1-1-2011

Testing the impact of anger awareness and expression training and relaxation training on chronic headaches

Olga Slavin-Spenny
Wayne State University,

TESTING THE IMPACT OF ANGER AWARENESS AND EXPRESSION TRAINING AND RELAXATION TRAINING ON CHRONIC HEADACHES

by

OLGA SLAVIN-SPENNY

DISSERTATION

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

2011

MAJOR: PSYCHOLOGY (Clinical)

Approved by:

_____

Advisor Date

_____

_____

_____

_____

ACKNOWLEDGMENTS

I would like to thank my advisor, Mark Lumley, PhD., for all of his guidance and support throughout this project as well as during my entire graduate student career. His assistance was invaluable along this road of becoming a professional researcher and clinician. I would like to also thank all of my lab-mates, who walked along this road with me and without whom nothing would have been the same. In particular, I would like thank Elyse Sklar for all of her hard work on data collection on this project; without her, this project could not exist. Finally, I would like to thank my husband, family, and friends for their continued love and understanding.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

STUDY OVERVIEW

Chronic headache is a very common problem and affects millions of people each year. According to the World Health Organization, 1 in 20 adults has a headache every, or nearly every, day (World Health Organization [WHO], 2004). Migraine and tension-type headache (TTH) are the most common types of headache, and both take a serious toll on their sufferers. Social and work activities are affected in the majority of chronic headache sufferers; in one study, three-quarters of chronic tension headache sufferers reported being kept from their normal activities by headaches at some time in the previous six months (Holroyd et al., 2000). Additionally, chronic headache sufferers in this study were seven times more likely to be classified as impaired on measures of physical, social, or role functioning as healthy controls, and almost half the chronic headache sufferers qualified for a mood or anxiety disorder diagnosis, which is much higher than the rate of these disorders in the general population.

The fact that mood and anxiety disorders are so prevalent among individuals with headaches suggests that psychological factors such as depression, anxiety, and anger are implicated in the frequency, severity, and impact of headaches (Nicholson, Houle, Rhudy, & Norton, 2007). Although it is unclear how exactly psychological symptoms interact with the experience of pain, what is known is that they are indeed key elements. Some biopsychosocial models of headache, as well as other types of pain, propose that many of the brain regions associated with pain processing, such as the limbic system, are

also involved in other psychological phenomena (e.g. emotions, attention, stress), and modulation of pain by these other factors may occur through these shared circuits (Nicholson et al., 2007). Although the exact mechanism is unknown, there is a great deal of evidence that negative emotions have an impact on pain.

Helping individuals manage psychological stress and the resulting negative affects – such as depression, anxiety, and anger – is a common goal of psychotherapy. However, there are many paths to achieving that goal. Such paths appear to divide into two main approaches. One approach suggests that negative affect is problematic or pathological and should be minimized or avoided directly and promptly. The other approach suggests the opposite – that negative emotions may have an adaptive role in functioning, and one should seek to learn about, experience, express, and be guided by negative emotions.

The first approach to negative emotion and pain has given rise to a range of chronic pain and headache interventions in the fields of behavioral medicine and health psychology, particularly relaxation, biofeedback, and some cognitive-behavioral techniques such as activity-rest cycling, distraction, and problem-solving. Such techniques, particularly those that include the relaxation training component, have been found to be effective and helpful to people with migraines or tension headaches (Buse & Andrasik, 2009).

Yet, a different approach to intervening with stress and negative emotions has been advocated in various circles. This approach suggests that rather than calming patients and distracting them from their negative emotions, the therapist

should elicit the emotions and help patients process them. This approach has been suggested by multiple proponents. For example, Alexander and French wrote about the importance of the corrective emotional experience in 1946, and this approach is also the basis of exposure therapy for the treatment of anxiety disorders such as PTSD or panic disorder, and phobia (Foa & Kozak, 1986). Indeed, Barlow argues that it is a common factor for all effective therapies for "negative emotion" disorders. The processing approaches have not made many inroads into the health psychology and chronic pain intervention literature, except with respect to expressive writing (Pennebaker & Beall, 1986), which has been researched extensively with various health populations. In the expressive writing technique, individuals are instructed to write in detail about a stressor or traumatic event, with the belief that setting it down on paper helps to process the event and its impact. Although the findings on the effectiveness of expressive writing in improving physical health have been mixed, a recent meta-analysis found it to have at least a small positive impact (Frattaroli, 2006).

Expressive writing is a relatively simple, self-guided, and low intensity method of emotional processing, which might explain its relatively small impact. A recent pilot study of an emotional exposure-based treatment of fibromyalgia in women with trauma histories (Lumley et al., 2008) demonstrated better results, with some of the participants making large improvements in fibromyalgia pain. This treatment included expressive writing as one component but used other experiential techniques to help the women access, express, and process their unresolved traumatic events and emotions related to these events. Because

stress and unexpressed emotions are commonly found in people with headaches, an emotional awareness and expression intervention may be a viable alternative to relaxation-based treatments for chronic pain problems, including headache.

Goals of This Study

The primary goal of this study is to investigate a new treatment for chronic headaches. The premise of this treatment is that emotional processing leads to relief of physical symptoms. Participants were helped to identify and become more comfortable with expressing emotions, particularly anger. Assertiveness training techniques were used to help participants engage in these emotional experiences. Additionally, participants engaged in contemplative activities related to emotions and the value or effects of changing communication styles.

This treatment was administered in a small group setting, which is commonly used to treat chronic pain problems. Small groups have been found to be at least as effective as individual treatment, but can be more efficient (Thorn & Kuhajda, 2006). This proposed treatment was compared to a group-based relaxation training, which is a standard approach for treating headaches, and a no-treatment control group. Use of a control group permitted testing of the efficacy of the two active intervention groups. We hypothesized that the participants receiving either of the active treatments will experience a greater decrease in symptoms than the participants in the no-treatment control group. However, because emotional identification and expression has not yet been used

as a treatment for chronic pain, we could not predict how it would compare to the established treatment of relaxation training.

CHAPTER 2

LITERATURE REVIEW

Chronic headache is a common but debilitating condition. Approximately 5% of Americans suffer from chronic headaches (WHO, 2004). Migraine and tension-type headaches (TTH) are the two most common types of headache. For migraines, the prevalence rates differ in men and women, with 6% of men and 18% of women experiencing migraines. For many people, migraines are a frequent occurrence, with 37% of migraine sufferers experiencing five or more headache days per month (Bigal & Lipton, 2009). For TTH, the gender ratio is much more equal, with one study finding it to be 5:4, female: male (Bendtsen & Jensen, 2009). This same study found that, overall, 2% to 3% of the population had tension-type headaches at least 180 days of the year, and another 10% experienced TTH weekly. Migraine and TTH are thought to be separate types of pain with different etiologies. Nonetheless, clinicians often find it somewhat difficult to differentiate the two types of headache. Patients often do not recall specific features of their headaches, such as the presence of an aura or other symptoms, especially for mild migraines (Tassorelli et al., 2008), and many patients have features of both types of headache. Regardless of the type of headache, there is a heavy social and economic burden associated with this ailment. One study estimated that chronic migraine, defined as 15 or more headache days per month, may cost the individual as much as $7,700 per year in direct and indirect costs, including hospital visits and missed work days (Munakata et al., 2009). Social and family costs are also high. Headache

sufferers report that they are likely to forgo social events or put off various tasks when they have a headache (Holroyd et al., 2000).

The Role of Mood and Anxiety Disorders in Headache

Holroyd et al. (2000) found that almost half of the participants in their study who had chronic headaches also qualified for a mood or anxiety disorder diagnosis. Given that the prevalence rate of these disorders in the general population is much lower, this finding suggests that depression and anxiety may contribute to the frequency, severity, and impact of headaches. Nonetheless, as this is a correlational finding, it is not possible to conclude that mood and anxiety disorders cause headaches. It is also quite conceivable that the mood and anxiety disorders are a consequence of having a serious chronic pain condition.

These links, however, have been explored in a variety of different studies in an attempt to clarify the relationship between headaches and mood/anxiety disorders. One line of research focused on the importance of life stressors or traumatic events in the development of chronic headaches. These findings suggest that an increased number of stressful life events puts individuals at greater risk of experiencing chronic pain, possibly because unresolved stressful events contribute to mood and anxiety problems. For example, White and Farrell (2006) studied urban adolescents and found that those teens who reported the greatest number of stressful life events also reported more headaches as well as more abdominal pain. Moreover, it was revealed that anxiety was a mediating factor between stressful life events and pain; after controlling for anxiety, the impact of stressful life events on pain was diminished. Thus, it seems that anxiety

is a very important factor in the experience of headaches, as well as other pain. It may be that stressful life events increase anxiety, and failure to resolve this anxiety results in chronic pain.

Another study looked at the prevalence of post-traumatic stress disorder in people with chronic headaches (Peterlin et al., 2009). In this study, 25% of the participants were diagnosed with PTSD, as compared to the approximately 8% of individuals with PTSD commonly found in the general population. In addition, headache-related disability was much higher for those participants who had PTSD. The authors also examined those participants who had comorbid PTSD and depression, and found that headaches were even more frequent for these participants. The findings indicate that a history of trauma, anxiety, and depression all play a role in chronic headache, and that suffering from multiple symptoms increases the severity of headache.

Roelofs and Spinhoven (2007) reviewed the connection between a childhood history of trauma and medically unexplained symptoms such irritable bowel syndrome and chronic pelvic pain. They found that a history of trauma is much more common in these patient groups than in the general population. Thus, it seems that a history of trauma is common not only to headaches but to multiple chronic pain populations more generally. Although no definitive explanation exists to explain this link, these authors suggest that early traumatic stress may affect the body's central nervous system and hypothalamic-pituitary-adrenal axis reactivity. The link between trauma, mental health, and headaches

may also be explained by these physical and hormonal changes, which can lead to various symptoms, especially after further stress exposure.

Depression has also been explored as an important psychological factor in the experience of headaches. In an elegant experimental design, headache-prone, depressed women were compared to headache-prone non-depressed women, as well as healthy controls (Janke, Holroyd, & Romanek, 2004). All participants completed a 60-minute long arithmetic stress task. Self-reported stress levels were measured before, during, and after the stress task, and it was found that while the stress task increased the stress levels of all of the participants, the headache prone depressed women reported the highest levels of stress at all three points. In addition, at both the midpoint and the end of the stress task, the headache-prone depressed women were much more likely to experience a headache than the other two groups. In fact, 100% of this group had a headache during, and immediately after, the stress task, which was approximately twice the rate at which the non-depressed headache-prone women had headaches, and ten times the rate of the healthy controls. This trend continued in the following 24 hours as well: the depressed headache-prone women had more headaches than the non-depressed headache-prone women, who had more headaches than the healthy controls. This study points to the importance of both depression and anxiety/stress in the onset and maintenance of headache. The women who were depressed were much more likely to experience a headache, but both of the headache-prone groups were more likely

then the healthy controls to experience a headache when their anxiety was aroused by the stress task.

Emotion Expression and Headaches

In addition to anxiety and depression, the experience and expression of anger and other emotions also appears to be an important factor in headache. Nicholson, Gramling, Ong, and Buenevar (2003) compared individuals with and without headaches in their anger experience and expression. Although the two groups did not differ on trait anger or hostility, those with headaches scored significantly higher on a scale measuring "anger-in," the tendency to refrain from expressing anger. Thus, it seems that individuals with headaches are more likely to have difficulty with expressing their anger. In another study, researchers provoked anger in healthy participants, then administered a cold pressor pain task (Quartana, Bounds, Yoon, Goodin, & Burns, 2010). This study found an association between self-reported suppression of emotions related to the anger-provoking task and self-reported ratings of pain intensity during the cold pressor task. Participants who reported more suppression of emotions tended to report greater pain intensity. These results suggest that anger is an important component of the experience of pain.

Anger is only one emotion, but it is possible that the ability to understand and express emotions in general is an important factor in the headache experience. The finding that those with headaches tend to avoid expressing anger suggests that the inability to express anger, and possibly other emotions, might raise stress levels and lead to an increased pain experience. Further

evidence of this can be seen in the research on assertiveness, which at its core is the ability to express one's thoughts and feelings, especially negative ones. For example, Tomaka et al. (1999) compared women high in assertiveness with those low in assertiveness. The women were exposed to a stress task (an impromptu public speech). The authors found that the high-assertive women were more likely to appraise this task as challenging, whereas the low-assertive women appraised the task as threatening. After the task, women high in assertiveness reported experiencing less stress and negative affect, and more positive affect, than the women low in assertiveness.

In the health literature, findings also support the importance of identifying and expressing emotions. Individuals with tension-type headaches have been found to have not only had higher depression but also lower assertiveness than controls without headache (Yucel et al., 2002). In addition, participants with headaches also had higher alexithymia, or the inability to identify and express emotions. Moreover, in a study conducted with middle- and high-school aged children, researchers found that children with chronic headaches were less likely to express feelings of sadness or worry than healthy children (Osterhaus, 1999). Researchers (Mattila et al., 2009) have also investigated the relationship between alexithymia and health-related quality of life (HRQoL), finding that alexithymia is significantly associated with lower HRQoL even when other variables, such as depression and physical health functioning and diagnoses, are controlled for. These findings clearly suggest that the ability to identify and express emotions may be a key variable in leading a healthy and satisfying life. It

is possible that when a person who has difficulty identifying and expressing feelings experiences stressful or traumatic life events, coping is more difficult than it might be for someone who is more “in tune” with his or her emotional state. Conversely, experiencing high levels of stressful or traumatic events, especially early in life, might lead one to inhibit emotions and lose some self-awareness. In either case, it is likely that having high levels of stress while at the same time being unable to cope with emotions, might lead to an increased risk of somatic symptoms – such as headache.

Research on emotions in healthy populations underlines the importance of emotional skills as a component of effective coping. As an example, researchers have looked at the concept of emotional approach coping, defined as coping through trying to acknowledge, understand, and express emotions. Stanton, Danoff-Burg, Cameron, and Ellis (1994) found that this was a helpful coping strategy, especially for women. Additionally, research suggests that emotional intelligence may be a separate category of intelligence. Mayer, Caruso, and Salovey (2000) investigated an experimental scale that attempted to measure emotional intelligence. The scale involved asking participants to complete tasks such as rating the emotions present in the pictures of faces or abstract designs, judge the feelings of characters in stories, or rate the effectiveness of various coping techniques. The authors found that this scale seemed to reliably measure emotional intelligence and that it was correlated with empathy and parental warmth.

On the other hand, suppression of emotions as a coping technique has also been investigated. Gross (2002) looked at the difference between reappraisal (i.e., trying to see the situation in a different way that is less emotionally distressing) and suppression of emotions (i.e. attempting to not experience the emotion aroused by the situation). His experimental research showed that suppression in response to emotion-arousing stimuli led to increased physiological activation, and self-reported levels of negative emotion were higher in participants asked to suppress emotions, versus those who were asked to use the reappraisal technique. Moreover, levels of positive emotion were lower in those asked to suppress, suggesting that suppression not only does not help regulate negative affect, but also decreases positive affect. In addition to these findings, participants asked to suppress their emotions during a film that aroused negative emotions showed worse performance on memory tasks than those participants who had been asked to use reappraisal. This author also looked at the social consequences of these two coping techniques. He found that people who report habitually suppressing emotions are less likely to share both positive and negative emotions with others, and report having poorer social support, than individuals who report using reappraisal. Additionally, based on both self- and other-report, individuals who use suppression are less well-liked than individuals who use reappraisal (Gross, 2002). Moreover, Hayes and Gifford (1997) found that attempting to suppress certain thoughts leads to an increased frequency of those thoughts, which also identifies suppression as a particularly ineffective technique.

Although these studies do not directly look at a link between emotional suppression and health or pain, the findings suggest that such a link is highly possible. Experimental and correlational data in these studies showed that suppression results in physiological arousal, poor memory performance, and had important social consequences. The findings on physiological arousal, in particular, support the above-mentioned neurobiological model proposed by Roelofs and Spinhoven (2007), who suggested that stress causes physiological changes, which can lead to physical pain symptoms. The studies presented by Gross (2002) suggest that emotional suppression acts as a stressor on the body, leading to physiological arousal, which can be supposed to lead to future physical symptoms. In addition, emotional suppression was also associated with a lower level of emotional support and poorer social relationships, and both of these factors have been associated with poorer physical health (Sheldon, Doyle, Turner, Alper, & Skoner, 2003). Therefore, it is possible that individuals who suffer social consequences due to ineffective emotional coping become more vulnerable to the effects of stress or in some other way become more likely to experience more physical symptoms.

Behavioral Treatments for Chronic Headaches

In view of the fact that psychological and emotional factors have been shown to be of importance in headaches, psychological/behavioral treatments have been used to treat headaches. One of the most common behavioral treatments for headache has been relaxation training. Relaxation training generally consists of teaching participants how to purposefully relax their bodies

and minds through techniques such as paced breathing, progressive muscle relaxation, and guided imagery. If practiced consistently, these relaxation techniques are thought to decrease the overall stress, arousal, and anxiety level of the individual, and have a beneficial impact on physical functioning. In addition to relaxation, many behavioral treatments include other components, such as biofeedback, pleasant activity scheduling, distraction, and education about headache triggers. Such behavioral treatments have been used for many years for the treatment of headaches, as well as other chronic pain conditions, and have been found to be quite effective. For example, Martin, Forsyth, and Reece (2007) compared cognitive behavioral therapy, biofeedback, and control interventions for participants with either migraine or tension headaches. Participants completed eight, 1-hour sessions, of CBT; combining education, relaxation training, and CBT techniques. Participants in the biofeedback condition underwent multiple temporal pulse amplitude biofeedback sessions. In comparison to the control condition, the researchers found reductions in migraine headache symptoms for both the CBT and biofeedback conditions at a one-month follow-up with continued benefit for CBT on migraine headache symptoms at 12 months post-treatment. Similarly, in a pilot study of an in-home behavioral training for migraine headaches, Merelle, Sorbi, and Passchier (2007) focused on an intervention teaching relaxation skills, providing emotional and motivational assistance, and practicing time management skills. They found significant reductions in migraine frequency and medication usage for approximately 50% of patients at a 4-week follow up session. Additionally, a recent meta-analysis of

pharmacological and behavioral treatments for migraine headaches had a similarly positive conclusion. Stewart (2004) reviewed 82 studies comparing various migraine treatments, including several different medications, thermal biofeedback, and relaxation, as well as combined treatments. The results showed that all of these treatments have very similar effect sizes (d = .60 to d = .75). These studies suggest that behavioral treatments are effective for both migraine and tension-type headache, and are comparable in effectiveness to medication-based treatments.

Although these behavioral treatments can be very useful, they are aimed primarily at relieving anxiety and arousal in the patient. However, as discussed above, this is only one of many factors that have been implicated in the experience of chronic headache. Reduced abilities to identify and express emotions (e.g., alexithymia and low assertiveness) have also been found to be important factors, and there is reason to believe that treatments focused on these factors might be quite effective. Teaching the sufferers of chronic headaches how to recognize and label their own emotions, as well as expressing them in an appropriate manner, might relieve some of their pain.

Interventions Based in Emotional Expression

Therapies based in emotional expression have not often been used to treat physical problems such as chronic pain, but they have been quite popular in other areas of clinical practice. For example, therapies used to treat anxiety disorders such as PTSD or panic disorder are based in the idea that the patient must be exposed to the feared stimulus and experience the fear in the session,

and only then will he or she be able to process this fear and resolve or overcome it. Foa and Kozak (1986) proposed that the activation of fear in exposure therapy lets the patient modify the memory of the feared event (as in the case of PTSD) with new cognitive and affective information. This is similar to the concept of the "corrective emotional experience" proposed by Alexander and French (1946). Reviews have found that exposure-based techniques are the most effective way to treat anxiety disorders (e.g., Barlow & Lehman, 1996).

Psychologists have also proposed that emotional processing must take place before not only anxiety, but many problems rooted in emotional avoidance can be ameliorated. For example, Rachman (1980) defined emotional processing as the method of working through disturbing experiences and evoking the original emotional response in order to be able to let go of this original disturbing emotion. Greenberg and Bolger (2001) suggested that patients must access their primary emotions in order to resolve their emotional pain. These authors suggest that patients often subconsciously cover up their primary emotions with other emotional responses (e.g., becoming angry when feelings of sadness are overwhelming) and that it is vital to understand and access the primary emotion in order to resolve the pain associated with it. Although therapy clients often find it difficult to re-live painful emotions, Greenberg and Safran (1989) found that high levels of client "experiencing" during therapy sessions leads to better outcomes. These authors also promote the idea that emotions are biologically adaptive responses that promote survival-oriented action. Examples of this kind adaptive action include running when feeling afraid, seeking comfort when feeling

sad, and defending or asserting when violated or wronged. In this perspective, ignoring one's primary emotions is maladaptive, and learning how to recognize and express these emotions productively can be quite useful and can lead to a healthy restructuring of the emotional response system (Greenberg & Safran, 1989).

One intervention that utilizes some of these constructs has been used extensively with health populations. This is the technique of expressive writing, or written emotional disclosure. Introduced by Pennebaker and Beall (1986), this technique asks the participants to write (or in some cases, talk) about an unresolved stressful event in their lives. Usually, participants write for three or four, 20-minute sessions, although both more extensive and briefer interventions have also been tested.

Within healthy populations, disclosure participants have been found to have improved mood, reduced health center visits, and improved college grade points (Lumley & Provenzano, 2003; Pennebaker & Francis, 1996; Sloan & Marx, 2004). Disclosure has even been found to be effective after only a single session. Greenberg, Wortman, and Stone (1996) found that female college students who were given 30 minutes to write an essay about a previously experienced traumatic event reported significantly fewer physician visits at one-month follow-up, compared to the control group, which wrote about the physical appearance of the college campus. Another study examined depressive symptoms of students prior to taking a graduate entrance exam (i.e., MCAT, GRE, etc). Participants who were given 25 minutes to write an essay about their deepest thoughts and

feelings about the exam reported significantly lower levels of depression three days prior to the exam versus control participants who had written about their activities over the past day (Lepore, 1997).

When tested in various clinical populations, written emotional disclosure has also been found to have some positive results. It significantly decreased symptoms in patients with asthma or rheumatoid arthritis (Smyth, Stone, Hurewitz, & Kaell, 1999), and improved sleep quality and duration in terminally ill patients with cancer (de Moor et al., 2002). It has also been tested with patients with fibromyalgia, in whom it has been reported to significantly reduce pain and fatigue (Broderick, Junghaenel, & Schwartz, 2005), and improve sleep and decrease health care utilization (Gillis, Lumley, Mosley-Williams, Leisen, & Roehrs, 2006).

Despite these initial positive findings, the overall effectiveness of written emotional disclosure has been questioned. A recent meta-analysis that included 147 studies, including unpublished works, found a small effect size for the technique (Cohen's d = .15; Frattaroli, 2006). Thus, although written emotional disclosure does have some benefits, it appears that overall it is not a very effective technique. This might be because it is a very basic task with little instruction or guidance given to the participants on how to utilize the time or cope with the emotions stimulated by the task. A study investigating the impact of emotional styles on the efficacy of relaxation training and emotional disclosure for individuals with migraine headaches found that participants who self-reported greater use of emotional approach coping benefited more from written emotional

disclosure rather than relaxation training (Kraft, Lumley, D'Souza, & Dooley, 2008). This suggests that for those individuals who do not utilize emotion-based coping, written emotional disclosure is not very effective; however, for those with the skills to utilize it, it may be an effective method of reducing symptoms. Individuals with low emotional skills might find the task overwhelming or they may be unable to utilize the task for the maximum benefit. As discussed above, individuals with chronic headaches (as well as other chronic pain conditions) are more likely to have low emotional skills, express their emotions less, and tend to suffer more often from conditions such as depression and anxiety. All of these factors may make it more difficult to benefit from an intervention such as written emotional disclosure. Individuals with such characteristics may benefit more from an experiential approach that is more guided.

In order to address some of these factors, Lumley et al. (2008) developed an intervention focused on resolving emotional trauma in chronic pain populations. In this model, the therapist works on detecting unresolved emotions and utilizing exposure techniques to process these emotions, while building a strong alliance with the patient and helping him or her cope in a supportive environment. The authors tested this novel treatment in a 10-session pilot study of ten women with fibromyalgia syndrome and unresolved emotional trauma. They found that at 3-month follow-up the participants showed moderate to large effects on stress symptoms, fibromyalgia impact, and emotional distress. Also, they found small to moderate improvements on pain and disability (Lumley et al., 2008). This study suggests than an intervention that helps clients discover their

unresolved emotions and helps them process these through exposure techniques, could be quite helpful for participants with a chronic pain condition.

Although this intervention has potential benefits, it is quite time consuming, in that it requires at least ten one-on-one sessions. Additionally, most headache sufferers likely have lower levels of psychological/interpersonal pathology than fibromyalgia patients selected for this particular study. Considering the great number of individuals with chronic headache, and that many of them may not be interested in or able to afford intensive psychotherapy, it is also important to think about how this type of intervention could be applied differently. For example, many behavioral interventions are provided in a group setting, which is more cost effective. In fact, a recent review found that CBT-based group interventions are as effective as individual interventions for chronic pain (Thorn & Kuhajda, 2006).

Goals of This Study

This study sought to test a new brief psychological treatment for individuals suffering from chronic headaches. This treatment focused on helping individuals develop emotional awareness, express their emotions assertively, and process the effects of expressing one's emotions. To accomplish these goals, the techniques commonly used in assertiveness training were utilized, with the addition of components focused on emotional awareness and emotional processing, particularly of the emotion, anger. The intervention was provided in a small group setting, and took place over three 60-minute sessions occurring one week apart. There was a no-treatment control group, as well as a third

group who received relaxation training in order to compare the effectiveness of this novel intervention against a well-tested and commonly used treatment.

This study recruited college students with chronic headaches, who were randomly assigned to three 60-minute sessions of either relaxation or emotional processing training, or to the no-treatment condition. Before beginning the study, participants reported their current level of headache symptoms and psychological distress, and they returned for a six-week follow-up to report their level of post-intervention symptoms. The three groups were compared to each other.

Hypotheses

It was hypothesized that both of the intervention groups (relaxation training and anger awareness and expression training) would show more improvement in their functioning at the 6-week follow-up than the no-treatment control group. Additionally, the differences in outcome between the two active control groups were explored. Because the emotional/anger processing training is a novel and untested intervention, it was not possible to hypothesize which of the active treatments would be more effective at reducing headaches and distress.

CHAPTER 3

METHODS

Participants

The participants were 130 Wayne State University students who endorsed experiencing moderate to severe headaches at least several times per month. Additionally, students were screened to verify that they were motivated to engage in a stress management treatment for chronic headaches (see Appendix D for the specific screening questions). Participants were 86.9% female and 13.1% male, and the mean age of the participants was 21.6 (*SD* = 5.6). Three of the participants did not provide data on their race/ethnicity, but of the other 127 participants, 38.5% identified themselves as White/Caucasian, 23.8% as Black/African-American, 13.1% as Arab/Middle-Eastern, 11.5% as Asian/Southeast Asian/Indian, 2.3% Hispanic, 0.8% Native American, 3.8% Multiple Races/Mixed and 3.8% Other.

Procedures

The study was approved by the Human Investigation Committee of Wayne State University, and it was registered with Clinicaltrials.gov (NCT00956969) prior to recruitment. Undergraduate students were recruited based upon their responses to the Psychology Department mass screening survey, which is completed at the beginning of each semester by all students enrolled in psychology classes at the university. Students screened through the mass screening survey were contacted through email and invited to participate in the study. Interested students meeting study criteria (see Appendix D) were directed

to the department's Research Participation website, where they were able to schedule their initial visit. The initial visit was scheduled in group format; students signed up for time slots, with up to six students able to sign up for a single, common time slot. During the initial visit, the study was described in full to the group of students, and participants provided written informed consent to the protocol. Students then completed several questionnaires assessing their baseline level of headaches, as well as personality and coping styles. Data was collected using the Remark Web Survey software.

Next, the group of up to six students was randomly assigned to one of the three experimental conditions (anger awareness and expression training, relaxation training, or no-treatment control). Students assigned to either of the active interventions had their first session conducted immediately, whereas students assigned to the no-treatment control condition were scheduled to come back after six weeks for the follow-up visit. After the first session of the intervention, participants in the two active conditions were scheduled to come back in one week for the second session. Participants also returned a week after the second visit for the third session. After the third session, participants were asked to return in four weeks for the follow-up visit, which was at the same time-point from baseline (6 weeks) as for the control group.

Each intervention session was 60 minutes in length. The sessions were conducted in group format, with each group consisting of up to 6 students. The group leaders were graduate students in the clinical psychology program. The sessions consisted of didactic presentation of information and practice of

presented skills, as well as group discussion of the skills. If a participant missed a session of their assigned intervention, they were given the option of "making up" the session by listening to the recording of their group session privately in the laboratory. After each of the sessions, students were given homework assignments to practice their assigned intervention. A more detailed discussion of each intervention follows (for the full detailed intervention protocol, see Appendix A).

Relaxation Training

Session One

Participants were welcomed to the group and the rationale for the treatment was presented. Participants were taught about the relationship between stress and pain, and how learning techniques to reduce arousal and calm the body and mind might also help the participants manage their headaches. Participants were guided in a discussion of these ideas, and then began a relaxation exercise. In this session, the group leader demonstrated and the participants practiced progressive muscle relaxation (PMR). After the 20-minute exercise, participants discussed their reactions and were given their homework assignment. Participants were asked to practice PMR at least once per day. An audio recording of PMR was provided to the participants to aid in the home practice.

Session Two

At the beginning of this session, participants were asked about their home practice and barriers to practice were discussed. A portion of the session was

set aside to discuss how participants could integrate relaxation exercises into their daily life. Mini-practice of relaxation was introduced in this session in order to help participants find the time for relaxation practice during daily activities (30- to 60-second relaxed breathing exercise). Following this discussion, participants engaged in another relaxation exercise. In this session, they were guided through a 20-minute relaxed breathing exercise, which was also provided as an audio recording for home practice. After completing the exercise, participants discussed their reactions and were again assigned to practice relaxation daily with either (or both) recording(s).

Session Three

Participants began the final session by discussing their home practice. This portion of the session was conducted in a similar manner to the previous session, with a discussion of integrating relaxation into daily life. Participants were then taught the final 20-minute relaxation exercise, involving imagery. The end of the session was devoted to setting goals, with each participant stating how they hope to use these exercises in the future. The full set of recordings was given to the participants to keep, and the group wrapped up.

Anger Awareness and Expression Training (AAET)

Session One

As in the Relaxation Training group, participants were welcomed to the group and presented with a rationale for the treatment. Participants were taught that inhibiting feelings can be stressful for the body and mind, and may lead to more headaches. The emotion of anger was introduced as the focus of

treatment. Different facets of anger were discussed, such as why we experience it, its adaptive function, and why we might be reluctant to express it. Participants were guided through an exercise in labeling and expressing anger, and discussed their reactions to the exercise. The group was informed that in the next sessions they would learn how to express anger productively. Participants were assigned the homework of daily monitoring of their anger, using a worksheet (see Appendix B).

Session Two

Participants began the second session by discussing their homework. Participants discussed their experience of monitoring their own anger, and shared what they noted about it. Assertive communication as a way to communicate that anger effectively was then introduced. Assertiveness and three common assertiveness problems (expressing feelings/disagreeing, asking for what you want, saying no) were introduced. Participants were guided in a discussion of these difficulties in effective assertive communication and how these apply in their personal contexts. Participants were then asked to picture a situation from their life where they may have wanted to express their thoughts or feelings or to disagree with someone. These situations may be ones in which participants noted anger during past week's homework exercise. A discussion followed of how this situation made individual group members feel. The group leader helped each individual identify emotions and the physical symptoms associated with these emotions (e.g., muscle tension). The group leader helped the group to identify strategies to address the situation and communicate

effectively. Participant reactions to this exercise were discussed, and participants were asked to plan and carry out several “minor” assertive communications during the week, such as speaking up in class or asking for help at a store. Participants were given a worksheet that provided some guidance and space to record assertive communication experiences (see Appendix B).

Session Three

The final session began by discussing participants’ experiences with the assertiveness exercises during the previous week. For members who were not able to carry out the exercise, barriers to practice were discussed. The group leader then reviewed the basics of assertive communication that were previously introduced, and the group practiced together once more. Participants were provided with a worksheet detailing an outline of how to communicate assertively in an interpersonal situation. Participants were asked to think of a situation in which they wanted to be able to communicate assertively. The group leader helped participants identify feelings in the sample situations, and asked group members to role-play some of the situations. The group discussed the feelings evoked while doing or watching the role-play, and their reactions to the exercise. At the end of the session, the group focused on a discussion of the intervention. Participants were asked whether they think assertive communication would benefit them, how it might affect their relationships with others, and how they might be able to use it in their lives. Participants were asked to generate goals for the future, using assertive communication skills to decrease stress in relationships.

Measures

Process Variables: Mood and Pain. Participants were asked to rate their mood valence, arousal, sense of control, and current headache pain both prior to and immediately following each session. The first three variables were rated on a scale of 1 to 9 using the Self-Assessment Mannequin (SAM), a stylized figure representing the various mood/arousal/control states, with the rating of 5 indicating a neutral state. Mood was rated on a continuum of pleasant (1) vs. unpleasant (9), arousal was rated on a continuum of excited (1) vs. calm (9), and sense of control was rated on a continuum of controlled (1) vs. in control (9). Headache pain was rated on a 0 (no pain) to 10 (worst pain) scale.

Headache Frequency and Severity. Participants were asked to report the number of days, in the last month and the last week, they experienced a headache and how many hours their headaches lasted, on average. They rated how painful their headaches were during the last month and week, on average, on a 0 (no pain at all) to 10 (pain as bad as it can be) scale. (In addition, participants provided information on several additional variables not analyzed in this study: the number of days during the past week and the past month that they took medication for their headaches, as well as whether they had a headache in the past 24 hours and its severity.)

Headache Disability. The Migraine Disability Assessment Scale (MIDAS; Stewart et al., 2001) is a five-question scale that asks participants to report the number of days in the preceding month that headaches affected social, occupational, and daily functioning. The MIDAS overall headache disability score

is derived by adding up the number of days impaired by headaches across the five questions. The MIDAS measure has demonstrated good reliability, validity, and internal consistencies in the measurement of migraine frequency, severity, and disability. In a community sample of migraine headache sufferers, internal consistency was established at .8, and test-retest reliability was established at .8. The measure has also demonstrated high correlations with other measures of headache disability (r = .63), diary ratings of disability, and (r = .69) physician ratings of disability (Stewart, Lipton, Dowson, & Sawyer, 2001). In this study, the scale had good reliability at baseline (Cronbach's alpha = 0.72) and follow-up (Cronbach's alpha = 0.75).

Headache Self-Efficacy. The Headache Self-Efficacy Scale (HSES; Martin, Holyroyd, & Rockiki, 1993) is a 25-item scale that assesses how much control participants feel that they have over their headaches (e.g., "Nothing I do will keep a bad headache from disrupting my day." or "I can do things to cope with my headaches."). Participants are asked to rate how much they agree or disagree with each item on a 7-point scale (1 = strongly disagree, 7 = strongly agree). The scale was constructed and tested on populations of recurrent headache sufferers. The measure has demonstrated good discriminant and criterion validity as well as incremental utility over and above overall levels of general self-efficacy (Martin, Holroyd, & Rokicki, 1993). This scale demonstrated good reliability at baseline (Cronbach's alpha = 0.71) and follow-up (Cronbach's alpha = 0.77) of this study.

Psychological Symptoms. The 53-item Brief Symptom Inventory (BSI; Derogatis & Melisaratos, 1983) assesses a range of psychological symptom domains (e.g., anxiety, depression, interpersonal sensitivity, hostility, etc.) Participants rated each item for how much discomfort they have experienced over the past week on a 5-point scale (0 = not at all and 4 = extremely). This measure or its parent measure, the Symptom Checklist-90-Revised (Derogatis, 1977), has been widely used and validated. In this study, we analyzed the Global Severity Index (mean value of all items). The scale had excellent reliability at both baseline and follow-up (Cronbach's alpha = 0.97 at both time points).

PTSD Symptoms. The Impact of Events Scale-Revised (Weiss & Marmar, 1997) is a 22-item scale that assesses symptoms of cognitive intrusions, cognitive avoidance, and hyperarousal with respect to a specific stressful event. Participants were instructed to identify the single most stressful event or experience that they have had and that continues to bother them, and to answer questions with respect to that event. The items are rated on a 5-point scale (0 = not at all and 4 = extremely). The scale has excellent internal consistency reliability (alpha = .96) and was found to correlate highly (r = .84) with the PTSD Checklist, a measure designed to assess DSM-IV symptoms of PTSD (Creamer, Bell, & Failla, 2003). In this study, the scale demonstrated excellent reliability, both at baseline and follow-up (Cronbach's alpha = 0.95 at both time points).

CHAPTER 4

RESULTS

Preliminary Analyses

130 participants were enrolled into the study, with 43 randomized to Anger Awareness and Expression Training (AAET), 46 randomized to the Relaxation Training (RT), and 41 to the control group. Out of the 130 participants, 18 did not complete the follow up questionnaires (13.8%). Of these, 9 participants were from the AAET group, 5 were from the RT group, and 4 were control condition participants (See Figure 1). The chi-square significance test comparing conditions on attrition rate was not significant (p = .26).

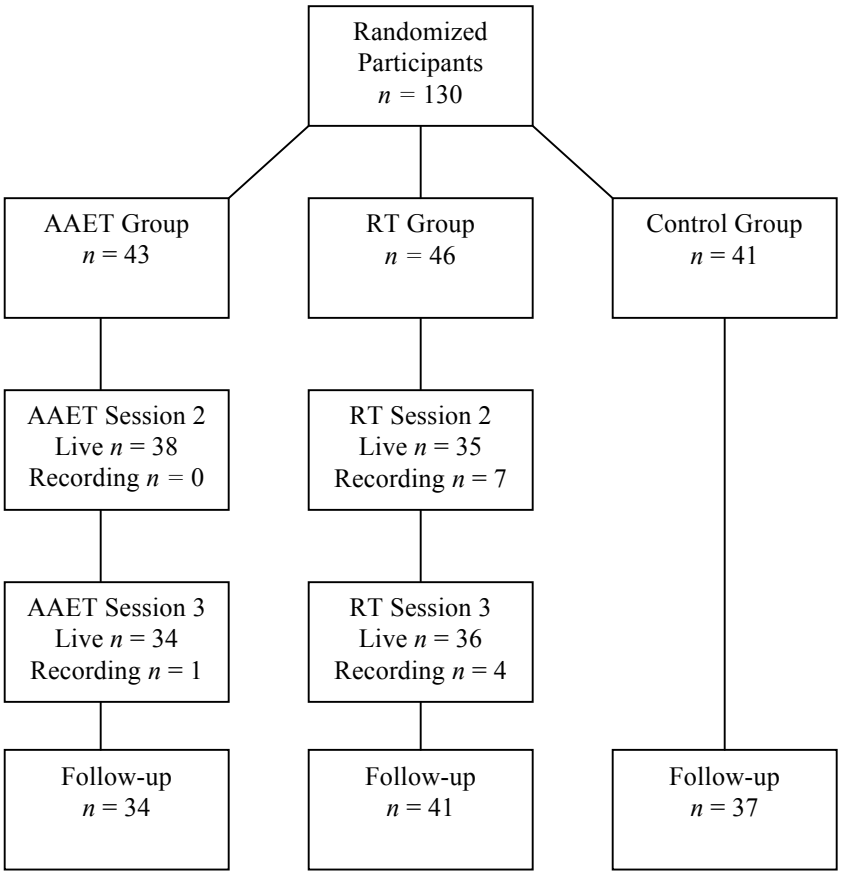
The baseline scores on outcome measures of the three conditions were compared to each other to determine the success of randomization. The three groups did not have significantly different scores on the majority of the measures at baseline. However, a significant difference in MIDAS scores at baseline was found, (F(2, 127) = 3.2, p = .044). Post-hoc Fisher's LSD tests revealed that both of the experimental groups reported lower headache disability scores at baseline than the control group (both p < .05; see Table 2 for group means at baseline).

Of the 130 total participants, 89 were active group participants (assigned to either AAET or RT; see Figure 1). Of these 89 participants, 73 (82%) completed session 2 as scheduled, 7 (8%) completed session 2 privately (listening to a recording of the session), and 9 (10%) did not complete session 2 at all. For session 3, 70 (79%) of the participants completed it as scheduled, 5 (6%) completed it by listening to a recording, and 14 (16%) did not complete this

session. Of those participants who missed the second or third treatment session, only three participants then returned for follow-up.

Figure 1

Flow of participants through the study



Additionally, the participants who completed the follow-up (*n* = 112) were compared to those who were lost to follow up (*n* = 18). These two groups were not significantly different in age (*p* = .45), gender *(p* = .63), or ethnicity (*p* = .20). For ethnicity, the comparison included only White/Caucasian and Black/African-American participants (*n* = 81) as the other groups had too few members to be included. Furthermore, none of the outcome measure scores at baseline differed significantly between those who provided follow-up data and those who dropped (all *p* > .05). However, completers reported marginally (p < .10) lower headache frequency over the past week and the past month, but greater headache severity over the past month, compared to those lost to follow-up. It is unclear whether this represents a meaningful difference between the two groups of participants.

Table 1

Participants Who Completed the Follow-up Session Compared to Participants Who Were Lost to Follow-up on Demographic Variables and Baseline Levels of Outcome Measures

		Completers (*n* = 112)	Non-Completers (*n* = 18)	*t/F/χ²* Value	*p* - value
Demographic Variables					
Age (years)	*M (SD)*	21.47 (5.48)	22.56 (6.06)	0.77	.45
Gender				0.24	.63
Male	*n* (%)	14 (12.50)	3 (16.67)		
Female	*n* (%)	98 (87.50)	15 (83.33)		
Ethnicity[a]				1.61	.20
Caucasian	*n* (%)	42 (38.18)	8 (47.06)		
African-American	*n* (%)	29 (26.36)	2 (11.76)		
Middle-Eastern	*n* (%)	14 (12.73)	3 (17.65)		
Asian	*n* (%)	14 (12.73)	1 (5.88)		
Hispanic	*n* (%)	3 (2.73)	0 (0)		
Other	*n* (%)	8 (7.27)	3 (17.65)		
Baseline Levels of Outcome Variables					
Headache Frequency (past week)	*M (SD)*	2.69 (1.64)	3.44 (2.28)	1.71	.09
Headache Severity (past week)	*M (SD)*	5.73 (2.29)	5.89 (1.88)	0.28	.78
Headache Duration (past week)	*M (SD)*	6.25 (9.08)[b]	5.69 (7.01)	-0.25	.81
Headache Frequency (past month)	*M (SD)*	9.89 (6.96)[c]	13.17 (9.45)	1.76	.08
Headache Severity (past month)	*M (SD)*	6.34 (1.56)	5.61 (1.61)	-1.83	.07
Headache Duration (past month)	*M (SD)*	7.14 (10.49)	6.36 (7.27)	-0.30	.76
Headache Disability	*M (SD)*	2.57 (2.49)	2.30 (1.95)	-0.44	.66
Headache Self-Efficacy	*M (SD)*	4.04 (1.00)	4.14 (0.89)	0.42	.67
Psychological Symptoms	*M (SD)*	1.06 (0.72)	0.93 (0.69)	-0.70	.48
PTSD Symptoms	*M (SD)*	4.91 (2.92)	4.50 (2.84)	-0.55	.58

Note. All tests were 2-tailed. M = mean; SD = standard deviation; n = number of participants positive on variable in question; % = percent of participants positive on variable in question.

[a]Chi-square analysis for ethnicity was analyzed comparing only Caucasian to African-American, due to the small numbers in the other cells. Three participants did not provide data regarding their ethnicity; percentages are based on 127 total participants.

[b] Data missing for two participants

[c]Data missing for one participant

[d] Data missing for six participants

Analyses of In-session (Process) Variables

To examine the processes underlying the two different active treatments, analyses compared changes from pre- to post-session in mood, arousal, sense of control, and headache pain between the two active groups. Change scores (post – pre) were calculated for each variable for each session, and t-tests compared change scores for differences between RT and AAET groups. Paired sample t-tests were also utilized to test whether significant change occurred pre- to post-session for each variable within each group.

In the first session, changes in mood and sense of control were not significantly different between the two treatment conditions (both $p > .05$). However, the AAET participants were significantly more aroused/excited post-session than RT participants ($t(81) = -2.33$, $p < .05$). Both groups experienced a significant reduction in headache pain post-session [AAET ($t(42) = 2.26$, $p < .05$); RT ($t(38) = 3.90$, $p < .001$)] , but RT participants reported significantly more reduction ($t(80) = 2.05$, $p < .05$; see Table 2 for group means). A similar picture emerged in the second session. The changes in mood and sense of control were not significantly different between the two groups (both $p > .05$). The AAET participants were significantly more excited/aroused than RT participants post-session ($t(77) = -5.05$, $p < .01$). The change in headache pain was also significantly different in the two groups ($t(77) = 2.45$, $p < .05$). In this session, however, the AAET participants reported no change in pain pre- to post-session, while the RT participants reported a slight, but significant, reduction ($t(41) = 4.42$, $p < .001$). In the third session, again the differences in sense of control were not

significantly different between the two groups (p > .05). Both groups reported more pleasant mood post-session, but the difference was only significant in the RT group (t(39) = 5.48, p < .001). The RT had a significantly greater mood improvement than did the AAET group, (t(72) = 2.83), p < .01). The AAET group again reported feeling more excitement/arousal post-session, although this was a non-significant change (t(33) = 1.88, p = .07) while the RT group reported feeling significantly more calm (t(39) = -2.73, p < .01), and the difference between the two groups was significant, (t(72) = -3.24, p < .01). The RT participants reported significant reduction in pain (t (39) = 4.94, p < .001), while the reduction in pain was not significant within the AAET group (t (33) = 0.56, p = .58). The difference between the two groups was significant, (t(72) = 2.60, p < .05).

Table 2

Comparison of in-session variable mean change scores in the two active conditions across the three sessions

		AAET	RT	*p*-value
Session 1 AAET *n* = 43 RT *n* = 40	Mood	-0.95 (1.80)	-1.50 (1.72)	.16
	Arousal	-0.93 (2.43)	0.35 (2.57)	.02
	Control	1.14 (1.67)	1.03 (1.90)	.77
	Pain	-0.49 (1.42)	-1.28 (2.05)	.04
Session 2 AAET *n* = 37 RT *n* = 42	Mood	-0.32 (2.19)	-0.95 (1.67)	.15
	Arousal	-0.19 (1.94)	2.02 (1.94)	.00
	Control	0.11 (1.78)	0.79 (2.01)	.12
	Pain	0.00 (1.89)	-0.88 (1.29)	.02
Session 3 AAET *n* = 34 RT *n* = 40	Mood	-0.24 (2.35)	-1.6 (1.88)	.01
	Arousal	-0.68 (2.10)	0.93 (2.14)	.00
	Control	0.76 (2.03)	0.70 (1.65)	.88
	Pain	-0.15 (1.54)	-1.00 (1.28)	.01

Primary Analyses

Analyses of covariance were conducted to compare all three conditions on outcome measures. Covariance analyses were conducted on each of the outcome measures, controlling for the baseline levels. There were several significant differences among the conditions. On headache frequency during the past week, the three conditions were significantly different at follow-up ($F(2, 108) = 4.35$, $p = .02$, partial $\eta^2 = .075$). Post-hoc tests (LSD tests were used throughout) revealed that both of the experimental groups had significantly lower frequency of headaches at follow-up than the control group (AAET vs Control $p < .05$; RT vs Control $p < .01$; see Table 2 for mean scores in each group). However, pain severity in the past week was not significantly different among the three groups at follow-up ($F(2, 108) = 2.09$, $p = .13$, partial $\eta^2 = .037$), and neither was pain duration in the past week ($F(2, 102) = 2.39$, $p = .097$, partial $\eta^2 = .045$).

A review of headache frequency, severity, and duration over the past month revealed a slightly different pattern. Headache frequency over the past month was significantly different at follow-up among the three groups; ($F(2, 106) = 6.18$, $p < .01$, partial $\eta^2 = .104$). Post-hoc tests showed that both of the active treatment groups had significantly fewer headaches at follow-up than the control group (both $p < .01$). There was no significant difference between the two active groups. The differences among the three conditions in headache severity over the past month was marginally significant ($F(2, 108) = 2.91$, $p = .059$, partial $\eta^2 = .051$); post-hoc tests showed that the RT condition participants rated their headaches as significantly less severe than the control condition participants ($p =$

.02), but the difference between the AAET group and the control group was not significant and neither was the difference between the two active groups. The difference among the three conditions in pain duration was significant ($F(2, 107) = 6.17$, $p = .003$, partial $\eta^2 = .103$). Post-hoc tests showed that, again, the two active groups had significantly shorter headaches at follow-up than the control group (both $p < .05$), but the two intervention groups did not differ between themselves.

Headache Disability (MIDAS) scores were significantly different among the three conditions at follow-up (F (2, 108) = 3.41, $p < .05$, partial $\eta^2 = .059$). Post-hoc tests showed that both of the experimental groups reported significantly less headache disability (both $p < .05$) than the control group. Headache Self-Efficacy scores at follow-up were also significantly different among the three groups ($F(2, 108) = 31.79$, $p < .001$, partial $\eta^2 = .371$). Post-hoc tests revealed that both of the active groups felt significantly more efficacious about their headache management than the control group (both $p < .001$), but the active groups did not differ from each other. The difference in overall psychological symptoms (Brief Symptom Inventory – Global Severity Index) at follow-up approached significance ($F(2, 108) = 2.68$, $p = .07$, partial $\eta^2 = .047$). Post-hoc tests revealed that the RT condition participants reported lower levels of psychological symptoms than the control condition participants ($p < .05$), but there were no significant differences between the AAET group and control, or between the two active groups. PTSD symptoms (Impact of Event Scale) were not significantly

different between the three conditions at follow-up ($F(2, 108) = 2.19$, $p = .12$, partial $\eta^2 = .039$).

Table 3

Comparison of Group Means and Adjusted Means on Outcome Measures at Follow-up

Outcome Measure		Anger Awareness and Expression Training (n = 34)	Relaxation Training (n = 41)	Control Group (n = 37)	F-value	p-value
Headache Frequency (past week)	Baseline M (SD) Follow-up M (SD) Adj. M (SE)	2.59 (1.56) 1.91 (1.75) 1.96 (0.26)[a]	2.56 (1.50) 1.66 (1.39) 1.71 (0.24)[a]	2.92 (1.88) 2.81 (1.91) 2.71 (0.25)[b]	4.35	.02
Headache Severity (past week)	Baseline M (SD) Follow-up M (SD) Adj. M (SE)	5.68 (2.51) 3.79 (2.19) 3.80 (0.41)	5.95 (2.24) 4.05 (2.73) 4.01 (0.37)	5.54 (2.19) 4.84 (2.18) 4.87 (0.39)	2.09	.13
Headache Duration (past week)	Baseline M (SD) Follow-up M (SD) Adj. M (SE)	5.23 (8.83) 5.13 (10.19) 5.50 (1.25)	5.14 (6.46) 2.21 (2.08) 2.61 (1.17)	8.44 (11.37) 6.81 (9.75) 6.04 (1.22)	2.39	.10
Headache Frequency (past month)	Baseline M (SD) Follow-up M (SD) Adj. M (SE)	9.76 (7.54) 5.38 (4.94) 5.44 (0.82)[a]	8.35 (5.18) 5.53 (5.34) 6.24 (0.77)[a]	11.68 (7.81) 10.12 (6.81) 9.28 (0.81)[b]	6.18	.00
Headache Severity (past month)	Baseline M (SD) Follow-up M (SD) Adj. M (SE)	6.12 (1.51) 4.68 (2.04) 4.76 (0.34)[a,b]	6.54 (1.63) 4.44 (1.91) 4.37 (0.31)[a]	6.32 (1.53) 5.43 (2.17) 5.44 (0.32)[b]	2.91	.06
Headache Duration (past month)	Baseline M (SD) Follow-up M (SD) Adj. M (SE)	5.67 (8.91) 4.41 (8.85) 4.46 (2.06)[a]	5.77 (8.74) 2.54 (3.36) 2.58 (1.88)[a]	10.01 (13.00) 12.01 (18.79) 11.91 (2.01)[b]	6.17	.00
Headache Disability	Baseline M (SD) Follow-up M (SD) Adj. M (SE)	2.26 (1.76) 1.11 (2.08) 1.24 (0.39)[a]	2.12 (1.93) 1.20 (2.61) 1.38 (0.36)[a]	3.35 (3.35) 2.86 (2.67) 2.53 (0.38)[b]	3.41	.04
Headache Self-Efficacy	Baseline M (SD) Follow-up M (SD) Adj. M (SE)	4.18 (0.95) 5.18 (1.00) 5.10 (0.14)[a]	3.93 (1.01) 5.23 (0.81) 5.28 (0.13)[a]	5.16 (3.07) 3.91 (1.10) 3.92 (0.13)[b]	31.79	.00
Psychological Symptoms	Baseline M (SD) Follow-up M (SD) Adj. M (SE)	0.97 (0.71) 0.63 (0.50) 0.68 (0.09)[a,b]	1.13 (0.68) 0.65 (0.63) 0.61 (0.08)[a]	1.06 (0.79) 0.87 (0.71) 0.87 (0.08)[b]	2.68	.07
PTSD Symptoms	Baseline M (SD) Follow-up M (SD) Adj. M (SE)	4.45 (2.96) 3.50 (2.60) 3.72 (0.42)	5.06 (2.79) 3.93 (3.10) 3.85 (0.38)	5.16 (3.07) 4.94 (2.71) 4.82 (0.40)	2.19	.12

Note: Some data was missing for several of the participants on the Headache Frequency/Severity/Duration questions; no more than three participants from any group at a time.
[a, b]: Adjusted means with different superscripts differ significantly according to Fisher's LSD post-hoc test.

Intent-to-Treat Analyses

In order to determine treatment effects on the entire randomized sample, instead of only those who completed the treatment, intent-treat-analyses were carried out. For each of the 18 participants who were lost to follow-up, missing follow-up values were replaced with that participant's baseline value. The primary analyses were repeated with these new variables. These analyses revealed a largely similar pattern of results to that found with the original follow-up variables, with two exceptions. The first difference was that headache frequency over the past month, which was significantly lower in active condition participants than control participants at follow-up among completers ($p < .01$), became only marginally significant when using the intent-to-treat data ($F(2, 125) = 2.99$, $p = .054$, partial $\eta^2 = .046$). The second difference that headache severity over the past month, which was not significantly different among the three groups at follow-up among completers ($p = .059$) actually became a significant difference when analyzed using the intent-to-treat data ($F(2, 126) = 3.68$, $p = .028$, partial $\eta^2 = .055$). Post-hoc tests revealed the RT group reported significantly lower headache severity than the control group ($p < .01$), but all other differences among the groups were non-significant.

Analyses of Fully Adherent Sample

Additionally, the primary analyses were repeated with only the participants who completed all three of the sessions as originally planned (not through a recording) and follow-up, as well as all those in the control group who completed

follow-up (n = 99). Thus, this was a sample who received the planned, full “dose” of the treatment. In this sample, the pattern of the results overall was, again, largely the same as in the larger samples (completer and intent-to-treat), although the effects were somewhat stronger. In one case, psychological symptoms, which had not been significantly different between the groups at follow-up in the completer sample (p = .073), were significantly different in the fully adherent sample ($F(2, 95) = 3.94$, $p < .05$, partial $\eta^2 = .077$). Post-hoc tests show that RT condition participants reported significantly less symptoms than the control condition participants ($p < .01$).

CHAPTER 5

DISCUSSION

This study sought to examine the effects of a novel, brief psychological treatment for chronic headaches and compare it to a well-established psychological treatment and no treatment. The novel treatment focused on helping individuals develop awareness of their anger and express their emotions assertively, and it was compared to relaxation training as well as an assessment-only control condition. Both interventions were provided in a small group setting over three, weekly, 60-minute sessions. Undergraduate students with chronic headaches were randomized into one of the three conditions, and completed follow-up six weeks after the baseline assessment and first session of the intervention. Physical and psychological functioning were assessed with self-report measures at baseline and follow-up, and participants in the active treatment conditions also reported affective reactions and head pain before and after each of the sessions.

Immediate Reactions to Interventions

Analyses of the in-session variables showed that the two treatments had different immediate effects on participants during the sessions. Participants in the relaxation training condition reported feeling more calm and pleasant immediately after the sessions, and reported significant decreases in pain post-session. In the anger awareness and expression condition, on the other hand, participants reported feeling more aroused and excited post-session, and reported little or no reduction in pain and no significant changes in mood. The RT

and AAET conditions differed significantly from each other in every session in arousal; the RT participants always felt calmer after the sessions whereas the AAET participants always reported feeling more aroused/excited. The differences in pain ratings between the two conditions were also significantly different at every session, with RT participants reporting reductions in pain while AAET participants reported little or no reduction in pain. The difference in mood ratings was different between the two conditions only in the third session, when RT participants reported significantly greater improvements in mood.

These findings indicate that the two interventions worked in very different ways, affecting different underlying processes in the participants as expected by the type of intervention. The relaxation training reduced immediate arousal and pain, whereas AAET increased arousal and did not change pain during the sessions. This demonstrates that two different, distinguishable interventions were conducted.

Effects of Conditions on Outcomes

Our primary hypothesis, that the two active groups would report more improvement in functioning at follow-up than the control group, was generally supported. For most outcomes, the participants in the two treatment groups reported better outcomes at follow-up than the control group. Participants in both active treatment groups reported having fewer headaches over the past week and the past month than the control group, reported that their headaches over the past month were of a shorter duration, and that their headaches caused less disability. Participants in both active groups also reported an increase in self-

efficacy in dealing with their headaches. These findings indicate that either brief relaxation training or anger awareness and expression training are effective in decreasing headache frequency and possibly headache duration, decreasing headache disability, and increasing self-efficacy in coping with headaches. However, no significant differences among the three groups were found for some outcome measures. No differences among the three groups were found for headache severity or duration over the past week, or in overall PTSD symptoms. Neither of the interventions utilized in this study addressed PTSD symptomatology directly, so it is not surprising that no changes were seen in this measure at follow-up.

The two active conditions did not differ from each other on most outcomes, but there were also some small but significant differences in some outcomes between the relaxation training condition and the control condition. At follow-up, the relaxation group participants reported lower severity in headaches over the past month and lower psychological symptoms. The two active conditions did not differ from each other on these outcomes, and the Anger Awareness and Expression condition did not differ from the control condition. This may suggest that relaxation training is somewhat more effective than anger awareness and expression training in decreasing psychological symptoms and headache severity; this is unclear, however, because the difference between the two groups was not statistically significant despite the difference between the relaxation training and control groups being significant. This may represent

marginally better effects of relaxation training, or, it could be a spurious effect particular to this sample.

Some differences were seen between headache outcomes over the past week versus the past month, with better outcomes reported by participants when asked about functioning over the past month. This was true for headache severity and headache duration, although not headache frequency. Headache frequency was reported to be lower by both groups for both the past month and past week at follow-up. This finding might indicate that the effects of the intervention grew stronger over time. It is also possible that when participants were asked to report on their headaches over the past month, their memory was less accurate than when they were asked to report for headaches over the past week. Nonetheless, participants reported improvement on other measures that asked about functioning over the past month (i.e., headache disability), suggesting that the differences between the month and week data may not reflect true differences in functioning.

Analyses with an intent-to-treat sample revealed a very similar pattern of results to that seen in the “completer” sample, suggesting that the observed effects are relatively robust. There were two differences; headache frequency over the past month was found to be only marginally lower at follow-up for the active groups in the intent-to-treat sample, and headache severity over the past month was actually significantly lower in the active conditions in the intent-to-treat sample. Because these two differences in headache frequency and severity shifted into opposite directions, they are likely not meaningful differences but

instead artifacts of the data. Overall, it is important to note that the analyses were largely the same when repeated with the intent-to-treat sample.

Additionally, analyses were also repeated with a fully-adherent sample; that is, those participants who completed the maximum “dose” of the treatment. The pattern of results was again largely similar to that observed in the “completer” sample, although the effects were somewhat stronger overall. For example, psychological symptoms were significantly lower in the relaxation training condition than in the control condition in the fully-adherent sample, although they were only marginally lower within the full completer sample. This suggests that there may be a dose effect for these treatments, with participants who complete all of the sessions reporting more benefit. It could also be, however, that participants who adhered to the treatment were in some way different from those who did not complete the full treatment, and benefited more from the interventions because of their own intrinsic characteristics.

The Two Treatments: Same or Different?

These findings support previous research showing that relaxation training is an effective treatment for chronic headaches (e.g., Stewart, 2004). This study also suggests that treatments focusing on anger awareness and expression may be equally effective as relaxation training. However, analysis of in-session variables revealed that participants reacted quite differently to the two interventions with respect to arousal, pain, and to some degree, mood. How is it then that the two treatment conditions, with apparently different immediate effects, have largely equivalent benefits at follow-up?

The two conditions may have worked through different methods to achieve the same result. Relaxation training is widely believed to work through reducing anxiety and physiological arousal, leading to a reduction in pain. This method of action was supported by the analyses of in-session variables. The relaxation training participants reported more pleasant and calm mood after the session as well as reductions in pain. This method may work through the reduction of autonomic nervous system arousal and anxiety, which leads to a reduced muscle tension and an immediate feeling of well-being. This may then lead to a decrease in headache frequency and intensity over time as participants learn how to implement the techniques in daily life. Anecdotally, many participants in this condition reported that they enjoyed the relaxation exercises because they allowed them to mentally “take a break” from daily stressors and relax. They reported that the exercises helped them feel less worried about schoolwork and other stressors by allowing them some distance from these worries. This suggests that relaxation training works in the hypothesized manner.

Emotional expression as a method of pain reduction, however, is thought to work quite differently. Research suggests that suppression of emotions negatively impacts the experience of pain. For example, Quartana et al. (2010) found that healthy participants who reported greater suppression of anger also reported greater pain intensity during a cold pressor task, and Nicholson et al. (2003) found that individuals with headaches tend to score higher on measures of “anger-in”; that is, they tend to refrain from expressing their anger. In a study of women with fibromyalgia, researchers found that the lowest levels of pain were

found among those individuals who had high trait anger expression and expressed their anger in appropriate situations (van Middendorp, et al., 2010).

Various lines of research have suggested that suppression of emotions leads to physiological arousal, poorer coping with stressful events, and poorer social relationships (e.g., Gross, 2002). This line of research suggests that suppression of all emotions, and anger in particular, is an effortful process and leads to increases in sympathetic nervous system activation, which, over time, can lead to poorer health and worse pain. Interventions such as written emotional disclosure (Pennebaker & Beall, 1986) are based on the premise that allowing the individual to cease suppressing their emotional experiences by writing about them can lead to improvements in health and functioning. As discussed in the introduction, written emotional disclosure has been found to be of somewhat limited effectiveness (Frattaroli, 2006) overall, but the idea of reversing suppression by expression does have some empirical support.

Burns et al. (2008) suggested that another theory, the ironic process theory of mental control, can also be used to understand the link between anger suppression and pain. This “ironic” theory is based on the finding that attempts to suppress unwanted thoughts have the paradoxical effect of making these thoughts more persistent. They suggest that this involves two processes; the first is an intentional “operating process” that uses distraction to avoid unwanted thoughts, and the second is a less-conscious “monitoring process” that searches for instances of failure to suppress the unwanted thoughts, thus actually making these thoughts more salient. Thus, when people try to suppress anger-related

thoughts, they will also subconsciously be monitoring closely for any instances of angry thoughts, leading to these thoughts paradoxically becoming more intrusive. These researchers suggest that increased accessibility of anger-related thoughts may lead to pain appraisals that are “contaminated” with feelings of frustration and annoyance. The emotional response to pain will thus be stronger and more negative, leading to perception of worse pain and pain-related disability, and possibly exacerbating the pain by increasing arousal and tension.

Thus, teaching individuals to recognize and express their emotions, particularly anger, may work by helping them reduce the effects of this ironic process. If it functions as proposed, this intervention may help participants by allowing them to feel less anger on a regular basis and making anger a less salient emotion, leading to appraisals of their headache pain to be less contaminated by anger, frustration and irritation. Calmer appraisals of their headache pain may lead to a perception of the pain as milder or more manageable.

The anger awareness and expression intervention may also improve individual ability to cope with interpersonal stressors. The ability to express their emotions appropriately and assertively in the days and weeks following the intervention may have allowed them to cope better with various interpersonal stressors. Anecdotally, many participants reported during the last session that they found it empowering to be able to ask for what they needed from significant others in their lives and that this helped them feel less stressed. For example, one participant, who reported an enormous amount of stress related to her job

during the initial session, during the last session reported that she was able to speak to her manager about creating a more manageable and predictable schedule using the skills taught in the group. She described that she used to frequently have crying spells because she felt so overwhelmed by her work and the lack of time for anything else. After talking with him, she found that her manager was very receptive to a new schedule and she no longer felt nearly as stressed or upset. This participant found it very surprising and also very powerful that she was able to negotiate a change in her environment. Her new schedule left her with enough time to complete her homework and enjoy other activities, leading to a large improvement in her quality of life. Her experience reflects the experience of many of the participants who participated in this intervention.

It is important to note that it is common in the therapy literature to find that different treatments lead to similar outcomes. The so-called “dodo-bird” effect, named for the Alice in Wonderland character who famously proclaims that “all have won, and all must have prizes!” has been written about extensively (e.g., Luborsky, Singer, & Luborsky, 1975; Lambert & Ogles, 2004). According to a review by Lambert and Ogles (2004), most meta-analyses of various types of therapeutic approaches do not find an advantage for any particular type of therapy. The common factors of therapy, such as therapeutic alliance, gaining insight, and practicing new behaviors, may account for the changes seen in therapy. In this study the two approaches certainly shared many of these common factors, such a supportive group setting, gaining insight into how stress affects headaches, and practicing new behaviors to alleviate stress. Although the

specific processes within the sessions appear to have been different, these common factors may account for the similarities in outcome.

One important common factor may be the increase in self-efficacy observed in the participants. In this study, both active groups reported equally large increases in headache self-efficacy at follow-up. In a study of behavioral and medical interventions for tension-type headaches, Holroyd, Labus, and Carlson (2009) found that headache self-efficacy partially mediated the effects of a stress-management treatment on headache disability. Additionally, French et al. (2000) found that headache self-efficacy was a significant predictor of headache disability, with participants who reported greater headache self-efficacy reporting lower disability, beyond the disability predicted by headache severity. Thus, it is possible that our treatments were effective because both were able to increase participants' self-efficacy in dealing with their headaches by giving them either relaxation or emotional-expression tools. This is not to say, however, that both interventions worked in the same manner. It is possible that headache management self-efficacy is a common endpoint of two very different earlier processes, such as reduced arousal for relaxation training, or improved assertion and changed relationships for the anger awareness and expression intervention. As noted years ago by Bandura (1977), self-efficacy might be a common mediator of change, but it can be enhanced by different pathways (performance accomplishments, verbal persuasion, modeling, physiological arousal reductions). Thus, it is likely in this study that different processes were

set in motion by the two interventions, and both led to enhanced sense of one's ability to manage headaches.

The overall similar outcomes of the two interventions may also have resulted from the presence of different subgroups of participants who benefited uniquely from each intervention. The sample in this study was diverse and consisted of individuals with both migraine and tension-type headaches, as well as with a wide variety of personality and communication styles. It is possible in this context that some types of individuals might find one or the other of the interventions more helpful. For example, previous research by Kraft, Lumley, D'Souza, and Dooley (2008) found that individuals with migraines who self-reported greater use of emotional approach coping benefited more from written emotional disclosure rather than relaxation training. In this study, it is possible that participants with the lowest levels of assertiveness may have benefited more from the intervention focused on improving this skill, or conversely that participants who had more comfort with emotionally-based discussions were able to utilize the skills presented in the AAET condition more fully. Thus, it is possible that although the two interventions had comparable overall efficacy, there were subgroups of participants who benefited more from a particular intervention, and that these subgroups balanced out the overall group effects. Future research should examine possible moderators of the main effects.

Limitations

One limitation of the study is the use of an undergraduate student sample. Although the participants were screened for presence of chronic headaches, they

were not a treatment-seeking sample, which limits our ability to generalize these findings. The pain and disability levels of the participants from this study are likely less severe than those in a treatment-seeking sample. It is possible that in a sample of patients recruited from a pain clinic, for example, the results would look different. A participant sample with more severe headaches that have been refractory to treatment can be supposed to be less likely to benefit from a brief behavioral intervention, and effects in such a sample may be hypothesized to be smaller. Such participants may have headaches that are more difficult to treat, and they may have lower ability to apply psychological skills successfully. On the other hand, treatment-seeking patients may be more motivated to implement the skills and do the homework that is required by the group. Anecdotally, homework adherence in the current sample was relatively low, with many participants not devoting much time to skills practice between sessions. This may be quite different in a sample more motivated to improve, and may actually lead to larger effects.

Additionally, we did not differentiate participants in this study by headache type. It is likely that the sample in this study contained participants with both migraine and tension-type headaches, as well as mixed types. There is some evidence that the two types of headache are difficult to differentially diagnose because individuals often have poor recall of exact headache symptoms (Tassorelli et al., 2008), and mixed headaches, or tension headaches that become migraines, are not uncommon. Nonetheless, it is possible that those with migraine headaches might have had a different response to the treatments from

those with tension-type headaches. The ability to compare the two groups against each other may have helped elucidate any potential differential effects of the two interventions.

In this study, information on headaches was gathered using retrospective self-report measures. Using a different method, such as daily headache diaries, would have allowed us a more accurate evaluation of the frequency, severity, and duration of the headaches. Retrospective self-report measures can be biased by experimental demand, with participants reporting greater gains because they feel obligated to do so due to their positive interactions with the researchers, or because they have a strong belief in the treatments they completed. Participants may also have poor recall of the details of their headaches over an entire month. Asking participants to record their levels of headache pain daily would likely diminish demand effects and problems with recall, and lead to more accurate reporting by the participants.

A longer follow-up period would have also been helpful in order to ascertain the effects of the treatment over time. Effects may have grown stronger over time, as participants gained more practice using either the relaxation or the emotional skills. On the other hand, effects may have diminished if participants stopped practicing relaxation regularly or reverted to their typical, non-assertive, way of interaction with others. Using headache diaries over a longer period of time would have been overall a more effective way of gaining a better insight into the effects of these interventions.

Unfortunately, randomization was not completely successful and control group participants reported a higher mean level of headache disability at baseline than the active group participants, which may limit our ability to generalize the findings related to this measure. However, baseline levels of headache disability were used as a covariate, which should have at least partially corrected these baseline group differences.

Of note, there were no differences in the sense of control reported by the participants post-session; their sense of control did not decrease or increase in either condition after the intervention. It was expected that the participants would experience more of a sense of control after learning new skills. Participants did report greater headache management self-efficacy at follow-up, which does suggest that they did, in fact, feel more in control of their headaches after completing the interventions. The fact that they did not report greater control post-session suggests that perhaps a sense of control may be gained only after participants have a chance to utilize and explore the skills in their daily life and find them effective; in the immediate period, participants may not find that the skills help them feel more in control. This may also indicate that this “control” scale lacks validity or reliability and perhaps was not an appropriate scale to use in this context.

Another limitation is that the design of this study did not control for non-specific aspects of the intervention, such as a supportive environment and discussion of headaches. Some form of a placebo control group would have helped elucidate the question of whether common factors are responsible for the

improvements in headaches seen at outcome. Such a control group may have been a headache support group or an educational group; in other words, a group providing attention and support without specific intervention.

Implications and Future Directions

This study suggests that anger awareness and expression skills can be used successfully in behavioral interventions for chronic headaches. In the past, interventions for chronic pain have tended to focus on relaxation, distraction, and the decrease of arousal as the main target of intervention; this study indicates that headaches can be treated successfully from a different perspective. For both clinicians and patients, it would be worthwhile to consider integrating anger awareness and assertiveness training into interventions targeting chronic headaches. Furthermore, it demonstrates that even a relatively brief, group-based intervention can have a significant positive effect on chronic headaches.

There are many questions that remain unanswered, however. Although this brief intervention was relatively efficacious, one wonders whether more extended interventions would have a greater impact. Future studies should investigate how many sessions are optimal in the improvement of headache pain. These interventions should also be tested within a treatment-seeking sample to determine whether they remain efficacious for individuals with more severe headaches, or those who are more distressed by their headaches. It would also be intriguing to investigate the application of the anger awareness and expression training in other pain samples; for example, individuals with low back pain or fibromyalgia. Future studies should also explore potential

moderators. This could involve testing whether particular types of headaches are more responsive to one of the interventions, or whether individuals with particular personality characteristics benefit more from either relaxation or anger and assertiveness interventions. In addition, although these approaches appear to be different, they may work well together. An intervention integrating relaxation and anger awareness and expression may be better than either one of these approaches alone. Future studies should explore whether that is the case and how the two approaches may be best combined. Moreover, it should be explored whether the anger and emotional skills training can be integrated successfully with other behavioral treatment approaches, such as CBT and education, which are widely used for the treatment of chronic headaches. Additionally, the processes underlying change in outcomes should be investigated. As discussed above, headache management self-efficacy is a potential mediator of both of the interventions, but it is unclear exactly how both of the interventions lead to increased efficacy, and consequently improved headaches. Change processes should be tracked more closely in time in order to understand this process, as well as find out what other factors may mediate change.

In conclusion, this study demonstrated that an intervention based in anger awareness and expression is comparable in effectiveness to relaxation training in the treatment of chronic headaches. Both interventions demonstrated good effectiveness in a sample of undergraduate students with chronic headaches. Future research should focus on understanding the mechanisms of action that

underpin these interventions as well as exploring the most effective way to utilize them in individuals with chronic headaches and other types of chronic pain.

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-practice

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 PRACTICE 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.
    - State the problem objectively, and avoid accusing or blaming.
    - Object to the person's behavior, not the person.
    - 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) ____

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?	☐☐ 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? *(Do not include days you counted in question 1 where you missed work or school)*	☐☐ days
3.	On how many days in the last month did you not do household work because of your headaches?	☐☐ days
4.	How many days in the last month was your productivity in household work reduced by half or more because of your headaches? *(Do not include days you counted in question 3 where you did not do household work)*	☐☐ days
5.	On how many days in the last month did you miss family, social or leisure activities because of your headaches?	☐☐ days

HSE

Your will find below a number of statements related to headaches. Please read each statement carefully and indicate how much you agree or disagree with the statement by circling a number next to it. Use the following scale as a guide:

Strongly Disagree	Moderately Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Moderately Agree	Strongly Agree
1	2	3	4	5	6	7

1.	I can keep even a *bad* headache from disrupting my day by changing the way I respond to the pain.	1	2	3	4	5	6	7
2.	When I'm in some situations, nothing I do will prevent headaches.	1	2	3	4	5	6	7
3.	I can reduce the intensity of headache by relaxing.	1	2	3	4	5	6	7
4.	There are things I can do to reduce headache pain.	1	2	3	4	5	6	7
5.	I can prevent headaches by recognizing headache triggers.	1	2	3	4	5	6	7
6.	Once I have a headache, there is nothing I can do to control it.	1	2	3	4	5	6	7
7.	When I'm tense, I can prevent headaches by controlling the tension.	1	2	3	4	5	6	7
8.	Nothing I do reduces the pain of a headache.	1	2	3	4	5	6	7
9.	If I do certain things every day, I can reduce the number of headaches I will have.	1	2	3	4	5	6	7
10.	If I can catch a headache before it begins, I often can stop it.	1	2	3	4	5	6	7
11.	Nothing I do will keep a mild headache from turning into a bad headache.	1	2	3	4	5	6	7
12.	I can prevent headaches by changing how I respond to stress.	1	2	3	4	5	6	7
13.	I can do things to control how much my headaches interfere with my life.	1	2	3	4	5	6	7
14.	I cannot control the tension that causes my headaches.	1	2	3	4	5	6	7
15.	I can do things that will control how long a headache lasts.	1	2	3	4	5	6	7
16.	Nothing I do will keep a bad headache from disrupting my day.	1	2	3	4	5	6	7
17.	When I'm not under a lot of stress, I can prevent many headaches.	1	2	3	4	5	6	7
18.	When I sense a headache is coming, there is nothing I can do to stop it.	1	2	3	4	5	6	7
19.	I can keep a *mild* headache from disrupting my day by changing the way I respond to the pain.	1	2	3	4	5	6	7
20.	If I am under a lot of stress, there is nothing I can do to prevent headaches.	1	2	3	4	5	6	7
21.	I can do things that make a headache seen not so bad.	1	2	3	4	5	6	7
22.	There are things I can do to prevent headaches.	1	2	3	4	5	6	7
23.	If I am upset, there is nothing I can do to control the pain of a headache.	1	2	3	4	5	6	7
24.	I can control the intensity of headache pain.	1	2	3	4	5	6	7
25.	I can do things to cope with my headaches.	1	2	3	4	5	6	7

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 week, 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 of 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

IMPACT OF EVENT SCALE-REVISED

Before you answer the following questionnaire, please spend a few moments to identify one particularly stressful experience. Some stressors happen only once to a person, whereas other stressors happen repeatedly or continue for a long time, and may even be happening right now. Please try to identify a stressful experience that continues to bother you. This may be a stressful experience that that you have not talked about or shared much with other people, or it may be one that you don't like to be reminded of. Once you have identified that stressor, you should answer the following questionnaire with respect to that stressor.

Instructions: The following is a list of difficulties people sometimes have after stressful life events. Please read each item, and then indicate how distressing each difficulty has been for you *during the past 7 days* with respect to _____, how much were you distressed or bothered by these difficulties?

		Not at all	A little bit	Moder ate-ly	Quite a bit	Ex-treme-ly
1	Any reminder brought back feelings about it.	0	1	2	3	4
2	I had trouble staying asleep.	0	1	2	3	4
3	Other things kept making me think about it.	0	1	2	3	4
4	I felt irritable and angry.	0	1	2	3	4
5	I avoided letting myself get upset when I thought about it or was reminded of it.	0	1	2	3	4
6	I thought about it when I didn't mean to.	0	1	2	3	4
7	I felt as if it hadn't happened or wasn't real.	0	1	2	3	4
8	I stayed away from reminders about it.	0	1	2	3	4
9	Pictures about it popped into my mind.	0	1	2	3	4
10	I was jumpy and easily startled.	0	1	2	3	4
11	I tried not to think about it.	0	1	2	3	4
12	I was aware that I still had a lot of feelings about it, but I didn't deal with them.	0	1	2	3	4
13	My feelings about it were kind of numb.	0	1	2	3	4
14	I found myself acting or feeling like I was back at that time.	0	1	2	3	4
15	I had trouble falling asleep.	0	1	2	3	4
16	I had waves of strong feelings about it.	0	1	2	3	4
17	I tried to remove it from my memory.	0	1	2	3	4
18	I had trouble concentrating.	0	1	2	3	4
19	Reminders of it caused me to have physical reactions, such as sweating, trouble breathing, nausea, or a pounding heart.	0	1	2	3	4
20	I had dreams about it.	0	1	2	3	4
21	I felt watchful and on guard.	0	1	2	3	4
22	I tried not to talk about it.	0	1	2	3	4

Before the Session

MOOD:

Looking at row 1 for SAM (separate sheet), I currently feel (pleasant vs. unpleasant):

1 2 3 4 5 6 7 8 9

Looking at row 2 for SAM (separate sheet), I currently feel (excited vs. calm):

1 2 3 4 5 6 7 8 9

Looking at row 3 for SAM (separate sheet), I currently feel (controlled vs. in-control):

1 2 3 4 5 6 7 8 9

HEADACHE PAIN:

I currently feel:

0 1 2 3 4 5 6 7 8 9 10

Little to no pain Great deal of pain

HOMEWORK:

On how many days in the last week were you able to complete the homework given during the previous session? _____

After the Session

MOOD:

Looking at row 1 for SAM (separate sheet), I currently feel (pleasant vs. unpleasant):

1 2 3 4 5 6 7 8 9

Looking at row 2 for SAM (separate sheet), I currently feel (excited vs. calm):

1 2 3 4 5 6 7 8 9

Looking at row 3 for SAM (separate sheet), I currently feel (controlled vs. in-control):

1 2 3 4 5 6 7 8 9

HEADACHE PAIN:

I currently feel:

0 1 2 3 4 5 6 7 8 9 10

Little to no pain Great deal of pain

SESSION REACTIONS:

1. Did you learn any new skills or information during today's session?

1 2 3 4 5 6 7

Not at all *Very*

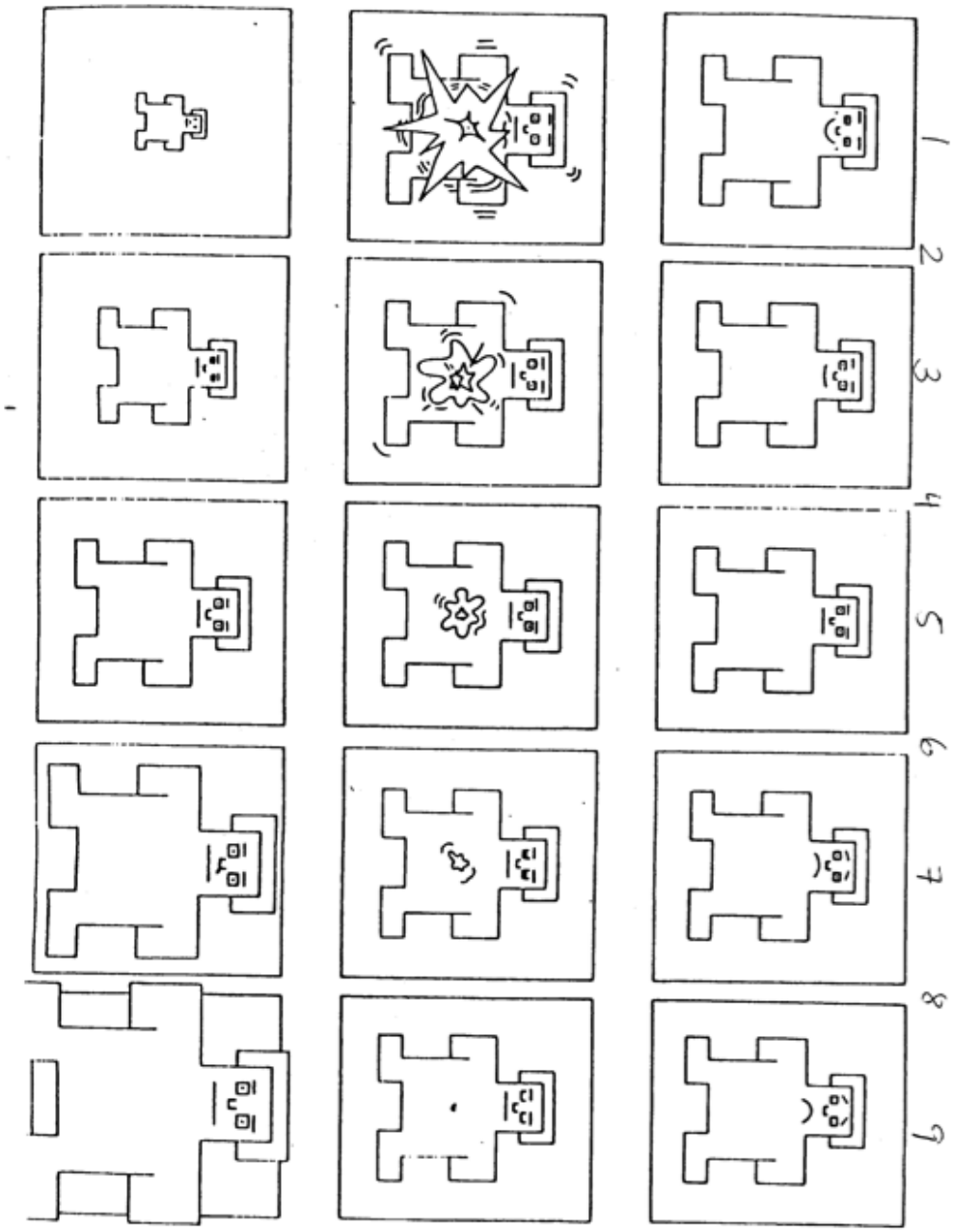
2. How valuable did you find today's session?

1 2 3 4 5 6 7

Not at all *Very*

COMMENTS *(optional):*

SAM (Self Assessment Maniquin)



APPENDIX E: SCREENING 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

REFERENCES

Alexander, E, & French, T. (1946). *Psychoanalytic Therapy: Principles and Application.* New York: Ronald Press.

Barlow, D.H, & Lehman, C.L. (1996). Advances in the psychosocial treatment of anxiety disorders: Implications for National Health Care. *Archives of General Psychiatry, 53* (8), 727 – 735.

Bendtsen, L., & Jensen, R. (2009). Tension-type headache. *Neurological Clinics, 27,* 525 – 535.

Bigal, M.E., & Lipton, R.B. (2009). The epidemiology, burden, and comorbidities of migraine. *Neurological Clinics, 27,* 321 – 334.

Broderick, J.E., Junghaenel, D.U, & Schwartz, J.E. (2005). Written emotional expression produces health benefits in fibromyalgia patients. *Psychosomatic Medicine, 67,* 326-334.

Burns, J.W., Quartana, P.J., & Bruehl, S. (2008). Anger inhibition and pain: Conceptualizations, evidence, and new directions. *Journal of Behavioral Medicine, 31,* 259 – 279.

Buse, D.C., & Andrasik, F. (2009). Behavioral medicine for migraine. *Neurologic Clinics, 27,* 445 – 465.

De Moor, C., Sterner, J., Warneke, C., Gilani, Z., Hall, M., Amato, R., & Cohen, L. (2002). A pilot study of the effects of expressive writing on psychological and behavioral adjustment in patients enrolled in a Phase II trial of vaccine therapy for metastatic renal cell carcinoma. *Health Psychology, 21*(6), 615-619.

Foa, E.B., & Kozak, M.J. (1986). Emotional processing of fear: Exposure to corrective information. *Psychological Bulletin, 99* (1), 20 – 35.

Frattaroli, J. (2006). Experimental disclosure and its moderators: A meta-analysis. *Psychological Bulletin, 132* (6), 823 – 865.

French, D.J., Holroyd, K.A., Pinell, C., Malinoski, P.T., O'Donell, F., & Hill, K.R. (2000). Perceived self-efficacy and headache-related disability. *Headache, 40,* 647 – 656.

Gillis, M.E., Lumley, M.A., Mosley-Williams, A., Leisen, J.C.C., & Roehrs, T. (2006). The health effects of at-home written emotional disclosure in fibromyalgia: A randomized trial. *Annals of Behavioral Medicine, 32* (2), 135 – 146.

Greenberg, L.S., & Bolger, E. (2001). An emotion-focused approach to the overregulation of emotion and emotional pain. *Journal of Clinical Psychology, 57,* 197 – 211.

Greenberg, L.S., & Safran, J.D. (1989). Emotion in psychotherapy. *American Psychologist, 44*(1), 19 – 29.

Gross, J.J. (2002). Emotion regulation: Affective, cognitive, and social consequences. *Psychophysiology, 39,* 281 – 291.

Hayes, S.C., & Gifford, E.V. (1997). The trouble with language: Experiential avoidance, rules, and the nature of verbal events. *Psychological Science, 8*(3), 170 – 173.

Holroyd, K.A., Stensland, M., Lipchik, G.L., Hill, K.R., O'Donnell, F.S., and

Cordingley, G. (2000). Psychosocial correlates and impact of chronic tension-type headaches. *Headache, 40* (1), 3 – 16.

Janke, E.A., Holroyd, K.A., & Romanek, K. (2004). Depression increases onset of tension-type headache following laboratory stress. *Pain, 111* (3), 230 – 238.

Kraft, C.A., Lumley, M.A., D'Souza, P.J., & Dooley, J.A. (2008). Emotional approach coping and self-efficacy moderate the effects of written emotional disclosure and relaxation training for people with migraine headaches. *Headache, 13,* 67 – 71.

Lambert, M.M., & Ogles, B.M. (2004). The efficacy and effectiveness of psychotherapy. In M. J. Lambert (Ed.), *Bergin and Garfield's handbook of psychotherapy and behavior change* (5th ed., pp. 139 – 193). New York: Wiley.

Luborsky, L., Singer, B., & Luborsky, L. (1975). Comparative studies of psychotherapies: Is it true that "everyone has won and all must have prizes"? *Archives of General Psychiatry, 32,* 995 – 1008.

Lumley, M.A., Cohen, J.L., Stout, R.L., Neely, L.C., Sander, L.M., & Burger, A.J. (2008). An emotional exposure-based treatment of traumatic stress for people with chronic pain: Preliminary results for fibromyalgia syndrome. *Psychotherapy Theory, Research, Practice, Training, 45*(2), 165 – 172.

Martin, N.J., Holroyd, K.A., & Rokicki, L.A. (1993). The Headache Self-Efficacy Scale: Adaptation to recurrent headaches. *Headache, 33* (5), 244 – 248.

Mattila, A.K., Saarni, S.I., Salminen, J.K., Huhtala, H., Sintonen, H., & Joukamaa,

M. (2009). Alexithymia and health-related quality of life in a general population. *Psychosomatics, 50,* 59 – 68.

Mayer, J.D., Caruso, D.R., Salovey, P. (2000). Emotional intelligence meets traditional standards for an intelligence. *Intelligence, 27*(4), 267 – 298.

Munakata, J., Hazard, E., Serrano, D., Klingman, D., Rupnow, M.F.T., Tierce, J., Reed, M., & Lipton, R.B. (2009). Economic burden of transformed migraine: Results from the American Migraine Prevalence and Prevention (AMPP) Study. *Headache, 49,* 498 – 508.

Nicholson, R.A., Gramling, E.G., Ong, J.C., & Buenevar, L. (2003). Differences in anger expression between individuals with and without headache after controlling for depression and anxiety. *Headache, 43,* 651 – 663.

Nicholson, R.A., Houle, T.T., Rhudy, J.L., & Norton, P.J. (2007). Psychological risk factors in headache. *Headache, 47*(3), 413 – 426.

Osterhaus, S.O.L. (1999). The Familial Emotional Expression Scale for Children and Adolescents (FEECHA) and an exploration of young headache patients' emotional expression. *Family Systems and Health, 17,* 229 – 242.

Peterlin, B.L., Tietjen, G.E., Brandes, J.L., Rubin, S.M., Drexler, E., Lidicker, J.R., & Meng, S. (2009). Posttraumatic stress disorder in migraine. *Headache, 49,* 541 – 551.

Quartana, P.J., Bounds, S., Yoon, K. L., Goodin, B.R., & Burns, J.W. (2010).

Anger suppression predicts pain, emotional, and cardiovascular responses to the cold pressor. *Annals of Behavioral Medicine, 39*, 211 – 221.

Rachman, S. (1980). Emotional processing. *Behavioral Research and Therapy, 18,* 51 – 60.

Roelofs, K., & Spinhoven, P. (2007). Trauma and medically unexplained symptoms: Towards an integration of cognitive and neuro-biological accounts. *Clinical Psychology Review, 27,* 798 – 820.

Smyth, J.M., Stone, A.A., Hurewitz, A., & Kaell, A. (1999). Effects of writing about stressful experiences on symptom reduction in patients with asthma or rheumatoid arthritis. *Journal of the American Medical Association, 281*(14), 1304-1309.

Stanton, A.L., Danoff-Burg, S., Cameron, C.L., & Ellis, A.P. (1994). Coping through emotional approach: Problems of conceptualization and confounding. *Journal of Personality and Social Psychology, 66*(2), 350 – 362.

Stewart, K.L. (2004). Pharmacological and behavioral treatments for migraine headaches: A meta-analytic review. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, *65*(3-B), 1535.

Stewart, W.F., Lipton, R.B., Dowson, A.J., & Sawyer, J. (2001). Development and testing of the Migraine Disability Assessment (MIDAS) Questionnaire to assess headache-related disability. *Neurology, 56* (6, Suppl.1), S20 – S28.

Tassorelli, C., Sances, G., Allena, M., Ghiotto, N., Bendtsen, L., Olesen, J., Nappi, G., & Jensen, R. (2008). The usefulness and applicability of a basic headache diary before first consultation: results of a pilot study conducted in two centres. *Cephalalgia, 28,* 1023 – 1030.

Tomaka, J., Palacios, R., Schneider, K., Colotla, M., Concha, J., & Herrald, M. (1999). Assertiveness predicts threat and challenge reactions to potential stress among women. *Journal of Personality and Social Psychology, 76*(6), 1008 – 1021.

Van Middendorp, H., Lumley, M.A., Moerbeek, M., Jacobs, J.W.G., Bijlsma, J.W.J., & Geenen, R. (2010). Effects of anger and anger regulation styles on pain in daily life of women with fibromyalgia: A diary study. *European Journal of Pain, 14,* 176 – 182.

White, K.S., & Farrell, A.D. (2006). Anxiety and psychosocial stress as predictors of headache and abdominal pain in urban early adolescents. *Journal of Pediatric Psychology, 31*(6), 582 – 596.

World Health Organization. (2004). *Fact Sheet No. 277 – Headache Disorders.* Retrieved April 26, 2009, from http://www.who.int/mediacentre/factsheets/fs277/en/

Yucel, B., Kora, K., Ozyalcin, S., Alacalar, N., Ozdemir, O., & Yucel, A. (2002). Depression, automatic thoughts, alexithymia, and assertiveness in patients with tension-type headache. *Headache, 42,* 194 – 199.

ABSTRACT

TESTING THE IMPACT OF EMOTIONAL AWARENESS AND EXPRESSION TRAINING AND RELAXATION TRAINING ON CHRONIC HEADACHES

by

OLGA SLAVIN-SPENNY

August 2011

Advisor: Dr. Mark A. Lumley

Major: Psychology (Clinical)

Degree: Doctor of Philosophy

Chronic headache is a serious and common problem (World Health Organization [WHO], 2004). There is a heavy social and economic burden associated with chronic headaches. Relaxation training, which is thought to work by decreasing arousal/anxiety, is a commonly used behavioral treatment for chronic headache and has been shown to be effective. However, other research has suggested that anger may be an important emotion in the experience of pain, and that suppression of anger may lead to worse pain (Quartana et al., 2006). Although existing literature has demonstrated that anger suppression leads to worse pain, it has not addressed the question of whether teaching someone to express anger appropriately leads to decreases in pain. In this study, we tested a new intervention, Anger Awareness and Expression training (AAET), which focused on teaching participants to recognize their anger and express it appropriately.

In this study, 130 undergraduate students with chronic headaches were randomized to three different conditions - Relaxation training (RT), Anger Awareness and Expression training (AAET), or an assessment-only control group. Both RT and AAET were implemented in a small-group setting over three weekly, one-hour long sessions. Participants completed self-report measures of psychological functioning, headache management self-efficacy, and headache frequency, severity, duration, and disability, at baseline and 6-week follow-up. Active group participants also completed measures of affect and pain pre- and post-session. Analyses of in-session process variables showed that the two interventions worked differently, with RT decreasing negative mood, arousal, and pain post-session, and AAET increasing arousal post-session. However, both led to significant improvement in headaches at follow-up, and largely did not differ from each other in their effects. Both led to significant decreases in headache frequency, duration, and disability, and increases in headache management self-efficacy. This study shows that a brief group-based intervention focusing on anger expression is an effective alternative to relaxation training for individuals with chronic headaches. Future research should focus on understanding whether there are similar or different processes underlying these two interventions, and the types of patients who will benefit the most from each intervention.

AUTOBIOGRAPHICAL STATEMENT

Olga Slavin-Spenny completed her undergraduate degree in Biopsychology and Cognitive Science from the University of Michigan in 2005. She is completing her PhD in Clinical Psychology at Wayne State University.

Olga's career interests are in the area of health psychology, particularly the relationship of physical and emotional health and chronic pain. Her work and graduate training have provided her an opportunity to participate as an active member of the WSU Health Psychology Research Lab. In addition to the current project, she completed a Master's thesis on exploring emotional disclosure among those who have experienced traumatic events, and worked on a study looking at stress management and assertiveness in international students. She has also taught several courses at Wayne State University, including Psychology of Women and Psychology of Everyday living.

She is currently completing her pre-doctoral internship in Health Psychology at Henry Ford Health System in Detroit, MI.