, where no change was found. There was a marginally significant interaction between difficulty describing feelings and group in predicting changes in sensory pain, $t(80) = 1.81, p = .07, \beta = .45$. In the AAET group, difficulty describing feelings at was inversely related to sensory pain, ($\beta = -.34, p = .03$), whereas in the control group there was no relationship (sensory pain: $\beta = -.04, p = .79$).

Difficulty describing feelings tended to predict a decrease in anxiety following AAET, and a slight increase following no intervention. More specifically, a marginally significant interaction was found between difficulty describing feelings and group in predicting changes in anxiety, AAET vs. control, $t(80) = 1.79, p = .08, \beta = .46$. In the AAET group, difficulty describing feelings tended to be inversely related to anxiety ($\beta = -.24, p = .15$), whereas in the control group ($\beta = .15, p = .33$) a slight positive relationship was found.

The same pattern was seen for somatic symptoms. There was a significant interaction between difficulty describing feelings and group (AAET vs. control) in predicting changes in

somatic symptoms, $t(80) = 2.56$ $p = .01$, $\beta = .62$. In the AAET group, difficulty describing feelings tended to be inversely related to somatic symptoms ($\beta = -.21$, $p = .20$), whereas in the control condition ($\beta = .35$, $p = .02$), a positive relationship was found.

Table 6. *Standardized Beta Coefficients for the Relationship Between Difficulty Describing Feelings and Each Adjusted Outcome for Each Intervention Condition, and Test of Group Differences*

Outcome Measure	Anger Awareness and Expression Training ($n = 40$)	Relaxation Training ($n = 43$)	Control Group ($n = 44$)	Group Differences
Headache Frequency (past month)	-0.22	0.18	-0.05	AT \neq RT†
Headache Severity (past month)	-0.35*	0.13	-0.02	AT \neq RT
Headache Duration (past month)	-0.41	-0.19	0.02	AT \neq RT† AT \neq C
SF-MPQ-SEN	-0.34*	-0.01	-0.04	AT \neq C†
SF-MPQ-AFF	-0.29†	-0.07	-0.02	
MIDAS	-0.27	0.06	-0.22	
BSI-SOM	-0.21	0.18	0.35	AT \neq RT† AT \neq C
BSI-ANX	-0.24	0.01	0.15	AT \neq C†
BSI-DEP	-0.13	0.08	0.20	
PANA-PA	-0.17	-0.16	0.03	
PANA-NA	-0.18	0.08	0.17	

† $p \leq .10$. * $p \leq .05$. ** $p \leq .001$. *** $p \leq .001$.

Note. SF-MPQ-SEN= McGill Pain Questionnaire-Short Form Sensory Descriptors
 SF-MPQ-AFF= McGill Pain Questionnaire-Short Form Affective Descriptors
 MIDAS= Migraine Disability Assessment Scale
 BSI-SOM= Brief Symptom Inventory Somatization
 BSI-ANX= Brief Symptom Inventory Anxiety
 BSI-DEP= Brief Symptom Inventory Depression
 PANA-PA= Positive Affect
 PANA-NA= Negative Affect

Alexithymia: Externally Oriented Thinking

A different pattern was found for the facet, externally oriented thinking. This facet predicted an increase in somatic symptoms following AAET, and a slight decrease following RT. This finding is demonstrated by a marginally significant interaction between group, AAET vs. RT, $t(79) = -1.77, p = .08, \beta = -.59$. In the AAET group, a positive relationship was found ($\beta = .31, p = .05$), whereas in the RT group, there was a weak inverse relationship ($\beta = -.11, p = .50$). These results are also presented in Table 7.

Table 7. *Standardized Beta Coefficients for the Relationship Between Externally Oriented Thinking and Each Adjusted Outcome for Each Intervention Condition, and Test of Group Differences*

Outcome Measure	Anger Awareness and Expression Training ($n = 40$)	Relaxation Training ($n = 43$)	Control Group ($n = 44$)	Group Differences
Headache Frequency (past month)	-0.17	0.20	-0.13	
Headache Severity (past month)	-0.03	-0.05	0.13	
Headache Duration (past month)	0.08	-0.03	-0.13	
SF-MPQ-SEN	0.17	-0.06	-0.07	

SF-MPQ-AFF	0.18	-0.16	-0.13	
MIDAS	0.04	0.01	0.05	
BSI-SOM	0.31	-.003	-0.11	AT ≠ RT†
BSI-ANX	0.16	0.009	0.17	
BSI-DEP	0.29†	0.08	0.28	
PANA-PA	-0.14	-0.16	-0.22	
PANA-NA	0.19	0.08	0.24	

† $p \leq .10$. * $p \leq .05$. ** $p \leq .001$. *** $p \leq .001$.

Note. SF-MPQ-SEN= McGill Pain Questionnaire-Short Form Sensory Descriptors
 SF-MPQ-AFF= McGill Pain Questionnaire-Short Form Affective Descriptors
 MIDAS= Migraine Disability Assessment Scale
 BSI-SOM= Brief Symptom Inventory Somatization
 BSI-ANX= Brief Symptom Inventory Anxiety
 BSI-DEP= Brief Symptom Inventory Depression
 PANA-PA= Positive Affect
 PANA-NA= Negative Affect

Baseline Levels of Assertiveness as a Moderator of Anger Awareness and Expression Training and Relaxation Training Interventions

It was hypothesized that low levels of baseline assertiveness, as measured by the Rathus Assertiveness Schedule, would predict greater benefits of anger awareness and expression training as compared to no treatment. However, contrary to my hypothesis, there was only one finding, in the opposite direction. This finding is described below and shown in Table 8. In prediction of positive affect, there was a marginally significant interaction between assertiveness and group, (AAET vs. RT), $t(79) = -1.85$, $p = .07$, $\beta = -.71$, (AAET vs. C), $t(80) = -1.72$, $p = .09$, $\beta = -.45$). In the AAET group, assertiveness was positively related to positive affect ($\beta = .32$

$p = .04$), whereas in the control group, no relationship was found ($\beta = -.03, p = .83$). In addition, in the RT group, assertiveness had a weak inverse relationship to positive affect ($\beta = -.08, p = .60$), compared to AAET.

I also hypothesized that low levels of baseline assertiveness would predict lesser benefits for relaxation training, as compared to the no-treatment control group. However, contrary to my hypothesis, no significant interactions were found between baseline levels of assertiveness and group (RT vs. C).

Table 8. *Standardized Beta Coefficients for the Relationship Between Assertiveness and Each Adjusted Outcome for Each Intervention Condition, and Test of Group Differences*

Outcome Measure	Anger Awareness and Expression Training ($n = 40$)	Relaxation Training ($n = 43$)	Control Group ($n = 44$)	Group Differences
Headache Frequency (past month)	0.06	-0.24	0.06	
Headache Severity (past month)	0.03	-0.15	-0.12	
Headache Duration (past month)	0.31	0.31	-0.009	
SF-MPQ-SEN	-0.05	0.01	-0.13	
SF-MPQ-AFF	-0.17	-0.03	-0.28	
MIDAS	0.08	-0.08	-0.02	
BSI-SOM	-0.16	-0.22	-0.22	
BSI-ANX	0.05	-0.23	-0.10	
BSI-DEP	-0.03	-0.22	-0.28	
PANA-PA	0.32*	-0.08	-0.03	AT \neq RT [†] AT \neq C [†]
PANA-NA	-0.06	-0.06	-0.10	

† $p \leq .10$. * $p \leq .05$. ** $p \leq .001$. *** $p \leq .001$.

Note. SF-MPQ-SEN= McGill Pain Questionnaire-Short Form Sensory Descriptors
 SF-MPQ-AFF= McGill Pain Questionnaire-Short Form Affective Descriptors
 MIDAS= Migraine Disability Assessment Scale
 BSI-SOM= Brief Symptom Inventory Somatization
 BSI-ANX= Brief Symptom Inventory Anxiety
 BSI-DEP= Brief Symptom Inventory Depression
 PANA-PA= Positive Affect
 PANA-NA= Negative Affect

Baseline Levels Ambivalence over Anger Expression as a Moderator of Anger Awareness and Expression Training and Relaxation Training Interventions

Next, I explored the construct ambivalence over anger expression. Results are presented below and in Table 9. I hypothesized that higher levels of ambivalence over anger expression, as measured by the Ambivalence over Emotional Expression Scale- anger subscale, would be predictive of increased benefits from AAET, as compared to the no-treatment. However, this hypothesis was not supported because no interactions were found between ambivalence and the AAET /control group comparison.

However, ambivalence over anger expression predicted an increase in headache frequency following RT, and a decrease following no treatment. This finding is demonstrated by a significant interaction between ambivalence over anger expression and group RT vs. control, $t(82) = -2.23$ $p = .03$, $\beta = -1.51$. In the RT group, ambivalence over anger expression was positively related to headache frequency ($\beta = .34$, $p = .02$) whereas in the control group, a weak inverse relationship was seen ($\beta = -.14$, $p = .37$).

Ambivalence over anger expression also tended to predict an increase in headache severity following RT, compared to AAET, where it did not predict a change. In prediction of headache severity, there was a marginally significant interaction between ambivalence over anger expression and group in predicting changes in headache severity, AAET vs. RT, $t(79) =$

1.87, $p = .07$, $\beta = 1.01$. In the AAET group, there was no relationship between ambivalence over anger expression and headache severity ($\beta = -.09$, $p = .58$), whereas in the RT group, there was a significant, positive relationship ($\beta = .31$, $p = .04$).

Ambivalence over anger expression also tended to predict a decrease in headache related disability following AAET, and a slight increase following RT. This finding is indicated by the marginally significant interaction between ambivalence over anger expression and group in predicting changes in headache related disability, AAET vs. RT, $t(79) = 1.79$, $p = .08$, $\beta = .97$. In the AAET group, a weak inverse relationship between ambivalence over anger expression and headache related disability was found ($\beta = -.21$, $p = .19$), whereas in the RT group, a slight positive relationship was seen ($\beta = .19$, $p = .23$).

Table 9. *Standardized Beta Coefficients for the Relationship Between Ambivalence over Anger Expression and Each Adjusted Outcome for Each Intervention Condition, and Test of Group Differences*

Outcome Measure	Anger Awareness and Expression Training ($n = 40$)	Relaxation Training ($n = 43$)	Control Group ($n = 44$)	Group Differences
Headache Frequency (past month)	0.23	0.34*	-0.14	RT \neq C*
Headache Severity (past month)	-0.09	0.31*	0.16	AT \neq RT†
Headache Duration (past month)	-0.03	-0.27	0.05	
SF-MPQ-SEN	-0.11	0.17	-0.08	
SF-MPQ-AFF	-0.01	0.20	-0.07	
MIDAS	-0.21	0.19	-0.16	AT \neq RT†

BSI-SOM	0.04	0.26	0.22
BSI-ANX	-0.03	0.03	0.15
BSI-DEP	-0.03	-0.02	0.04
PANA-PA	-0.08	0.13	-0.03
PANA-NA	0.02	0.10	0.15

† $p \leq .10$. * $p \leq .05$. ** $p \leq .001$. *** $p \leq .001$.

Note. SF-MPQ-SEN= McGill Pain Questionnaire-Short Form Sensory Descriptors

SF-MPQ-AFF= McGill Pain Questionnaire-Short Form Affective Descriptors

MIDAS= Migraine Disability Assessment Scale

BSI-SOM= Brief Symptom Inventory Somatization

BSI-ANX= Brief Symptom Inventory Anxiety

BSI-DEP= Brief Symptom Inventory Depression

PANA-PA= Positive Affect

PANA-NA= Negative Affect

Chapter 4: Discussion

This study sought to identify individual differences that would predict who is most likely to benefit from a novel, group-based anger awareness and expression training intervention compared to a well-established treatment for headaches, relaxation training, and no treatment. The novel intervention was designed to help individuals develop anger awareness and expression skills. Measures of potential moderators—alexithymia, ambivalence over anger expression, and assertiveness—were assessed in a sample of undergraduate students with chronic headaches. Health outcome measures were completed at baseline and six weeks later.

Baseline Levels of Alexithymia and its facets as Moderators of Anger Awareness and Expression Training and Relaxation Training Interventions

The findings did not fully support the original hypotheses, that high baseline levels of *global* alexithymia, would predict reduced benefits for individuals who participated in the AAET intervention but increased benefits for individuals who engaged in RT, as compared to the no-treatment control group. Contrary to my original hypothesis, alexithymia predicted some increased benefits following AAET, and reduced benefits following RT. More specifically, alexithymia predicted a decrease in headache frequency for individuals who engaged in AAET and for individuals who did not participate in an intervention, whereas it predicted an increase in headache frequency for those who participated in RT. Similar findings were seen for headache severity, except alexithymia did not predict any change for participants in the control group. These findings indicate that AAET is effective in decreasing headache frequency and severity among people with higher baseline alexithymia, whereas RT is not an effective intervention for these individuals.

However, alexithymia is a multidimensional personality construct, and further evaluation of the three facets (i.e., difficulty identifying feelings, difficulty describing feelings, and externally oriented thinking) was conducted to determine how these facets of alexithymia predict outcomes for the different interventions. Results indicated that these three facets predicted different responses to anger awareness and expression training compared to relaxation training. Similar to global alexithymia, individuals who had difficulty identifying and difficulty describing their feelings had better outcomes following AAET, whereas the opposite was true for these participants when they engaged in RT or no intervention.

In general, individuals who have difficulty identifying feelings and difficulty describing feelings reported decreases in headache frequency, severity, and duration, somatic symptoms, and anxiety following AAET. Difficulty describing feelings also predicted a decrease in pain following AAET. On the other hand, individuals who have difficulty identifying feelings and difficulty describing feelings reported increases in headache frequency, headache severity, and somatic symptoms when they participated in the RT group. One exception to this pattern was that difficulty describing feelings predicted a decrease in headache duration for individuals in the RT group. Individuals who had difficulty identifying feelings or difficulty describing feelings, who did not participate in an intervention, generally reported worse headaches and somatic symptoms.

Taken together, these findings suggest that AAET is beneficial at reducing headache symptoms, physical health problems, and anxiety for individuals who have difficulty identifying feelings and difficulty describing feelings, whereas RT has very minimal benefits for these individuals. This suggests that a focused, emotion-activating intervention, such as AAET is particularly useful for individuals who have limited emotional awareness and expression.

This novel intervention may have provided some benefit to these individuals because it allowed them to enhance their emotional awareness, by giving them an opportunity to learn how to label and identify their emotions (particularly anger), prior to engaging in emotional expression. It is possible that once these individuals became aware of their anger, they were then able to effectively engage in emotional expression, which allowed them to process and resolve suppressed anger contributing to their headaches. This logic is in accordance with Kraft et al.'s (2008) finding that emotional awareness was an important intermediary step that predicted more improvement after emotional disclosure. Thus, it appears that with appropriate guidance and training, alexithymic individuals who have difficulty identifying and describing emotions may be able to overcome their deficits. However, further research is needed to confirm this proposal.

In contrast, another facet of alexithymia, externally oriented thinking, showed a different pattern. Increasing levels of externally oriented thinking predicted poorer responses to anger awareness and expression training, but improvement of somatic symptoms following relaxation training. This suggests that a lack of insight or psychological mindedness interfered with AAET, but was better suited for an intervention that is concrete and technical—relaxation training.

This finding is in line with previous literature that suggest that emotion-reducing interventions that are externally focused and/or structured are more beneficial for individuals with alexithymia than are interventions that are insight-oriented (Lumley et al., 2007). That is, people who are higher on externally oriented thinking tend to focus on concrete, behavioral or environmental experiences rather than on insight and psychological motivations. Thus, it makes sense that a straightforward behavioral intervention like relaxation training would prove beneficial for such people, whereas an intervention that requires an examination of emotions and needs would prove unhelpful. Also, one should not be surprised that externally oriented thinking

showed a pattern of prediction that differed from that of the other two alexithymia facets. In zero-order correlations, externally oriented thinking had a relatively low correlation with the other two facets. Moreover, many studies have found that externally oriented thinking predicts criterion variables differently than do difficulty identifying or describing feelings (Lumley et al., 2007).

Baseline Levels of Ambivalence over Emotional Expression as a Moderator of Anger Awareness and Expression Training and Relaxation Training Interventions

This research partially supports the hypothesis that higher levels of ambivalence over anger expression would predict benefits from AAET. Consistent with this hypothesis, I found that greater ambivalence over anger expression predicted a decrease in headache severity and headache related disability following AAET, but an increase in headache severity and headache related disability following RT.

This novel anger awareness and expression intervention may have provided some benefit to participants who are relatively ambivalent over expressing their anger, because it is specifically designed for such individuals. It is possible that after these individuals were encouraged to label and identify their emotions, they were less ambivalent about anger expression and felt more comfortable engaging in emotional expression. Given that anger inhibition has been linked to pain (Kerns, Rosenberg, & Jacob, 1994; Carson et al., 2007; Nicholson, Gramling, Ong, & Buenevar, 2003), it is not surprising that an intervention that encouraged anger expression, reduced headache pain. This is in line with previous literature supporting the benefit of other emotional expression interventions for pain patients, such as emotional disclosure, which was shown to be beneficial for individuals suffering from chronic pelvic pain (Norman et al., 2004).

Although no hypothesis was made regarding ambivalence over anger expression and RT, I also found that ambivalence over anger expression predicted an increase in headache frequency, headache severity and headache related disability following RT. It may be that individuals who are ambivalent about expressing their anger are over regulating their emotions, therefore an intervention that asks them to regulate their breathing patterns would not be appealing to them. Perhaps, an intervention, that challenges them to engage in a new skill, emotional expression, may be more appropriate. However, more research is needed to confirm this assertion.

Baseline Levels of Assertiveness as a Moderator of Anger Awareness and Expression Training and Relaxation Training Interventions

The findings do not support the hypothesis that low levels of baseline assertiveness would predict greater benefits of AAET training, as compared to no treatment. Contrary to my hypothesis, I found that greater assertiveness predicted an increase in positive affect (PA) for individuals who engaged in AAET, compared to individuals who did not participate in a treatment, who had no change in PA. These findings suggest that AAET is particularly effective at increasing PA for those who already have high baseline levels of assertiveness, but not useful for individuals who have low assertiveness. I also found that assertiveness did not moderate any other outcomes.

There are many possible reasons for these findings. First, it is possible that high assertiveness is a general marker of competence or self-efficacy. Perhaps, efficacious people benefit from many interventions because they believe they can succeed. In this sample, individuals who had high baseline levels of assertiveness may have had an advantage because they were able to easily engage in an emotion-activating intervention. They may have viewed the

task to communicate their thoughts and feelings directly as a challenge that they felt they could succeed at, instead of a threat, which may have contributed to their greater PA. Another possibility is that PA – which is the only outcome that improved in individuals with high assertiveness – is directly linked to assertiveness. Perhaps, PA is the affect that underlies extraversion, which is a common characteristic of assertive individuals. Individuals who are extroverted, or have a tendency towards extraversion, may be able to enhance more readily what they are already good at (i.e., assertiveness).

In addition, although I speculated that an emotion-activating intervention similar to emotional disclosure, AAET, would be beneficial for individuals who were unassertive, my research did not support this. One possibility is that unassertive individuals in this sample did not practice these skills outside of session enough to benefit from treatment or that our treatment was not long enough to help individuals develop this skill. As with any other skill, practice is needed to see long-term changes in assertiveness.

I also hypothesized that low levels of baseline assertiveness would predict lesser benefits for RT as compared to the no-treatment control group. However, assertiveness did not moderate any outcomes. Although I speculated that individuals low on assertiveness, are often over-regulating their emotions, and therefore would not benefit from an arousal-reducing technique, our research did not support this proposal. These findings suggest that RT has no impact on individuals with headaches who are low on assertiveness, indicating that it neither harms nor helps these individuals.

Limitations

One major limitation to our study is that there were a lot of null findings, and moderator effects were relatively weak. This may be due to the limited number of intervention sessions

(three) coupled with the participant's poor adherence to their homework. Furthermore, our small sample size per group ($n = 42$) limited our statistical power to find significant moderators. I also did not have many predicted moderators of RT. Perhaps, if I included more potential moderators of RT, I may have found stronger effects.

Another limitation of the study is the use of an undergraduate sample, which may limit the generalizability of my findings. Although participants reported that they experienced headaches at least several times per month, they were not a clinical sample. If I had recruited pain patients from a clinical setting, the findings may have differed. Patients with headaches are more likely than non-patients to have tried various treatment methods in the past. Thus, they may be more motivated to try a novel technique, which asked them to implement skills that are not typically addressed in standard behavioral treatments. Although I recruited students who stated that they were interested in engaging in an intervention to reduce their stress, many students were non-adherent when asked to do homework to practice the skills that they learned during sessions. Perhaps, a clinical sample, may have been more motivated to improve and more likely to dedicate time to practice skills between sessions, which may have positively influenced my findings. A clinical sample may also have had more individuals scoring higher on measures of alexithymia, anger ambivalence, and lack of assertion, which may have contributed to a greater range, which would allow for stronger correlations. Furthermore, it is likely that these moderator constructs are more extreme with clinical samples, which could lead to more powerful effects on outcomes of AAET and RT.

Another important limitation is the moderate correlation between our moderators. Preliminary analyses revealed a significant, positive association between alexithymia, its facets, and ambivalence over anger expression. Preliminary analyses also indicated that low assertion

covaries moderately with alexithymia and ambivalence over anger expression. This finding suggests that these variables may not be independent constructs. This raises the possibility that there is one underlying factor instead of multiple moderators. If this is true, this may have impacted our ability to find unique outcomes, thus, contributing to the null findings and weak effects of our study.

Another limitation is that only self-report measures of outcomes were used in our study, and these measures were taken at a single time point. Perhaps, participants did not correctly recall their experience over the past month, which may have biased our findings. If we had a more reliable and valid measure, such as a headache diary, which provided more detailed information regarding headache outcomes, it may have been more likely that we would be able to detect a moderator.

Another reason why we may have had limited findings may be because other baseline variables may be associated with our findings; however, we did not measure them. For example, we also did not separate participants based on headache type. However, it is likely that participants in our sample had different types of headaches and various triggers associated with their onset. Although emotional distress has been shown to be associated with headache frequency, severity, and duration, there is evidence suggesting other important contributing factors. For instance, aside from distress, migraine headaches have been associated with genetics and environmental changes, and hormonal changes (Mayo Clinic, 2011), and tension-type headaches may also be related to poor posture (Mayo Clinic, 2011).

Implications and Future Directions

This study suggests that individuals who have chronic headaches and difficulty identifying and/or describing feelings, or who are ambivalent about expressing anger, benefit the

most from an intervention that incorporates anger awareness and expression skills. However, classic arousal-reducing interventions that focus on relaxation are particularly beneficial for individuals who are relatively low in psychological insight. Thus, this study demonstrates that a brief, group-based intervention that incorporates anger awareness and expression skills can be beneficial for a particular subset of individuals with chronic headaches. We hope that our findings can direct future studies that will help clinicians tailor treatment to individual differences.

Future investigations should explore different types of potential moderators, such as other personality characteristics (e.g., neuroticism, introversion) or different types of headaches (e.g., tension headaches, migraines) that may be impacted by such an intervention. Given the moderate correlation between our moderators, it would be especially important to consider independent moderators in the future. Future studies should also explore these variables in a clinical sample. Ideally, a purposeful match/mismatch study should be used to assess these variables.

APPENDIX A: INTERVENTION PROTOCOL

Relaxation Training

Session 1:

- Welcome and introductions – 10 min
 - Group leader and members introduce themselves. Members go around and state what they hope to study in college and what made them interested in the study.
 - Leader reminds members of confidentiality and sets ground rules: do not discuss other members' comments outside of group, but it is ok to discuss the skills learned in the group.
 - Discuss importance of timely/regular attendance, how this affects the group as a whole.
- Rationale for treatment – 15 min
 - Pain is a physical reality, but it can also be stress-related
 - Pain is processed by the brain – the same organ that sorts through thoughts and feelings, stores and retrieves memories, responds to stress, and translates all incoming information into meaning.
 - What is stress and how can it cause headaches? What does stress do to your body? Ask for responses.
 - “Stress” is defined as a biological, emotional, and mental reaction to an event that you think you might not be able to cope with.
 - Biological: Your body automatically prepares for either “fight or flight.” This is useful in life-or-death situations, like being attacked by a tiger or an armed robber. But our body responds the same way whether we are stressed by an armed robber or a final exam. The biological response includes a rise in blood pressure, heart rate, and respiration. Certain hormones that affect these processes are released into the bloodstream. There is an increased blood flow to your large body muscles – same that you would use for fight or flight. A lot of muscles tense up. These responses would be useful if we had to run from a tiger, but our modern-day stressors are usually different, and the stress response can produce a lot of wear and tear on the body. This stress and tension can produce or worsen headaches.
 - Ask for examples of where in their bodies the participants feel muscle tension when stressed.
 - Emotional/mental: Stress also sets off other reactions. People become nervous, sad, angry, and embarrassed, to name some emotions. It might make us feel helpless. These reactions can make the stress feel even worse. Learning stress management techniques can make you feel more in control of your stress and your pain.
 - Pain triggers stress, and stress can make pain worse
 - Ask, What do you normally do when you feel stressed? What do you normally do when you have a headache?

- Stress and pain can be made better or worse by how one responds to them. Learning how to quiet your body's and mind's response to stress is key to feeling calm and relaxed.
- Learning how to manage stress can also reduce one's pain. Learning how to purposefully relax and let go of the things bothering us, even if only for short periods of time, lets the body recover and tension to ease.
 - Group leader pauses for questions and asks members to think of instances when their headaches might have been related to stress.
- Practice relaxation: PMR – 20 min
 - Leader demonstrates the exercise for the group, leads group through the exercise
- Wrap-up, reactions to exercise, and homework assignment – 15 min
 - What did you think of the exercise? Did you like/not like it?
 - Do you feel more relaxed now? Same?
 - Homework: Practice the PMR at least once per day. Each participant will be given an audio-recording that will lead them through this exercise, as well as the other exercises used in each of the sessions.
 - Discuss where/how each member will practice.
 - Practice does not have to be while having a headache, can be at any time.

Session 2:

- Review of homework and discussion – 10 min
 - Ask for honest reports, “you are not being graded”
 - How often were you able to practice?
- What was it like to practice at home? Did it help you feel more relaxed?
- Problem solving of barriers to practice
 - If any members were not able to practice daily or almost daily, discuss why and how they might work on this for the future.
- Review PMR – 5 min
 - Briefly lead the group through the PMR exercise
- Practice relaxation: Relaxed breathing – 20 min
 - Leader conducts the exercise for the group
 - Discussion: What did you think? Did you like this exercise or PMR more? Any reactions?
- Practice relaxation: Mini-practice – 10 min
 - For relaxation to be most beneficial, you need to also know how to relax and calm yourself whenever needed
 - This skill can be very helpful when you are feeling increased tension or pain but can't go to a secluded area to do the longer exercises
 - Begin by stopping whatever you are doing
 - Take a long breath and exhale
 - Take another deep breath
 - Say the word RELAX to yourself while you slowly exhale
 - Allow yourself to relax and focus on relaxed sensations
 - Allow your jaws to relax, and allow sensations of heaviness to flow downward from your shoulders throughout your body
 - After 30 – 60 seconds, return to what you were doing – regardless of how well you have succeeded in relaxing.

- Practice 4 or 5 times, start with a 60-second practice
- When could you do these? (standing in check-out lane, stopped at a red light, after hanging up the phone, etc).
- Useful to do these several times every day. You get better at inducing a relaxed feeling if you practice it many times. But, remember to stop after about a minute and go back to what you were doing, even if you don't feel relaxed.
- How was it? What does it feel like? Any questions/problems?
- Wrap-up and homework assignment – 15 min
 - Which exercises do you think will be more helpful for you? How do you think these exercises will affect your headaches?
 - Homework: Practice with either/both recordings daily, do the mini-practices

Session 3:

- Review of homework and discussion, problem solving – 5 min
 - Same as in previous session
- Review breathing and mini-practice exercises – 5 min
- Practice relaxation: Imagery – 20 min
 - Leader conducts the exercise
- Wrap-up, setting goals for the future, goodbyes – 20 min
 - Reactions to the exercise
 - Reactions to the treatment as a whole
 - Do you think you know more about managing stress? How do you think you can incorporate these exercises into your daily life?
 - Set goals: What other things do you think you might do to relax/improve your headaches? How will these exercises be part of that?
 - Encourage each participant to talk, set an individual goal
 - All group members say goodbye to each other
 - Remind members about the follow-up in 4 weeks, in the lab, and the email follow-ups after that.

Anger Awareness and Expression Training (AAET)

Session 1:

- Welcome and introductions – 10 min
 - Group leader and members introduce themselves. Members go around and state what they hope to study in college and what made them interested in the study.
 - Leader reminds members of confidentiality and sets ground rules: do not discuss other members' comments outside of group, but it is ok to discuss the skills learned in the group.
 - Discuss importance of timely attendance, how this affects the group as a whole.
- Rationale for treatment – 20 min
 - Pain is a physical reality, but it can also be stress-related
 - Pain is processed by the brain – the same organ that sorts through thoughts and feelings, stores and retrieves memories, responds to stress, and translates all incoming information into meaning.
 - What is stress? What kinds of things make us stressed out?
 - Thoughts and feelings can be one source of stress – for example, if you feel something very strongly, but are not able to express it for some reason.
 - If you have a lot of these unexpressed emotions, it can become difficult for your body to have to keep them “bottled up.”
 - Example of trying to NOT think about a pink elephant – have participants try this. It is a stressor for the brain and body to have to suppress unexpressed emotion.
 - Another way that feelings can be a source of stress is if we are not able to pinpoint what we are feeling – we might know that something is not right, but we can't figure out why we might feel “out of sorts” or “moody.” Sometimes, emotions can be confusing, and it might be tempting to try to hide from them. However, this is another source of stress, similar to trying to hide what you are really feeling.
 - Research shows that being able to label your own feelings can make you feel better.
 - One feeling that is often the source of this kind of stress is anger.
 - Research studies tells us that being able to recognize when we are angry, and express that anger appropriately, can help us decrease stress levels and possibly improve physical pain. Being able to express anger appropriately can also improve our relationships, which can also decrease stress.
 - During these three groups we will talk about feelings and how to recognize and express them assertively. We will focus mostly on anger, because it's such a common emotions that a lot of people have trouble with, but these skills are also applicable to other emotions.
 - Pause here for questions, check for understanding. Ask for participant reactions. Have you had a time where you were angry and weren't able to express it? What stopped you from expressing it? How did that make you feel in the long run?

- Reiterate that not being able to express anger makes us feel helpless and stressed in the long run, and might increase headaches.
- What is anger? Why do we have anger? Is it “good” or “bad”? Solicit participant responses.
 - Provide answer that anger is a necessary emotion that everyone experiences. Anger motivates us to stand up for ourselves or fight for what we need/want.
- Why might we sometimes not express our anger? (Society disapproves of “too much” anger, sometimes we don’t know how to express it).
- Labeling and expressing anger exercises – 20 min
 - There can be different words for “anger”: What are some other words that we use when we mean that we are angry? (e.g., irritation, frustration, grumpiness, resentment, hostility, hate, rage, etc).
 - How do we know when we are angry? What are the physical responses in your body? (Muscle tension, clenching fists, fast breathing, etc).
 - What are some non-verbal ways of expressing anger? Have participants stand and demonstrate anger (glaring, leaning forward, clenched fists, crossed arms, etc). Talk about the range of anger expression.
 - When do you feel angry? Solicit responses from everyone here – what makes you angry? Guide discussion to focus on anger in relationships (anger at a friend who is always late, anger at parent who is too restrictive, etc).
 - How would you express this anger if you could say anything?
 - Practice expressing anger. Have each group member state “I am angry.” Start with a normal, calm, speaking voice. Then ask each group member to say the phrase a little louder.
 - Have each participant try staying “I am angry” loudly, with increasing emotion, and while standing in the angry pose. Go on to express more and more anger – swearing, adding non-verbal gestures, etc. Try to engage participants fully in this exercise, make it a “game.” Practice until everyone is able to engage and feels at ease expressing this type of anger.
- Wrap-up, reactions, homework – 10 min
 - How did it feel to do this exercise? How do you feel now?
 - Why don’t we usually express anger in this way?
 - How might this kind of anger expression make other people feel? Will it get us what we want? It is important to express anger, but we also have to learn to do it in a way that preserves our important relationships while getting our needs met. In our culture, that is best accomplished through assertive communication, which we will talk about next time.
 - Homework: Daily monitoring of times you feel angry. Provide worksheet for participants, and explain assignment.

Session 2

- Review of homework and discussion – 10 min
 - Review participant anger monitoring. Was it easy or hard to keep track of your anger? Did you have trouble doing the assignment?

- What did you notice as you did the exercise? How often do you get angry? Who do you usually get angry at? What do you think about that? Is this something you would like to change?
- Introduction of assertiveness – 15 min
 - Last week, we talked about anger. This week we will talk about how to express that anger in a way that is most likely to get you what you want, and at the same time not damage your relationships with others.
 - What is assertiveness? Have a discussion while emphasizing the following points:
 - Assertiveness involves asking for what you want or saying no to something in a simple, direct, and honest manner.
 - Sometimes it is hard to know what it is that you want. We often have an easy time figuring out what is bothering us about another person, but we may have a harder time figuring out what we want instead. You have the right to express your feelings, to ask for what you want, and to say no. Assertiveness involves the skill of doing that without disrespecting others, but at the same time standing up for yourself without guilt or apology.
 - Keep in mind that other people are not mind readers. Most people are caught up in their own thoughts and problems; they aren't focusing on what's going on with you unless you tell them. You might be very angry, but unless you tell the person you are angry at, they probably won't know about it. Most people then respond favorably to assertive behavior, since it's clear where you stand and what you want.
 - Being assertive means that you state exactly what you want (or don't want) in a straightforward and calm manner, without excuses or apologies. Assertiveness also involves non-verbal behavior – keeping an open pose with your body. Assertiveness also means that you are willing to listen to the other person's point of view, but you do not have to agree with them.
 - This is very different from what we practiced last week – last week we practiced expressing pure anger. Now, we will learn how to use that anger and communicate it in a way that accomplishes your goals.
 - With these classes, we want to help you
 - Identify potential problems you might have in communicating directly
 - Learn the skill of communicating to others in a way that increases the likelihood of getting what you want, but does not drive others away or make them too upset in the process
 - To figure out which parts of communication you might have trouble with, we will divide assertive communication in three parts:
 - Expressing thoughts and feelings to someone, especially disagreeing or saying something negative
 - Asking for what you want
 - Saying no to something you do not want
 - Which of these do you think you might have trouble with? How do you think these situations might affect your stress level? Your headaches?
- Practice – 25 min
 - Let's start with the first category – expressing thoughts and feelings/disagreeing.

- Can you think of a situation where you disagree with something, or are bothered by someone's actions, and would like to be able to say something negative? Try to think of a situation now. This might be one of the situations that made you feel angry over the past week.
- Leader helps everyone come up with this type of situation, and asks them to hold it in their mind.
- How does this type of situation affect your thoughts and feelings? What are you feeling as you think about the situation?
- What stops you from expressing your thoughts and feelings?
- What physical symptoms do you notice as you think about this situation?
 - Leader helps participants notice tension or other physical symptoms, identify anger as the felt emotion
- How would you express your thoughts and feelings?
 - Leader gives examples and helps some of the group members come up with assertive communications using their examples.
- The group practices together, using role-plays between participants or with leader and participants.
- Wrap-up, reactions, homework – 10 min
 - What do you think about assertive communication? Do you think it will help you develop better relationships with others in your life? What do you think might be difficult about it?
 - Homework: Try to perform a small assertive action every day (see homework sheet for instructions).

Session 3

- Review of homework and discussion – 20 min
 - Ask for honest reports, “you are not being graded”
 - What was it like to try assertive communication? How did you feel before trying it? After trying it?
 - If members were not able to carry out a practice, ask what stood in the way.
 - What thoughts and feelings did you have? Do you think these helped you or stood in your way?
- Practice – 25 min
 - Review the three assertiveness categories
 - Disagreeing, asking for something, or saying no
 - Review basics of assertiveness – being direct and honest.
 - Today we will talk more about assertiveness, and we will use a worksheet to guide our discussion.
 - Hand out the “bigger assertiveness challenge” worksheet
 - Can you think of a situation where you want to disagree, or ask for something you want or say no to something you do not want?
 - Help the group come up with some situations that will guide the discussion.
 - Think about your thoughts and feelings in this situation – what are you feeling right now?
 - Leader will help members identify feelings, especially anger

- Pick one participant and use their situation to go through the worksheet (depending on time, you might be able to do this with some of the other participants as well)
- Ask group members to role-play some of the situations with each other, or with leader
- Guide group members in having assertive communication
- For each member of the role-play team: How did you feel while doing the exercise? How do you feel now?
- Solicit feedback from other group members – how did it feel to watch the interaction? What would you do if you were in the situation?
- Wrap-up, goal-setting, goodbyes – 15 min
 - How do you think being able to express your emotions might benefit you? How might it affect your headaches?
 - How do you think this will affect your relationships with others?
 - How can you continue to work on these skills?
 - Help each group member come up with a goal for assertive communication/relationships.
 - Members say good bye to each other

APPENDIX B: HOMEWORK SHEETS FOR AAET**Homework 1:****Daily Monitoring of Anger**

Spend a few minutes at the end of each day to think about and write down situations that made you angry (or irritated, frustrated, etc). In particular, think about things that happened with your friends and family members.

Day 1:**Day 2:****Day 3:****Day 4:****Day 5:****Day 6:****Day 7:**

Practice – Assertive Communication

Step 1: Identify a problem situation

Think of a situation that is a problem for you right now – something you would like to handle assertively. Choose a situation that is not too overwhelming, but also not too easy.

- What is the problem situation?
- Who is involved?
- How does it make you feel?
- What would you like to happen?
- How would you normally handle this problem?
- What do you think would happen if you tried communicating assertively?

Step 2: Plan the Assertive Response

Reminding yourself of what you want, and that you have the right to ask for it, list the steps involved in communicating assertively.

- Think of a time and place convenient for both of you. You may have to ask the other person when you could have 15 minutes to talk. Write this down here:
- Write down the problem in the way that you want to describe it to the other person.
 - o State the problem objectively, and avoid accusing or blaming.
 - o Object to the person's behavior, not the person.
 - o State your feelings about the situation, using "I" rather than "you"
- *My problem:*

Step 3: Write down your request

- Keep the request short and simple
- Be specific
- Use "I" statements

- Ask for one thing at a time
- Don't explain why you deserve it, or apologize for making the request
- Don't demand, command, or make ultimatums
- State the positive consequences of getting your request granted, or negative consequence of having it not granted, but without threats
- If you want to decline a request, do it as simply and straightforwardly as you would make a request

- *My request:*

APPENDIX C: RELAXATION TRAINING SCRIPTS

Relaxation Training Session One: Progressive Muscle Relaxation

Sit back and relax. Make sure your legs are uncrossed and your arms are free to relax.

Now allow your right arm to rest limply on the table, palm down. Keeping your arm on the table, raise your hand until it is bent back tightly at the wrist. Pull it back really hard, and feel the tension in your hand and arm. When I say “release” let the relaxation be immediate, as if your hand was being held up by thread and the thread is being cut. Now release.

Take a deep breath in, and as you let it out, allow your body to begin to let go. Let yourself become aware of any area of your body in which you can detect stress. You may notice this stress as a feeling of tension in certain muscles or groups of muscles of your body. In a few minutes, when you’ve become more relaxed, you will have an opportunity to release this stress and let your muscles relax completely.

Now become aware of your hands. And allowing all the rest of your body to remain comfortably still, tense your right hand. Make a fist. Hold that tension and feel it. Now release – letting the tension drain away. And each time you release the tension, allow it to be a passive release. Make sure the relaxation is not a contraction of the opposing muscles, but passive relaxation.

Now tense your forearms. Feel the tension, letting all the other muscles of your body remain relaxed. Release. Feel the relaxation.

Now tense your upper arms – your biceps. This may involve a little of your shoulder. Feel the tension. Release. And feel the relaxation.

Now lift your shoulders up toward your ears so that you are shrugging your shoulders, and feel where there is tension. Release. Feeling the relaxation.

Now tense the muscles in your feet – curl your toes. Feel the tension. Release. Feel the relaxation.

Now tense the muscles of your ankle and heel and calves – point your toes upwards. Feel the tension. Release. Feel the relaxation.

Now tensing the muscles of your thighs – roll your legs in, push your knees together. Feeling the tension, allowing all the other muscles of your body to remain relaxed. Now releasing. Letting the tension drain away. Feeling the relaxation.

Now arch your back gently, as though you are bending backwards slightly. Feel the tension in your back. Releasing. Really letting go. And feeling the relaxation.

Now tense the muscles of your stomach and abdomen. Feeling the tension. Releasing. And feeling the relaxation.

Take a deep breath in. Hold your breath, feeling the tension. Now release the air and let your chest passively collapse. Now feeling the relaxation.

Now tense the muscles in your neck by arching your neck as if to look up. Feel the tension in the muscles as you do that. And release. Really releasing, and feeling the relaxation.

Now pull your chin down toward your chest and feel that tension, bending your whole head forward. And releasing. And feeling the relaxation.

Now roll your neck to the left, then forward, then to the right. Roll forward, to the right, then back. Feel the relaxation.

Now clench your teeth together, so you can feel the tension in your jaw muscles. Releasing. And feeling the relaxation.

Now open your mouth wide. Feeling the tension in the muscles that do that. Releasing. And feeling the relaxation.

Now tense the muscles in your forehead, as though you are worried. Feel the tension. Release. And feel the relaxation. Now raise your eyebrows, as though you are surprised. Feel the tension. Release.

Clenching your eyes closed tightly. Feeling the tension. Releasing. Feeling the relaxation. And let your eyes open wide, feeling the tension in the muscles that hold them open. Now releasing, letting your eyelids close, feel the relaxation. And as you look into the comfortable darkness behind your eyelids, picture the word "relax" or some other word or symbol or scene that can be your own personal symbol of relaxation.

Let that relaxation flow into your forehead, your scalp, the muscles of your face, your jaw and neck, your shoulders, arms, the muscles of your back. Relaxed, more and more relaxed with each rising and falling of your abdomen. The air breathes for you. Your abdomen becoming more and more relaxed, letting that relaxation continue to flow down, your thighs, your knees, your legs, your ankles, and your feet, flowing right out the soles of your feet.

And each time you do this, you will be building up a new response to stress within your body. A relaxing response. And soon you will notice that your body automatically releases stress and tension without your having to become consciously aware of it at all. Now look within your body and find the part of your body that feels the most comfortable. The most pleasant. And as I count from 1 to 5, imagine letting this feeling begin to spread from this part of your body to all the other parts of your body. And as I count, and the pleasant feeling spreads, you will slowly let yourself turn entirely to an awareness of the outside, as though you have been asleep for a while, becoming more and more awake. Each time you enter the relaxed state, you will be able to relax yourself more and more fully, and more rapidly.

One, slowly let that pleasant feeling expand and travel into each muscle and to each bone, to each organ, through every part of you. Two, and as you are feeling this spreading, feeling yourself becoming a little more awake. Three, letting your awareness return to the world around you, as the pleasant feeling continues to spread throughout all your body. Four, letting your eyelids open as you take a deep breath in, and let it out. Five, Wide awake now, ready to respond to the world around you, your body still feeling pleasant and comfortable.

Take a moment to enjoy that feeling as you stretch your body. Carry that feeling with you, as you let your body return to its wide awake state of movement. Letting your arms and hands move, your feet. Wide awake. And take a moment to notice how comfortable you feel.

Relaxation Session Two: Relaxed Breathing

You are sitting in a comfortable position. You can now let yourself begin to relax. And notice how easy it is for you to listen to the sound of my voice and follow those instructions, which are easy and pleasant for you to follow.

Become aware of your breathing. Notice any movement of your chest or abdomen as your breathing comes and goes. Not controlling your breathing – simply observing it. At first you might find it a little bit difficult not to interfere with your breathing. But let yourself, as much as you can, just observe your breathing as it is now.

Notice that as you allow the muscles of your chest and abdomen to relax, your abdomen rises and falls with each breath. Just notice this, the rising and falling of your abdomen, as your lungs fill with air and empty.

In a few moments I am going to ask you to increase the depth of your breathing very gradually. I'm going to ask to breathe in just a little bit more air with each breath. As much as possible, let the breath start itself, letting the abdomen rise just a little bit more than the previous breath.

Letting your lungs fill a little more deeply with air. Now gradually let your breathing become a little bit deeper, letting your abdomen rise a little bit higher with each breath. Not hurrying your breath, letting each breath start itself. Never pushing. Never straining. Just allowing your breath to become comfortably deeper.

And you may notice that your breathing rate is becoming slower as you take a little more air in with each breath. The pause between breaths becomes a little longer. And if you notice this happening, that's fine. Let it happen.

In a moment I'm going to ask you to let your breathing become still deeper in the following way. Once your abdomen is lifted as high as it will rise comfortably, indicating that your lower lungs have filled completely with air, you will let a little more air in, this time fill the middle part of your lungs. As this happens, you will notice that the middle part of your chest will expand upward and outward, but that the muscles of your neck and shoulders and the upper part of your chest will still remain completely relaxed.

Let your breathing gradually become a little bit deeper. First, filling the lower part of your lungs and feel the rising of your abdomen. Then the middle part of your chest feeling expansion outward of your ribs. And as you let your breath out, let it empty first from your chest, then from your abdomen. Then there is a pause. This may feel a little unfamiliar at first, but the coordination will gradually come as you let it. Really easily. Let your breath grow gradually deeper.

Your abdomen rises, and then your chest. Your chest deflates and then your abdomen.

Now in a moment I'm going to ask you to let your breath become still deeper in the following way. Your abdomen will fill completely, then your middle chest, and finally the very upper part of your chest will fill, so that you will feel some activity in the muscles of your shoulders and neck. In no case should you strain or struggle, but just let your chest fill as full as it will. Then, as you let your breath out, let it escape slowly. First letting the upper part of your chest deflate, then the middle, and finally the lower part as your abdomen slowly falls.

Now let your breath become a little deeper. Filling first your abdomen, then your middle chest, and finally your upper chest. And as you slowly let that breath escape, make sure all the muscles of your lips, your jaw, your mouth and your throat are relaxed. Emptying your upper chest, and your middle chest, and finally feeling your abdomen fall. Let your breathing continue in this way now.

Allowing your breathing to continue to be deep and very slow. And with each breath in, and each breath out, repeat the following phrase silently to yourself: My right arm is heavy and warm. My right arm is heavy and warm. Repeating this phrase with each breath in and each breath out.

Now with each breath in and each breath out repeat the following phrase: My left arm is heavy and warm. My left arm is heavy and warm.

Now with each breath in and out, My right leg is heavy and warm. My right leg is heavy and warm.

Now with each breath in and each breath out. My left leg is heavy and warm. My left leg is heavy and warm.

Breathing very slowly and deeply.

One more deep breath in. And letting go. And let your chest and abdomen be relaxed and let the air breath for you. No longer controlling your breathing, just letting the air do the breathing for you. And notice that there are still three parts to your breathing. There is the breathing in, and you let the air begin. There the breathing in, and you let the air breath for you, feeling your abdomen lift. Then there is the letting go, feeling yourself part of that letting go. Then there is a pause before the next breath comes in, filling your abdomen. And letting your chest remain quiet. With each letting go, with each breathing out, repeat the phrase in your mind: It breathes me. It breathes me.

And as you continue to let the air do the breathing for you, as you let each breath out repeat the words to yourself: The muscles of my back and neck are warm and relaxed. The muscles of my back and neck are warm and relaxed.

And now with each breath out, think the words: My jaw muscles are loose and relaxed. My jaw muscles are loose and relaxed.

Now with each breath out, repeat the words: My forehead is cool and quiet. My forehead is cool and quiet.

And now, with each breath out, repeat to yourself: My eyelids are relaxed and heavy. My eyelids are relaxed and heavy.

And as you continue to let the air breath for you, let your thoughts drift forward in time. And imagine yourself in a place where you can be completely relaxed. Far away from anything that could disturb you. Perhaps a vacation places, perhaps a place you have gone to relax in the past. And as you imagine yourself in this place, and enjoy relaxing, think the following phrase to yourself with each breath: Because I know how to relax, I can work and play better. Because I know how to relax, I can work and play better.

Each time you do this exercise and repeat these phrases to yourself, you are learning to relax yourself even more deeply. Each time you do, you become more and more the person you really want to be. In a moment I'm going to count from one to five, and as I do allow yourself to come to a full awake awareness of your surroundings.

One, feel yourself coming up as though you have just taken a nap.

Two, noticing that as you become more and more awake you become more and more alert to the sounds around you.

Three, perhaps letting yourself enjoy the feeling of your body stretching, like a cat taking a deep luxurious stretch.

Four, coming all the way up, taking a deep breath in. And as you let that breath out, let your eyes open, wide awake.

Five, feeling crystal clear and yet still relaxed and calm within.

Relaxation Session 3: Guided Imagery

Become aware of where you are right now and of the fact that there is no place you need to go and nothing that you need to respond to for a while.

Take two or three long, deep breaths. And as you do, let your body relax.

And feel the weight of your feet, allowing your feet and toes to feel heavy and warm. Your feet may feel far away, or it may even feel as though the borders around your feet and toes are growing more and more indistinct as your feet relax. And as you feel that relaxation, imagine you are on an elevator.

It can be any kind of elevator you want – perhaps it's made of lacy wrought iron and you can half-see the landscapes of imagination slide by as it passes from level to level. Or perhaps its made of polished wood, lined with soft pillows. And you can have any kind of decoration or lighting in it that you want. Or if you wish, you can just let it be dark in your elevator as you feel the warmth and relaxation of your toes and feet. And in a moment I'm going to count from ten down to one. And as I count, you might begin to imagine what it might feel like if your elevator slowly begins to descend. And as I count from ten down to one, you can imagine that with each number the elevator travels down another floor. And as it travels down, your entire body is becoming more and more relaxed. And more and more comfortable with each breath. And as I count, and as you feel the elevator begin to travel down, slowly let the relaxation from your feet begin to travel up your calves and the lower part of your legs.

Ten, feel the gentle floating down. Warm, heavy as the relaxation moves from your feet into your legs and knees. Growing more and more comfortable and more and more quiet.

Nine, and as you travel down deeper and more comfortably, feel the relaxation floating up into your thighs, relaxing your thighs as your muscles become soft and relaxed.

Eight, and let that relaxation and warmth flow up through your pelvis.

Seven, traveling down, deeper and deeper down, as the relaxation flows up into the muscles of your lower back and abdomen. Feeling the rising and falling of your abdomen with each breath. Letting each breath be a feeling of letting go, as you let the air breath for you.

Six, with each breath, feel relaxation filling and emptying your lungs. More and more calm.

More and more comfortable with each breath, feeling all the muscles of your chest relax as you travel down deeper and deeper.

Five, let that relaxation fill the upper part of your back and flow into your shoulders and the back of your neck, feeling heavy and warm.

Four, and as the back of your neck and your shoulders relax, let that feeling flow into your upper arms, like honey flowing slowly through your elbows, your forearms, your wrists, and your hands, all the way down into the very tips of your fingers. Feel as the relaxation reaches the tips of your fingers.

Three, your whole body filled with relaxation. Letting that relaxation flow through your neck, into the back of your head and your ears, flowing around the back of your head, relaxing all the muscles of your scalp. A warm, comfortable, feeling of relaxation.

Two, feeling the muscles around your mouth and your jaw muscles, relaxing. Feeling the muscles of your lips relaxing. Let that relaxation flow through the muscles of your cheeks and your forehead. More and more relaxed as your elevator goes down, deeper and deeper down, more and more comfortable with each breath.

One, and as you feel the elevator gently stopping, and resting at this level, let that heavy relaxed feeling flow into your eyelids. Feeling your eyelids so relaxed and comfortable, they just don't want to move at all. Imagine letting your eyelids feel so heavy and warm and relaxed, that you

can test them. And feel they just don't want to budge at all. And as you imagine this feeling, let the air breathe for you. And notice the breathing in and the letting go. And with each letting go, picture the number 1 in your mind's eye. Or perhaps imagine an internal voice speaking the number 1 with each breathing out. In some way, whatever way is easiest for you, being aware of the number one with each breathing out.

With each breathing out, you think the number one. With each breathing out there a letting go as the tension drains from your body.

Repeating with each breathing out, with each letting go. And as you continue to let the air breathe for you, you may stop repeating, and just feel the relaxation in your eyelids. Now gently let the relaxation flow from your eyelids throughout all the rest of your body. All the way down to your feet. And let your awareness follow that relaxation as it spreads from your eyelids, flowing through your body, gently guiding your awareness as you follow that relaxation all the way down through your chest and abdomen, through your pelvis, all the way down through your thighs and your knees, your legs, all the way down into your feet. And feel your feet and toes feeling warm and relaxed, as relaxed and as warm as though you are standing on the warm sand of a beach.

And you can feel the warmth of the sand and the dryness of the warm sand beneath your feet. And as you move first one foot and then the other from side to side, you can feel the warm sand on the sides and on top of your feet. And as you push your toes gently into it, you can feel the dry granules of sand between your warm toes. And as you are enjoying the warmth of the sand, you might imagine letting yourself open your eyes and see the warm, bright, golden light sand beneath your feet. And let your eyes follow the sand as you lift your eyes and look down the golden white sandy beach. Bright in the sunlight. And turning your head you begin to see the deep blue green of the ocean. And let yourself hear the sounds of the ocean. Waves rolling slowly to shore, breaking into fingers of foam that glide over the sand.

And you may want to walk over to the edge of the wet sand and see bright reflection of the sky and the thin film of water left behind as each wave strokes the wet surface and then rushes back down the slope. Feel the damp sand beneath your feet. Feel its coolness. Feel its moistness. And its firmness as you watch each wave foam towards you on the sand and then rush back into the ocean.

White crests of waves slowly follow each other in toward the shore. And as you enjoy the deep rich color of the ocean, perhaps you can feel the salty breeze blowing in, gently cool on the surface of your body. Taking a deep breath in, savoring the pleasant fragrance, the smell of the sea, perhaps even tasting the slightly salty taste on your lips and tongue. And let your eyes look up and out over the expanse of the ocean, following the waves to their source. Bright reflections dancing on the ocean's surface, looking far off across the ocean now, to the distant horizon. A long, slightly curved line in the distance. And above the horizon, patches of white cloud in a blue sky. And as you continue to look up, follow the clouds in the blue sky, and notice how the clouds that are closer to you look softer, puffy, fleecy white. And there's more and more deep bright blue sky, and floating above you, you can see cottony fluffs of pure white cloud, and a bird gliding through the vast expanses of blue.

And let yourself be aware of the bright sun behind you. Shining and warming, pleasantly warming the skin of your back. And feel the warmth on the surface of your back, sinking in deep into all the muscles of your back. The backs of your arms, the backs of your thighs and your calves. And as that warmth seeps into the muscles of your body, you look to your side and see a very comfortable place where you would like to lie down and rest for a while.

And as you lie down in the warm pleasant sun, you feel your body sinking deep into the surface beneath you and letting your eyelids close, you drift into a comfortable, relaxing sleep.

Comfortable, relaxing, pleasant, sleep.

And as you are sleeping, you are beginning to have a dream. A dream about standing on a warm, pleasant beach. Looking out at the ocean. And as you are standing there, you are feeling strong, healthy, your body looks and feels just like you want it to be. Feel how good your body feels as you stand there. And let your eyes look down and discover your body looking just the way you want it to look. You can see your thighs and your abdomen and your arms. They're strong yet relaxed. Your skin is healthy and has a rich, glowing color. Perhaps you'd like to do something active. Perhaps you'd like to go for a walk or a run down the beach. Perhaps you'd like to run on the firm damp sand, or on the soft warm sand. Or, if you wish, you might like to wade into the water and feel its pleasant temperature. Immerse your body in it. Maybe you'd like to swim. Whatever you'd like to do, let yourself do it now. And feel how pleasant it is to be moving your body in this way.

And as you are enjoying the movement of your comfortable, strong, healthy body, you are thinking to yourself and repeating within, My body is healthy, strong, and relaxed. My body is healthy, strong, and relaxed.

And gradually, the dream is fading away. Slowly fading. And as you open your eyes, in the comfortable place where your body is comfortably lying, you notice the words still echo within your mind, My body is healthy, strong, and relaxed. And as you look around, you notice the sand is now a deeper red golden color. It's late in the day. The sky is a deep turquoise, and the clouds glow in soft rows, in orange and crimson. And the sun is low on the horizon. And the sun slowly sinks out of sight, the clouds about where it disappeared fade magenta and purple, and violet. And as you begin to stand up, you notice that the evening air is slightly cooler. Standing, beginning to walk back across the beach, the darkening sky washing everything in deep blue. And as you walk, becoming aware that it's time to return to your elevator.

Let yourself be on that elevator again. Still feeling yourself comfortably relaxed, yet feeling yourself stronger, more energized.

One, as the elevator gently begins to rise and you feel yourself being lifted. It's as though you are becoming lighter and lighter.

Two, feeling of floating up.

Three, becoming more and more alert and responsive to the sounds around you.

Four, your body feeling more and more like moving.

Five, just as though you are becoming more and more awake.

Six, as though you have been asleep for a long time, coming up feeling refreshed and clear.

Seven, become aware of where you are. The room, the approximate time of day.

Eight, taking a deep breath in and letting it out.

Nine, letting your eyes open. Feeling wide awake and comfortable.

Ten, letting your body stretch and move. Perhaps stretching first your hands and then your arms. Or maybe beginning with your feet and legs, gradually letting your entire body stretch itself.

Take another deep breath in. Let it out. And let your body begin to move around. Feeling good and ready to go wherever you want to go. And to do whatever you want to do next.

APPENDIX D: MEASURES

Headache Frequency / Severity / Duration Questionnaire

1. Have you had a headache in the past 24 hours? ___ Yes ___ No
2. If yes, on a scale of 0 (not at all) to 10 (extremely), how painful was that headache? _____
3. *On how many days in the last week did you have a headache? (If a headache lasted more than 1 day, count each day)* _____
4. *On a scale of 0 (not at all) to 10 (extremely), how painful were those headaches?* _____
5. *On average, how many hours did those headaches last? (use decimals, such as 0.5 for half hours. If longer than a day, enter a value greater than 24)* _____
6. *On how many days in the last month did you have a headache? (If a headache lasted more than 1 day, count each day)* _____
7. On a scale of 0 (not at all) to 10 (extremely), how painful were those headaches? _____
8. On average, how many hours did those headaches last? (Use decimals, such as 0.5 for half hours. If longer than a day, enter a value greater than 24) _____
9. *On how many days in the last week did you take medication for your headaches?* _____
10. *On how many days in the last month did you take medication for your headaches?* _____

McGill Pain Questionnaire (Short Form)

Date: _____

Please rate the following items by placing an "X" in the column that best describes the pain you have experienced from recent migraine headaches.

	None	Mild	Moderate	Severe
Throbbing	0) ____	1) ____	2) ____	3) ____
Shooting	0) ____	1) ____	2) ____	3) ____
Stabbing	0) ____	1) ____	2) ____	3) ____
Sharp	0) ____	1) ____	2) ____	3) ____
Cramping	0) ____	1) ____	2) ____	3) ____
Gnawing	0) ____	1) ____	2) ____	3) ____
Hot-Burning	0) ____	1) ____	2) ____	3) ____
Aching	0) ____	1) ____	2) ____	3) ____
Heavy	0) ____	1) ____	2) ____	3) ____
Tender	0) ____	1) ____	2) ____	3) ____
Splitting	0) ____	1) ____	2) ____	3) ____
Tiring-Exhausting	0) ____	1) ____	2) ____	3) ____
Sickening	0) ____	1) ____	2) ____	3) ____
Fearful	0) ____	1) ____	2) ____	3) ____
Punishing-Cruel	0) ____	1) ____	2) ____	3) ____

Use the following scale and circle the appropriate number to indicate the level of pain you have experienced.

- 0 = No Pain
- 1 = Mild Pain
- 2 = Discomforting Pain
- 3 = Distressing Pain
- 4 = Horrible Pain
- 5 = Excruciating Pain

MIDAS QUESTIONNAIRE

INSTRUCTIONS: Please answer the following questions about ALL your headaches you have had over the last 1 month. Write your answer in the box next to each question. Write zero if you did not do the activity in the last month.

1. On how many days in the last month did you miss work or school because of your headaches?	<input type="text"/> <input type="text"/> days
2. How many days in the last month was your productivity at work or school reduced by half or more because of your headaches? <i>(Do not include days you counted in question 1 where you missed work or school)</i>	<input type="text"/> <input type="text"/> days
3. On how many days in the last month did you not do household work because of your headaches?	<input type="text"/> <input type="text"/> days
4. How many days in the last month was your productivity in household work reduced by half or more because of your headaches? <i>(Do not include days you counted in question 3 where you did not do household work)</i>	<input type="text"/> <input type="text"/> days
5. On how many days in the last month did you miss family, social or leisure activities because of your headaches?	<input type="text"/> <input type="text"/> days

PANAS

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to the word. Indicate to what extent you have felt this way during the past few weeks. Use the following scale to record your answers:

1	2	3	4	5
Very slightly or not at all	A little	Moderately	Quite a bit	Extremely

1. _____ interested
2. _____ irritable
3. _____ distressed
4. _____ alert
5. _____ excited
6. _____ ashamed
7. _____ upset
8. _____ inspired
9. _____ strong
10. _____ nervous
11. _____ guilty
12. _____ determined
13. _____ scared
14. _____ attentive
15. _____ hostile
16. _____ jittery
17. _____ enthusiastic
18. _____ active
19. _____ proud
20. _____ afraid

BRIEF SYMPTOM INVENTORY

Below is a list of problems and complaints that people sometimes have. Please circle the response that best tells how much discomfort that problem has caused you in the past WEEK. Please remember, you are to indicate how much the problem has bothered you in the last two weeks, not how often it has happened.

	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Nervousness or shakiness inside	0	1	2	3	4
2. Faintness or dizziness	0	1	2	3	4
3. The idea that someone else can control your thoughts	0	1	2	3	4
4. Feeling others are to blame for most of your troubles	0	1	2	3	4
5. Trouble remembering things	0	1	2	3	4
6. Feeling easily annoyed or irritated	0	1	2	3	4
7. Pains in your heart or chest	0	1	2	3	4
8. Feeling afraid in open spaces	0	1	2	3	4
9. Thoughts of ending your life	0	1	2	3	4
10. Feeling that most people cannot be trusted	0	1	2	3	4
11. Poor appetite	0	1	2	3	4
12. Suddenly scared for no reason	0	1	2	3	4
13. Temper outbursts that you could not control	0	1	2	3	4
14. Feeling lonely even when you are with other people	0	1	2	3	4
15. Feeling blocked in getting things done	0	1	2	3	4
16. Feeling lonely	0	1	2	3	4
17. Feeling blue	0	1	2	3	4
18. Feeling no interest in things	0	1	2	3	4
19. Feeling fearful	0	1	2	3	4
20. Your feelings being easily hurt	0	1	2	3	4
21. Feeling that people are unfriendly or dislike you	0	1	2	3	4
22. Feeling inferior to others	0	1	2	3	4
23. Nausea or upset stomach	0	1	2	3	4
24. Feeling that you are watched or talked about by others	0	1	2	3	4
25. Trouble falling asleep	0	1	2	3	4
26. Having to check and double check what you do	0	1	2	3	4
27. Difficulty making decisions	0	1	2	3	4
28. Feeling afraid to travel on buses, subways, or trains	0	1	2	3	4
29. Trouble getting your breath	0	1	2	3	4
30. Hot or cold spells	0	1	2	3	4
31. Having to avoid certain things, places, or activities because they frighten you	0	1	2	3	4

	Not at all	A little bit	Moderately	Quite a bit	Extremely
32. Your mind going blank	0	1	2	3	4
33. Numbness or tingling in parts of your body	0	1	2	3	4
34. The idea that you should be punished for your sins	0	1	2	3	4
35. Feeling hopeless about the future	0	1	2	3	4
36. Trouble concentrating	0	1	2	3	4
37. Feeling weak in parts of your body	0	1	2	3	4
38. Feeling tense or keyed up	0	1	2	3	4
39. Thoughts of death or dying	0	1	2	3	4
40. Having urges to beat, injure, or harm someone	0	1	2	3	4
41. Having urges to break or smash things	0	1	2	3	4
42. Feeling very self-conscious with others	0	1	2	3	4
43. Feeling uneasy in crowds	0	1	2	3	4
44. Never feeling close to another person	0	1	2	3	4
45. Spells of terror or panic	0	1	2	3	4
46. Getting into frequent arguments	0	1	2	3	4
47. Feeling nervous when you are left alone	0	1	2	3	4
48. Others not giving you proper credit for your achievements	0	1	2	3	4
49. Feeling so restless that you couldn't sit still	0	1	2	3	4
50. Feelings of worthlessness	0	1	2	3	4
51. Feeling that people will take advantage of you if you let them	0	1	2	3	4
52. Feelings of guilt	0	1	2	3	4
53. The idea that something is wrong with your mind	0	1	2	3	4

Toronto Alexithymia Scale

Code ____

TAS-20

Please indicate how much you agree or disagree with each of the following statements by writing a number from 1 to 5 in the blank in front of the statement. Use this scale:

- 1 = Strongly disagree
- 2 = Disagree
- 3 = Neither disagree nor agree
- 4 = Agree
- 5 = Strongly agree

1. _____ I am often confused about what emotion I am feeling.
2. _____ It is difficult for me to find the right words for my feelings.
3. _____ I have physical sensations that even doctors don't understand.
4. _____ I am able to describe my feelings easily.
5. _____ I prefer to analyze problems rather than just describe them.
6. _____ When I am upset, I don't know if I am sad, frightened or angry.
7. _____ I am often puzzled by sensations in my body.
8. _____ I prefer to just let things happen rather than to understand why they turned out that way.
9. _____ I have feelings that I can't quite identify.
10. _____ Being in touch with emotions is essential.
11. _____ I find it hard to describe how I feel.
12. _____ People tell me to describe my feelings more.
13. _____ I don't know what's going on inside me.
14. _____ I often don't know why I am angry.
15. _____ I prefer talking to people about their daily activities rather than their feelings.
16. _____ I prefer to watch "light" entertainment shows rather than psychological dramas.
17. _____ It is difficult for me to reveal my innermost feelings, even to close friends.
18. _____ I can feel close to someone, even in moments of silence.
19. _____ I find examination of my feelings useful in solving personal problems.
20. _____ Looking for hidden meaning in movies or plays distracts from their enjoyment.

Rathus Assertiveness Schedule

Directions: Indicate how characteristic or descriptive each of the following statements is of you by using the code given below.

- +3 very characteristic of me, extremely descriptive
 - +2 rather characteristic of me, quite descriptive
 - +1 somewhat characteristic of me, slightly descriptive
 - 1 somewhat uncharacteristic of me, slightly nondescriptive
 - 2 rather uncharacteristic of me, quite nondescriptive
 - 3 very uncharacteristic of me, extremely nondescriptive
-

- ___ 1. Most people seem to be more aggressive and assertive than I am
- ___ 2. I have hesitated to make or accept dates because of "shyness"
- ___ 3. When the food served at a restaurant is not done to my satisfaction, I complain about it to the waiter or waitress.
- ___ 4. I am careful to avoid hurting other people's feelings, even when I feel that I have been injured
- ___ 5. If a salesman has gone to considerable trouble to show me merchandise which is not quite suitable, I have a difficult time in saying "NO"
- ___ 6. When I am asked to do something, I insist upon knowing why
- ___ 7. There are times when I look for a good, vigorous argument
- ___ 8. I strive to get ahead as well as most people in my position
- ___ 9. To be honest, people often take advantage of me
- ___ 10. I enjoy starting conversations with new acquaintances and strangers.
- ___ 11. I often don't know what to say to attractive persons of the opposite sex
- ___ 12. I will hesitate to make phone calls to business establishments and institutions
- ___ 13. I would rather apply for a job or for admission to a college by writing letters than by going through with personal interviews
- ___ 14. I find it embarrassing to return merchandise

- _____ 15. if a close and respected relative were annoying me, I would smother my feelings rather than express my annoyance
- _____ 16. I have avoided asking questions for fear of sounding stupid
- _____ 17. During an argument I am sometimes afraid that I will get so upset that I will shake all over
- _____ 18. if a famed and respected lecturer makes a statement which I think is incorrect, I will have the audience hear my point of view as well
- _____ 19. I avoid arguing over prices with clerks and salesmen
- _____ 20. When I have done something important or worthwhile, I manage to let others know about it
- _____ 21. I am open and frank about my feelings
- _____ 22. If someone has been spreading false and bad stories about me, I see him/her as soon as possible to "have a talk" about it
- _____ 23. I often have a hard time saying "NO"
- _____ 24. I tend to bottle up my emotions rather than make a scene
- _____ 25. I complain about poor service in a restaurant and elsewhere
- _____ 26. When I am given a compliment, I sometimes just don't know what to say
- _____ 27. If a couple near me in a theatre or at a lecture were conversing rather loudly, I would ask them to be quiet or take their conversation elsewhere
- _____ 28. Anyone attempting to push ahead of me in a line is in for a good battle
- _____ 29. I am quick to express an opinion
- _____ 30. There are times when I just can't say anything

Ambivalence over Expressed Emotion Scale

Code ____

AEQ

Below are some statements that refer to how people sometimes feel and act. Using the following scale, rate each statement to indicate how frequently you have felt or experience each one.

1	2	3	4	5
I have never felt like this				I feel like this a lot

The statements may consist of 2 thoughts. Carefully read the statement as a whole before deciding on how characteristic it is of you. For example, consider item:

“I try to honestly criticize others for their own good, but I worry they may get angry with me if I do so”

You would give this item a high rating *if and only if* both parts of the statement apply to you; that is, you try to honestly criticize others *and* you worry about their getting angry. If only one part of the statement applies to you, you would give this item a lower rating. It is important to consider the complete thoughts being expressed before you respond.

- ___ 1. I make an effort to control my temper at all times even though I'd like to act on these feelings at times.
- ___ 2. Often I'd like to show others how I feel, but something seems to hold me back.
- ___ 3. I try to refrain from getting angry at my family even though I want to at times.
- ___ 4. I try to show people that I love them, although at times I am afraid that it may make me appear weak or too sensitive.
- ___ 5. Often I find that I am not able to tell others how much they really mean to me.
- ___ 6. I want to tell someone when I love them, but it is difficult to find the right words.
- ___ 7. I would like to express my disappointment when things don't go as well as planned, but I don't want to appear vulnerable.
- ___ 8. I would like to be more spontaneous in my emotional reactions, but I just can't seem to do it
- ___ 9. I try to suppress my anger, but I would like other people to know how I feel.
- ___ 10. It is hard to find the right words to indicate to others what I am really feeling.
- ___ 11. I worry that if I express negative emotions such as fear and anger, other people will not approve of me.
- ___ 12. I feel guilty after I have expressed my anger to someone.
- ___ 13. I often cannot bring myself to express what I am really feeling.
- ___ 14. After I express anger at someone, it bothers me for a long time.

APPENDIX E: SCREENING QUESTIONSScreening Questions

Response of *a* or *b* on all questions was required for selection to participate in the study.

1. How often do you experience headaches?
 - a. Several times per week
 - b. Several times per month
 - c. About once per month
 - d. Several times per year
 - e. Rarely or never

2. How painful are your headaches?
 - a. Severe pain
 - b. Moderate pain
 - c. Mild pain
 - d. Little or no pain, or I rarely or never have headaches

3. How much do you think that stress causes or worsens your headaches?
 - a. very much
 - b. somewhat
 - c. a little
 - d. not at all

4. As part of a research project for which you would receive course credit, would you like to participate in a small class that teaches some techniques that will reduce your stress and possibly improve your headaches?
 - a. Yes, definitely
 - b. Probably
 - c. Maybe
 - d. Probably not
 - e. No, or I don't have headaches

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ABSTRACT**MODERATORS OF THE EFFECTS OF ANGER AWARENESS AND EXPRESSION TRAINING AND RELAXATION TRAINING TO IMPROVE CHRONIC HEADACHE SYMPTOMS**

by

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August 2012

Advisor: Dr. Mark A. Lumley**Major:** Psychology (Clinical)**Degree:** Master of Arts

Chronic headache (HA), a common condition among young adults, is exacerbated by stress. Arousal reducing techniques, such as relaxation training (RT), are moderately effective as stress-management techniques. Suppression of negative emotions, such as anger, has also been shown to worsen stress and pain. Previously, our laboratory found that an innovative 3-session, group-based anger awareness and expression training (AAET) intervention was comparable to group relaxation training (RT) in improving outcomes in HA, and both treatments were more beneficial than no intervention. However, it is likely that individuals respond differently to these interventions. A person's baseline emotion regulation abilities, assertiveness, and ambivalence over emotional expression likely influence their response to these interventions. Therefore, secondary analyses were conducted to explore how alexithymia and its facets (difficulty identifying feelings, difficulty describing feelings, and externally oriented thinking), ambivalence over anger expression, and assertiveness, moderated the effects of AAET, RT, compared with each other and no intervention.

A sample of 127 young adults with chronic HA were randomized to 1 of the 3 conditions (AAET, RT, or no-intervention control), and headache frequency, severity, and duration, physical symptoms, and affect were assessed at baseline and 6-week follow-up. Results indicated that AAET is beneficial at reducing headache symptoms, physical health problems, and anxiety for individuals who have difficulty identifying feelings and difficulty describing feelings, whereas RT has very minimal benefits for these individuals. In contrast, externally oriented thinking predicted greater physical symptoms after AAET compared to RT. Results also demonstrated that AAET is beneficial at reducing headache severity for individuals who are ambivalent over anger expression. Furthermore, AAET was effective at increasing positive affect for individuals who have a high baseline levels of assertiveness, but not useful for individuals with low assertiveness. These findings suggest that a brief, group-based intervention that incorporates anger awareness and expression skills can be beneficial for a subset of individuals with chronic HA.

AUTOBIOGRAPHICAL STATEMENT

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Elyse R. Sklar is a Clinical Psychology graduate student at Wayne State University. She obtained her undergraduate degree in Behavioral Neuroscience from Northeastern University in 2007. She also had a minor in Jewish studies. After graduation, Elyse worked as a laboratory technician at the National Institutes of Mental Health.

As a health psychology enthusiast, Elyse's primary research interests include how stress and emotions influence chronic pain disorders such as headaches, gastrointestinal conditions, and chronic pelvic pain. Her graduate training has helped prepare her for a research career in which she will be able to further investigate interventions that may be able to address these problems. Elyse plays an active role as part of the research team at the Wayne State University Stress & Health lab. Elyse has also gained additional clinical and research experience at the Wayne State University Department of Family Medicine at Crittenton Hospital, where she provides consults for physicians, does short-term therapy with primary care patients, and contributes to several research studies. She also takes part in research at the Beaumont Health System, where she assists in a chronic pelvic pain study. Elyse has also taught Health Psychology and Psychology of Everyday Living at Wayne State University.