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Psychological Flexibility In Migraine Patients: The Role Of Acceptance And Values-Based Action

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PSYCHOLOGICAL FLEXIBILITY IN MIGRAINE PATIENTS:

THE ROLE OF ACCEPTANCE AND VALUES BASED ACTION

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ABSTRACT

According to the World Health Report 2001, mental and neurological disorders account for 30.80% of healthy years of life lost to disability; migraine alone accounts for 1.40% of that percentage. In addition to the functional impairment the attacks cause, migraine frequently co-occurs with other psychiatric disorders and is associated with other psychological factors. Related psychological factors include avoidance of negative private events (experiential avoidance) and persistent behaviors that are counterproductive to one's personal values. Recent studies of patients with other forms of chronic pain suggest that these behaviors are associated with poor functioning and that techniques fostering "psychological flexibility" may enhance functioning and quality of life. However, the roles of psychological flexibility and its component constructs have yet to be explored in migraine specifically. The purpose of this study was to examine the relationship between two components of psychological flexibility (acceptance and values-based action) and headache-related variables in treatment-seeking patients with migraine.

One hundred three adult patients participated in the study (mean age = 41.45 years [SD = 11.92]; 88.24% female; 91.17% Caucasian). All participants had a physician diagnosis of migraine: 53.39% with episodic migraine without aura, 18.44% with episodic migraine with aura, and 28.16% with chronic migraine. A series of hierarchical multiple regressions was used to assess relations between acceptance/values-based action and headache variables. As expected, acceptance of pain and engaging in values-based action were significantly associated with lower migraine disability and lower pain severity, although these constructs were not significantly associated with frequency of headache or medical visits. These findings suggest that perhaps

psychological flexibility is more strongly linked to functional improvement or pain perception than to pain-related symptoms. Clinical implications of this study include awareness of the benefits of psychological flexibility for migraine patients and potential therapeutic techniques to foster psychological flexibility as an adjunct to medical treatment.

DEDICATION

This dissertation is dedicated to my wonderful family for their patience and support through this process. In particular, I thank my parents, my in-laws, my beautiful boys, and most importantly, my amazing husband, Richard.

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INTRODUCTION

"When pain was unavoidable, we tolerated it. When pain became avoidable, it became

intolerable." (Dahl & Lundgren, 2006, pp. 286)

Migraine Classification and Prevalence

Migraine is diagnosed according to basic characteristics as outlined in the *International*

Classification of Headache Disorders—2nd edition (International Headache Society [IHS],

2004). Migraine headaches are typically of moderate to severe intensity, pulsating/throbbing

in quality, unilateral in location, aggravated by physical activity, and last 4-72 hours if

untreated.

Additionally, individuals with migraine experience nausea or vomiting during their headache

attacks, and/or sensitivity to light (photophobia) and sound (phonophobia). Migraine may

occur as chronic (15 or more times per month) or episodic (occurring less than 15 times per

month). Although most migraines occur without aura symptoms, a subset of migraine sufferers

experience aura symptoms that precede their migraine attacks. Aura is a set of temporary

neurological symptoms that occurs prior to or at the onset of a migraine. The most common

type of aura is visual, often in which a zigzag pattern is perceived at the point of focus and

then spreads and/or shifts right or left (i.e., fortification spectrum), though sensory prodromes

(e.g., "pins and needles," numbness) also may occur (IHS, 2004). In some cases, the aura may

occur in the absence of migraine or in conjunction with non-migrainous headaches.

Approximately 11-12% of the U.S. population experiences headaches diagnosable as migraine according to IHS diagnostic criteria (Hawkins, Wang, & Rupnow, 2008; Lipton Hamelsky, & Stewart, 2001; Silberstein, 2004; Stewart, Lipton, Celentano, & Reed, 1992; Stovner et al., 2007). This includes approximately 23-28 million cases in the United States annually (Pesa & Lage, 2004) and approximately 41 million annual cases in Europe (Fumal & Schoenen, 2008). Women are more likely than men to experience migraine. According to a number of studies reporting yearly prevalence rates, approximately 17-18% of women and 5-6% of men in the U.S. experience migraines (Diamond et al., 2007; Hawkins et al., 2008; Lipton, Stewart, Diamond, Diamond, & Reed, 2001). Cumulative lifetime incidence of migraine has been estimated at 43% for women and 18% for men (Stewart, Wood, Reed, Roy, & Lipton, 2008). The prevalence of migraine increases after puberty, peaks between the ages of 24 to 44, and is negatively correlated with household income in the U.S. (Dodick et al., 2007; Jette, Patten, Williams, Becker, & Wiebe, 2008; Silberstein, 2004). Migraine occurs most commonly in Caucasians, less frequently in African-Americans, and least frequently in Asian-Americans (Silberstein, 2004).

In addition to predictive factors such as sex, age, race, and socio-economic status, migraine also seems to have a genetic component (Gardner, 2006; Silberstein, 2004). Family studies show that migraine is more likely in first- and second-degree relatives of probands than among those in the general population (Gardner, 2006). Migraine runs in families; however, the contribution of genetics to the development of migraine is likely both complex and potentially alterable by environmental factors (Gardner, 2006; Silberstein, 2004).

Burden and Treatment of Migraine

Given the disabling nature of migraine and its extensive prevalence, it is not surprising that the financial cost of migraines is high. Hawkins, Wang, and Rupnow (2007) used the 2004

database of a U.S. health insurance company to estimate the cost of migraine per individual. Using only paid claims, they separated clients into two groups: individuals with primary migraine diagnosis and/or individuals being treated with migraine medication and a group of matched cohorts without migraine or migraine-related treatment/illness. They estimated that each patient filing a claim for migraine care spent an average of $2571 more per year than patients without migraine. Using this data in conjunction with documented prevalence rates, they estimated the national financial burden of migraine to be approximately $11 billion (Hawkins et al.). Other studies have estimated the direct costs (e.g. medical care, medication) to range between $127 and $7089 and indirect costs (e.g. missing work, lost productivity) to range between $709 and $4453 per migraineur (Edmeads & Mackell, 2002; Munakata et al., 2009; Pesa & Lage, 2004).

Patients' willingness to spend considerable time and money seeking relief from migraine attests to the disabling nature of migraine. Migraine causes significant disability and impairs quality of life (Bigal, Rapoport, Lipton, Tepper, & Sheftell, 2003; Park, Shin, Kim, & Lee, 2008). Park, Shin, Kim, and Lee (2008) conducted a study to evaluate the disability inflicted by individual headache attacks using a diary-based method of measurement in conjunction with a standardized measure. They found that over half (55%) of all migraine attacks were significantly disabling events and that pain intensity, nausea/vomiting, and employment status were related to disability. Similarly, participants of the American Migraine Prevalence and Prevention Study (AMPP) described 53.7% of migraine attacks as disabling or requiring bed rest (Lipton, Bigal, Diamond, Freitag, Reed, & Stewart, 2007). Additionally, of the 18,968 migraineurs surveyed in the AMPP study, only 7.2% reported an absence of headache-related impairment leaving, 92.8% of migraineurs experiencing some form of disability during attacks (Lipton et al., 2007). Migraine-related disability is highly correlated with health-related quality of life, both of which

are significantly reduced for people with migraine compared to nonmigraine controls (Lipton, Hamelsky, Kolodner, Steiner, & Stewart, 2000). More specifically, numerous studies have demonstrated the disabling nature of migraine on academic/professional, personal/social, financial, and emotional facets of life. Individuals with migraine frequently miss work or school, fail to participate in social or family activities, and may develop a comorbid mental health disorder such as depression (Bigal et al., 2003, Hamelsky & Lipton, 2006; Park et al., 2008; Sauro et al., 2010).

Treatment of migraine headaches can be divided into two categories: acute and preventive. Acute methods aim for immediate pain relief. Acute pharmacologic interventions include prescription medications such as triptans (selective serotonin receptor agonists) and over-the-counter medications such as nonsteroidal anti-inflammatory drugs (NSAIDs) (Fumal & Schoenen, 2008; Silberstein, 2004). Non-pharmacologic methods of acute management include relaxation techniques such as progressive muscle relaxation, guided imagery, massage, or the use of heat or cold. Preventive treatment is indicated for individuals whose headaches are severe, frequent, and considerably disabling despite the use of acute pharmacotherapy (Diamond et al., 2006; Doddick et al., 2007; Fumal & Schoenen, 2008; Silberstein, 2004). Prophylactic medications commonly used include beta-blockers, anti-depressants, and anticonvulsants, all of which were originally developed for purposes other than migraine prevention (Peters et al., 2005; Silberstein, 2004).

Evidence-based non-pharmacologic therapies used for preventing migraine attacks include biofeedback, relaxation training, and cognitive-behavioral therapy (Fumal & Shoenen, 2008; Peters et al., 2005), the latter of which often includes components of biofeedback and/or relaxation training in conjunction with other interventions. Preventive behaviors often taught in cognitive-behavioral therapy include identification and avoidance of possible migraine "triggers"

(e.g., stress, certain foods, work, exercise, excessive noise or light) and other lifestyle modifications such as stress management, eating a healthy diet, maintaining a regular sleeping and eating schedule, and exercising (Peters et al., 2005). Meta-analytic reviews have examined the efficacy of cognitive behavioral treatments for migraine. Summarizing the meta-analytic studies to date, Rains, Penzien, McCrory and Gray (2005) concluded that relaxation plus biofeedback yielded similar levels of efficacy (35-55% improvement) for migraine as did the commonly-used preventive medications propranolol and flunarizine. Similar conclusions were articulated in the *Evidence-Based Guidelines for Migraine Treatment* published under the auspices of the U.S. Headache Consortium (Campbell, Penzien, & Wall, 2000). This report recommended the use of relaxation training, thermal biofeedback combined with relaxation training, EMG biofeedback, and cognitive-behavioral therapy for prevention of migraine and classified the evidence base for these interventions as Grade A (highest) quality.

Psychiatric Comorbidity in Migraine

One of the potential difficulties in treating migraine patients is the prevalence of comorbid psychiatric disorders. Epidemiological studies show consistently that major depressive disorder, anxiety disorders, and bipolar disorder are more frequent among individuals with migraine than among those in the population without migraine (Breslau, 1998; Hamelsky & Lipton, 2006; Jette et al., 2008; Low, du Fort, Cervantes, 2003; Saunders, Merikangas, Low, Von Korff, and Kessler, 2008; Stewart, Breslau, & Keck, 1994).

Regarding major depression, studies have found that individuals with migraine are approximately 2 - 4 times more likely (odds ratios) to meet diagnostic criteria for major depressive disorder than are those without migraine, and individuals experiencing migraine with aura are at higher risk than those without aura symptoms (Hamelsky & Lipton, 2006). The lifetime prevalence for depression in persons with migraine is approximately 41% and similarly,

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about 46% of persons with depression experience migraines (Breslau, Schultz, Stewart, Lipton, Lucia, et al., 2000). Existing data suggests that this relationship is bidirectional in nature, with each disorder increasing subsequent risk of the other (Evans & Rosen, 2008). For instance, Breslau, Lipton, Stewart, Schultz and Welch (2003) conducted a study to investigate the etiology and prognosis of comorbid migraine and depression and found that individuals with a history of major depression had an increased risk for developing migraine by a two-year follow up. The incidence of developing migraine was 9.3% in persons with a history of depression, but only 2.9% in those without a history of depression. Conversely, persons with migraine were more likely to develop major depression within the 2-year follow up period (odds ratio of 5.2) than persons with severe headache (odds ratio of 2.7) or without headache (odds ratio of 1.0). These data challenge the traditional notion that depression co-occurs merely as a result of living with disabling migraine.

Anxiety disorders such as generalized anxiety disorder (GAD), social phobia, obsessive-compulsive disorder (OCD), and panic disorder also commonly occur with migraine (Baskin, Lipchik, & Smitherman, 2006; Hamelsky & Lipton, 2006; Juang, Wang, Fuh, Lu, & Su, 2000; Stewart, Breslau, & Keck, 1994). Compared to non-headache controls, migraineurs are 4-5 times more likely to suffer from GAD and OCD and 3-10 times more likely to suffer from panic disorder (Baskin & Smitherman, 2009; Breslau, 1998; Breslau, Davis, Andreski, 1991; Breslau, Schultz, Stewart, Lipton, & Welch, 2001). One study investigating the prevalence of migraine in patients at an anxiety disorders clinic found that 67% of the patients with an anxiety diagnosis experienced migraine (Senaratne, Van Ameringen, Mancini, Patterson, & Bennett, 2010). Additionally, the severity of anxiety disorder symptoms was greater when a migraine diagnosis was present. Conversely, the severity and frequency of headaches also seems to predict severity

of anxiety and depressive symptoms (Hung, Liu, Cheng, & Wang, 2009; Zwart et al., 2003). That is, more frequent and severe headache subforms (e.g., chronic migraine, chronic daily headache) are associated with more severe psychopathology than are less frequent and severe subforms. As with depression, the relationship between migraine and several anxiety disorders appears to be bidirectional, with the onset of migraine occurring first in some instances and the onset of an anxiety disorder preceding migraine (and depression) in others (Baskin & Smitherman, 2009; Breslau et al., 2001; Wang, Juang, & Fuh, 2007).

Other comorbidities have been explored with less frequency than depression and anxiety disorders. Bipolar disorder has also been found to be more prevalent among persons with migraine than the general population, and migraineurs are more likely to develop bipolar disorder than are individuals without migraines (Mahmood, Romans, & Silverstone, 1999; Fasmer & Oedegaard, 2005). Population-based studies have reported a 2- to 3-fold higher prevalence of bipolar spectrum disorders among migraineurs, with the strongest relationship for those who suffer from migraine with aura (Breslau, 1998; Jette et al., 2008; Saunders et al., 2008). Conflicting and inconclusive results have been obtained regarding whether substance use disorders are more prevalent among migraineurs than individuals without migraine (Jette et al, 2008; Saunders et al., 2008).

Psychiatric comorbidity in migraine patients is thus a common occurrence. In addition to high prevalence rates, psychiatric comorbidities also are associated with negative impact on migraine. Comorbid psychological disorders are associated with a poorer prognosis for treatment, greater headache-related disability, lower quality of life, and lower patient satisfaction with care (Baskin, et al., 2006; Guidetti et al., 1998; Lant´eri-Minet, Radat, Chautart, & Lucas, 2005; Saunders et al., 2008).

Psychological Factors in Migraine

    In addition to psychiatric comorbidities, a number of psychological constructs have been

implicated in the presence and chronification (progression) of migraine. Among these are fear of

pain, coping styles, and avoidance behaviors (Asmundson, Norton, & Veloso, 1999; Martin,

Reece, & Forsyth, 2006). Awareness of these factors may play an important role in evaluation,

treatment planning, and prognosis of the migraine patient.

    Fear of pain. Fear of pain (or "pain anxiety") generally refers to the fear of experiencing

pain and pain-related stimuli. Fear of pain is a functional response to certain stimuli for most

people, in that fear of pain prompts individuals to avoid potentially dangerous situations and

activities and thereby prevent potential injury. However, in persons with chronic pain such as

migraine, that protective measure may become maladaptive when the pain-related stimuli are

otherwise healthy behaviors such as exercise or social interaction. Fear of pain and the resulting

avoidance behaviors are associated with the maintenance of pain and increased pain-related

disability (Fordyce, 1976; McCracken, Zayfert, & Gross, 1992). As but one example,

McCracken and colleagues (1992) found that fear of pain was a stronger predictor of pain-related

disability among chronic pain patients than was pain severity itself.

    Research indicates that chronic pain patients routinely make errors in predicting the

degree of pain involved in a given situation (Arntz & Peters, 1995; McCracken, Gross, Sorg, &

Edmands, 1993; Murphy, Lindsay, & de C Williams, 1997). Arntz and Peters found that chronic

back pain patients made significantly more errors underestimating the severity of pain in an

induced-pain experiment than did healthy controls. Conversely, McCracken et al. found that fear

of pain in chronic pain patients was related to overestimates of predicted pain experience. This

discrepancy in the type of errors (overestimation vs. underestimation) may indicate that the

relationship between prediction errors and avoidance is mediated by fear of pain (Asmundson, Norton, & Norton, 1999; McCracken et al.). A chronic pain patient with low fear of pain may be more susceptible to underestimating pain involved in a given situation and therefore fail to avoid behaviors/stimuli when avoidance is appropriate. Conversely, a greater fear of pain may lead to overestimation and subsequent avoidance of behaviors/stimuli related to pain when avoidance is not necessary, increasing sensitivity to pain and pain-related disability (Asmundson et al., 1999; McCracken et al., 1993). Pain anxiety can thus become part of a self-perpetuating cycle of fear and avoidance.

Coping styles. Coping can be broadly defined as one's behavioral and cognitive responses to a stressor, usually with the intention of managing or reducing the negative effects of the stressor. Stress is a well-known trigger for migraines (Sauro & Becker, 2009), and the severe pain experienced during migraine attacks can be a significant stressor in itself (Lake, 2009; Sauro & Becker, 2009). Individuals cope with pain in a variety of ways, some of which are functional and some of which are dysfunctional. In a review published in 2009, Lake subsumed dysfunctional styles of coping with pain under two main categories: sensitizing or minimizing. Sensitizing styles include hypervigilance and anticipation, catastrophizing, and hyperempathy, or excessive concern for the pain of others. Minimizing styles of coping with pain include alexithymia, denial, and suppression of anger and negative affect. The sensitizing styles of hypervigilance and anticipation involve increased attention to pain and associated sensations. Research indicates that focusing attention on the pain experience is associated with higher ratings of pain intensity and impairment related to pain (Bantick, et al., 2002; Ploghaus, Becerra, Borras, & Borsook, 2003; Tracey, et al., 2002). Catastrophizing involves negative cognitions regarding the experience of pain as excessive or overwhelming. These cognitions often are

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assessed using the Pain Catastrophizing Scale (Sullivan, Bishop, & Pivik, 1995), which consists

of three basic factors: rumination, magnification, and helplessness (Van Damme, Crombez,

Bijttebier, Goubert, & Van Houdenhove, 2002). Pain catastrophizing has been linked to pain

severity, pain-related impairment and disability, chronicity of pain, and resistance to acute

pharmacological therapy (Drahovzal, Stewart, & Sullivan, 2006; Holroyd, Drew, Cottrell,

Romanek, & Heh, 2007; Turner, Mancl, & Aaron, 2004). Hyperempathy involves increased or

even excessive concern for the pain of others. Though limited, existing research indicates that

individuals rate personal pain experiences as more intense when viewing the pain experience of

someone with whom they empathize (Godinho, Magnin, Frot, Perchet, & Garcia-Larrea, 2006;

Loggia, Mogil, & Bushnell, 2008). Overall, focusing excessively on the experience of pain

appears to complicate the condition and exacerbate related difficulties.

In regards to minimizing styles of coping, alexithymia is a deficit in identifying and

discriminating emotions in oneself and in others and difficulty in differentiating between

emotional and physical states (Lake, 2009). Research shows that alexithymia is associated with

numerous types of chronic pain and problems in managing pain (Lake, 2009; Lumley, Asselin, &

Norman, 1997; Lumley, Smith, & Longo, 2002; Mehling & Kraus, 2005). Research on

alexithymia specific to headache is sparse, but alexithymia has been associated with depression

and anxiety in migraine patients (Yalug, et al., 2010). Preliminary research also indicates that

migraineurs who frequently present to the hospital emergency department for acute pain

management are more alexithymic than "non-repeater" patients (Villani, et al., 2010). Whereas

patients with alexithymia are considered to have a deficit in awareness of emotions, individuals

using denial as a coping mechanism actively disregard emotional experiences. Denial is

considered an obstacle to treatment and is associated with overuse of headache medication

(Lake, 2008; Lake 2009). Finally, people who attempt to cope with pain through suppression of anger and negative affect often experience increased pain, and the construct of "anger-in" is predictive of headache (Arena, Bruno, Rozantine, & Meador, 1997; Lake, 2009; Materazzo, Cathcart, & Pritchard, 2000). Apparently, failing to accurately identify and express one's emotions, either unintentionally (as with alexithymia) or intentionally (as with denial and suppression), is another potentially complicating factor in the pain experience.

Review of these coping strategies suggests that attention in either extreme (not enough or too much) is dysfunctional when managing pain. Fortunately, validated methods for improving coping with pain exist, such as relaxation training, cognitive restructuring, stress management techniques, and biofeedback (Sauro & Becker, 2009; Smitherman, Nicholson, Schafer, & Houle, in press). Many of these and other cognitive-behavioral techniques for migraine teach patients to identify and avoid headache triggers (Martin & Macleod, 2009; Schulman, & Silberstein, 1992; Skaer, 1996). However, the effectiveness and practicality of avoiding headache triggers recently has come into question.

Avoidance. The role of avoidance in migraine is controversial and under-studied. Whereas avoidance is typically an adaptive response to pain (i.e., promoting tissue recovery), avoidance behavior may become maladaptive when it continues despite recovery or extends to stimuli unrelated to the pain process (Phillips, 1987). Although avoidance of migraine triggers may seem intuitive, it is not always practical or even possible. A recent study indicates that many headache patients are unable to consistently and accurately identify the triggers for their own migraine attacks (Turner, Smitherman, Martin, Penzien, & Houle, 2013). Headache patients may be able to correctly identify their headache triggers but often are unable to avoid some of them (e.g. weather, hormonal fluctuations). Additionally, some empirical support exists for the notion

that avoidance of triggers may actually increase their potency as triggers for headache, and that prolonged exposure consequently may weaken their ability to induce a headache (Martin, 2009; Martin &MacLeod, 2009).

Martin, Reece, and Forsyth (2006) proposed that avoidance of headache triggers may increase sensitivity to a trigger and associated negative affect, based on findings stemming from research charting the sensitivity to noise over various exposure intervals. Additionally, they suggested that exposure to the trigger may decrease sensitivity, leading to greater tolerance and consequently a decrease in frequency of migraine. Details of the research supporting these hypotheses have been called into question (Nicholson, & Smitherman, 2006), with criticisms focusing on the representativeness of noise as a typical headache trigger, the limited number of patients with recurrent headaches used in this study, and the resulting practical implications of encouraging exposure to particular headache triggers. However, Martin and colleagues have made a valuable contribution to the literature by presenting a challenge to traditional views of avoiding migraine triggers.

A well-known and hard-to-avoid trigger for migraine is stress. Similar to the aforementioned ideas put forth by Martin and colleagues, some evidence suggests that using avoidance techniques to address stressful events may be involved in sustaining rather than preventing pain. Marlowe (1998) interviewed 114 headache suffers and asked them to keep a log of stressful events and headaches for 28 days. Results indicated that participants were less likely to develop a headache when they used cognitive techniques such as affective regulation to address stressful events, rather than avoidance or even direct problem solving. This suggests that removing the trigger may not be as important as one's response to the identified trigger. Furthermore, when participants used avoidance strategies in response to stressful events during a

headache, headache intensity remained elevated and pain severity was greater in subsequent attacks. In this case, not only were attempts to avoid the trigger ineffective in alleviating the pain, they were implicated in greater severity of future pain. Managing headache pain is clearly not as simple as avoiding the triggers for migraine, especially given that many triggers cannot be avoided.

The effects of avoidance on migraine are complex and likely cyclical in nature. McCracken and Gross (1995) described a "self-perpetuating cycle of pain" in which a person experiences pain, avoids as many experiences associated with pain as possible, and consequently decreases overall activity and therefore physical conditioning, ultimately making one more susceptible to pain and perpetuating the cycle. Similar patterns of avoidance behaviors have been conceptualized in fear-avoidance models of chronic musculoskeletal pain (Asmundson, Norton, & Norton, 1999; Vlaeyen & Linton, 2000), which describe relationships between fearful pain appraisals, avoidance behavior, and pain chronicity. According to these models, fearful appraisals of pain or re-injury drive avoidance behaviors, which subsequently exacerbate pain chronicity as a function of physical disuse and deconditioning, misinterpretations of bodily sensations, and inaccurate predictions about pain as described earlier (Vlaeyen & Linton, 2000). Avoidance behaviors become especially problematic when they extend beyond the mere triggers associated with pain and into broader life domains unrelated to the pain process (e.g., avoidance of leisure activities, withdrawal from social interactions, and taking pain medications when they are not needed). In this sense, fear of pain and resulting avoidance behaviors are actually more disabling than the pain itself. Restricted behavioral repertoires resulting from chronic and unwarranted avoidance contributes to depression (McCracken & Dhingra, 2002), which further narrows behavioral coping repertoires. Additionally, anxiety associated with avoidance

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behaviors may prevent more effective strategies such as problem solving and may increase pain due to increased physiological arousal and muscle tension, leading to more anxiety and avoidance (McCracken & Dhingra, 2002; McCracken & Gross, 1993).

Notably, fear-avoidance models have not been cogently applied to migraine. Based on the limited empirical data available and extrapolating from the broader chronic pain literature, unwarranted avoidance behaviors may inadvertently contribute to the persistence of migraine and migraine-related disability. Fundamentally though, this remains an empirical question as it applies to migraine, the latter of which is not initiated by musculoskeletal injury or maintained by disuse of muscular tissue (as is the case with most other chronic pain conditions from which the various fear-avoidance models were derived). Avoidance may be even less adaptive in migraine (compared to other chronic pain conditions) for this very reason, as the typical function of avoidance is to promote muscular and tissue repair (Dahl & Lundgren, 2006). Certainly, it is not the desire to avoid pain that is questionable, but the effectiveness (and possible negative repercussions) of attempts to do so.

Acceptance and Commitment Therapy (ACT)

The extent to which an individual with migraine will attempt to avoid pain is likely a function of personality traits, among other factors. Studies employing the Temperament and Character Inventory (TCI; Cloninger, Przybeck, Svrakic, & Wetzel, 1994), have found migraineurs to be high on harm avoidance and persistence and low on novelty seeking and self-directedness (Abbate-Daga,et al., 2007; Di Piero, et al., 2001; Park, et al., 2006). Individuals with these scores may be described as rigid in behavior and cognition, exhibiting behavioral inhibition in anticipation of negative events and living inconsistently with personal goals and values (Abbate-Daga et al., 2007; Di Piero et al., 2001; Park et al., 2006). One way to

conceptualize these traits characteristic of migraineurs is one of "psychological inflexibility," or an unwillingness to stay present in the moment to direct one's behavior, as often manifested by avoidance and escape behaviors. Addressing and modifying such obstacles to more flexible ways of behaving are at the heart of Acceptance and Commitment Therapy, or ACT (Hayes, Strosahl, & Wilson, 1999; McCracken & Vowles, 2008).

Acceptance and Commitment Therapy (ACT) is a behavioral therapy based on a functional, contextual philosophy with an emphasis on increasing the flexibility of one's behavioral repertoire and decreasing maladaptive avoidance behaviors (Hayes, 2008). One of the tenets of ACT is that much of human suffering stems from the struggle to control or avoid negative private events ("experiential avoidance"), inadvertently limiting opportunities for functional behavior and contributing to psychopathology (Hayes, Strosahl, & Wilson, 1999; Hayes, Strosahl, & Wilson, 2011). ACT is considered one of the "third wave" behavioral therapies, in that the focus is not primarily on symptom reduction (as with traditional cognitive behavioral therapies), but instead on increasing functioning and goal-directed activity (Arch & Craske, 2008). For example, whereas addressing negative thoughts about oneself and others (i.e., cognitive restructuring) is an integral component of cognitive behavioral therapy (CBT), an ACT therapist views attempts to modify cognitions as maladaptive and thus might endeavor to reduce the potency of the cognition itself via verbal exposure-based approaches.

An important goal of ACT is to utilize acceptance, mindfulness, and other experiential behavior change techniques to increase psychological flexibility. Psychological flexibility is defined as the ability to interact with the environment with awareness of oneself in that context, affording the ability to alter one's behavior in the interest of personal goals or values (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Put another way, psychological flexibility denotes one's

ability to interact flexibly with environmental contingencies and cognitions in order to pursue behaviors that are consistent with one's long-term goals and values. There are six core principles of ACT, the application of which culminates in psychological flexibility: acceptance, values, committed action, contact with the present moment, self-as-context, and cognitive defusion (Hayes et al., 2006). They are described briefly below, and those most central to the present study are addressed in further detail later.

The goal of acceptance, or the willingness to accept private events rather than persist in an unproductive struggle of control and avoidance, is to promote value-directed behavior. Values define the purposeful goals toward which the individual wishes to work, often in life areas such as family, career, or spirituality. Committed action refers to the specific behavior changes made in the direction of one's values. The processes of contact with the present moment, defusion, and self-as-context function to foster mindful action in the service of one's goals. Being in the present moment refers to a non-judgmental manner of interacting with the world directly while recognizing the influence of one's own thoughts, feelings, and private events. Self-as-context refers to the idea that through the use of language, humans develop a sense of self as perspective. Awareness of this perspective fosters defusion and acceptance. Finally, cognitive defusion provides flexibility in thinking and behavior by altering the unhelpful functions of thoughts and private events rather than attempting to alter their form.

The concept of defusion can be explained through relational frame theory (RFT; Hayes, 1994). A full description of the principles of RFT is beyond the scope of the present study. However, in short, relational frame theory describes the symbolic nature of human language and the transfer of stimulus properties from real life events to words, thoughts, or other symbols. For example, if A elicits a shock and a person learns verbally that A is smaller than B, then the

person will respond to B with greater emotion even though only A was directly conditioned (Dougher, Hamilton, Fink, & Harrington, 2007). Similarly, real life events become paired with their verbal representations such as thoughts. RFT suggests that this derived verbal relational responding may contribute to psychopathology when it causes humans to avoid private experiences and occurs at the expense of pursuing valued behavior (Arch & Craske, 2008). Through defusion, an individual is able to weaken the connection between the event and corresponding negative emotion. For example, the thought "I am worthless" is recognized as a product of one's mind rather than the actuality of living a worthless existence (Hayes et al., 2006). Many of the techniques used in ACT are experiential in nature, designed to weaken the control of fusion with language over behavior.

ACT has garnished significant empirical support over the past few years for the treatment of many different disorders and in various populations, even though the express focus of ACT is on increasing functioning rather than symptom reduction (Hayes et al., 1999). Many of these studies have found evidence of the effectiveness of ACT for conditions commonly comorbid with migraine such as depressive and anxiety disorders Arch, Eifert, Davies, Plumb Vilardaga, Rose, & Craske, 2012; Arch, Wolitzky-Taylor, Eifert, Craske, 2012; Block & Wulfert, 2000; Fledderus, Bohlmeijer, Fox, Schreurs, & Spinhoven, 2013; Forman, Herbert, Moitra, Yeomans, & Geller, 2007; López, 2000; Markanday et al, 2012; Twohig, Hayes, & Masuda, 2006). Initial empirical support for the mechanisms underlying ACT was obtained in a study conducted by Zettle and Rains (1989). Although both an early version of the ACT protocol and cognitive therapy elicited a reduction in depressive symptoms, participants in the cognitive therapy groups demonstrated a reduction in dysfunctional thoughts whereas the ACT group showed no significant change in automatic thoughts. These results suggest there are different mechanisms at

work for the two treatments, namely cognitive restructuring in cognitive therapy and acceptance, defusion, and mindfulness in ACT. Most recently the focus of ACT-related research has returned primarily to building empirical support for the mechanisms of change involved.

Acceptance and values-based action in ACT for psychopathology

Accumulating research suggests that the mechanisms of change at work in ACT are indeed the 6 core constructs outlined above (Hayes, 2008). Constructs that have been identified as contributing most to treatment efficacy include acceptance, values-based action, defusion, and mindfulness. The focus of the present study is on the role of acceptance and values-based action.

Acceptance as a mechanism of change has been highlighted in empirical studies with disorders such as social phobia (Block and Wulfert, 2000), OCD (Twohig, Hayes, & Masuda, 2006), and panic disorder (Levitt, Brown, Orsillo, & Barlow, 2004). Block and Wulfert (2000) examined outcome differences of CBT as compared to ACT and a wait list control group in 12 students who met criteria for phobic anxiety. After four weeks both treatment groups demonstrated significant improvement compared to a wait list control group, and results were maintained at 3-month follow up. Although both treatment groups yielded improved scores on all outcome measures, participants in the cognitive behavioral group demonstrated a larger decrease in anxiety symptoms, and participants in the ACT group demonstrated a higher increase in willingness to engage in feared situations. These results are consistent with the theoretical differences between the respective treatment modalities and demonstrate the clinical utility of increasing acceptance and decreasing experiential avoidance (even when independent of a reduction in symptoms).

However, a reduction of symptoms often does occur as a result of these ACT mechanisms of change. For example, Twohig, Hayes, and Masuda (2006) evaluated the outcome of an 8-session ACT intervention for OCD and found that increasing one's willingness to experience unpleasant private experiences was related to a significant decrease in scores on standard measures of OCD and decreases in symptoms of depression and anxiety. Notably, in addition to a decrease in experiential avoidance, believability of obsessions and the need to respond to the obsessions was also reduced. These findings indicate that "letting go" of the struggle to prevent obsessions (i.e., acceptance) actually decreased both frequency and potency of the obsessions.

Another example of the benefit of promoting acceptance and decreasing experiential avoidance can be found in a study of acceptance versus suppression of emotion in patients with panic disorder. Levitt and colleagues (2004) divided 60 participants into two treatment groups (brief acceptance or suppression intervention) and one control group. After instruction according to condition assignment, participants were given a 15-minute carbon dioxide challenge test. Participants in the acceptance condition reported less subjective anxiety and a greater willingness to participate in a second challenge, despite a lack of differences in reported panic symptoms or physiological arousal between the acceptance and suppression conditions. In other words, participants in the acceptance condition did not report a greater reduction of symptoms compared to those in the suppression condition, but nonetheless described less subjective anxiety and more willingness to try the challenge a second time.

Research on ACT for psychopathology also demonstrates the effectiveness of values-based action in promoting therapeutic change, though this construct has been explored less frequently than acceptance. As but one example, Hayes, Orsillo, and Roemer (2010) found that

significant improvement in generalized anxiety disorder was attributable to engagement in meaningful activities (values-based action) and acceptance. These mechanisms for change were significant beyond changes in worry, once again illustrating their utility independent of symptom reduction.

The results of these and other studies in the ACT literature point to the therapeutic benefits of increasing acceptance of negative private events and directing one's efforts toward behaviors consistent with personal values. In many cases these strategies decrease symptoms, but more consistently, and arguably more importantly, they reduce functional impairment and increase participation in important life activities.

ACT constructs in medical patients

In addition to efficacy for psychopathology, components of ACT have been found effective for improving adjustment to and coping with various medical conditions, such as diabetes, cancer, and epilepsy (Branstetter, Wilson, Hildebrandt, & Mutch, 2004; Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007; Lundgren, Dahl, & Hayes, 2008). Similar to research with ACT and psychological conditions, the underlying mechanisms of change that have been a focus of study include acceptance and values-based action, among others. These constructs may be especially salient for patients adjusting to medical conditions, in that many chronic conditions cannot be cured or their symptoms alleviated. That is, these patients must learn to persist in meaningful life activities despite their ongoing (and often incurable) medical problems.

Acceptance and values-based action are integral components of ACT treatments for chronic medical conditions, contributing to both improved adherence with recommended medical care and symptom reduction. Among a sample of 81 individuals with Type 2 diabetes, Gregg, Callaghan, Hayes, and Glenn-Lawson (2007) compared the 3-month follow-up results of

an educational program versus an ACT component that also emphasized acceptance and mindfulness skills. Participants in the ACT condition had better adherence with the self-care instructions and significant improvements in glycated hemoglobin; meditational analyses indicated that changes in acceptance were responsible for these improvements. The importance of values-based action as a mechanism of therapeutic change in medical patients was shown in an outcome study of ACT for patients with epileptic seizures (Lundgren et al., 2008). In this study, the duration of seizures was inversely related to values-based behavior, while quality of life and personal well-being were positively related to this construct.

These studies are a small sampling showing the relevance of the ACT constructs of acceptance and values-based action among patients with chronic medical conditions. Most recently, there has been a focus on these constructs in patients with chronic pain.

ACT and Chronic Pain

Very little research has explored the role of ACT constructs in migraine patients, though a growing body of literature attests to the utility of some ACT constructs as related to other types of chronic pain. Among the central 6 core constructs, acceptance and values-based action have been most frequently studied in chronic pain patients.

Acceptance**.** Regarding pain and discomfort, emotional suppression (avoidance) is linked to higher ratings of pain, discomfort and related distress in experimental settings (Luciano et al., 2010; Masedo & Esteve, 2007). More than 15 studies have been published on the roles of acceptance and avoidance in the context of chronic pain (as reviewed by McCracken & Vowles, 2008), all of which confirm that acceptance of pain is associated with improved emotional, social and physical functioning. The samples of these studies have included sufferers of various pain conditions such as back pain, fibromyalgia, musculoskeletal pain, and post lumbar surgery pain

(Mason, Mathias, & Skevington, 2008; McCracken, 1998; McCracken & Vowles, 2008). McCracken (1998) found that in a study of 160 patients of a university pain management center, a higher level of acceptance was related to lower levels of depressive symptoms, more activity, and less physical and psychosocial disability. Additionally, there was a relatively modest correlation between acceptance of pain and pain intensity, suggesting that acceptance is not merely a function of a low level of pain. In a regression analysis, pain acceptance was predictive of patient functioning as defined by the level of depressive symptoms, pain anxiety, and physical and psychosocial disability.

The construct of acceptance of pain along with activity engagement also appears beneficial to individuals suffering with cancer-related pain. Gauthier and colleagues (2009) examined pain acceptance in 81 patients receiving outpatient treatment at a comprehensive cancer center. Pain acceptance and activity engagement were negatively correlated with depression, and pain willingness was related to less catastrophizing. Pain acceptance was not related to severity or duration of pain. These results suggest that acceptance of cancer pain is related to better psychological well-being and can be fostered regardless of the level of pain. Other studies of chronic pain have confirmed that acceptance of pain is associated with less pain-related anxiety, depression, and disability, and with better work status (Huggins, Bonn-Miller, Oser, Sorrell,& Trafton, 2012, McCracken, 1998) and overall improved quality of life (Gauntlett-Gilbert, Conell, Clinch, & McCracken, 2013; Mason et al., 2008; McCracken & Vowles, 2008).

Values-Based Action. The benefits of pain acceptance are well documented, but the dialectic between acceptance and avoidance presents a struggle for many chronic pain patients. According to ACT, the motivation to accept pain and increase psychological flexibility is found in an individual's set of values (Dahl, Wilson, Luciano, & Hayes, 2005). In a study of acute pain, Branstetter-Rost, Cushing, and Douleh (2009) provided an ACT-based acceptance intervention to participants completing a cold pressor task. One group received the intervention including a values component and the other received the intervention with acceptance alone. A third group served as the control. Although both treatment conditions yielded higher pain tolerance during the cold pressor than the control group, the group receiving the values component demonstrated a higher level of pain tolerance than the group that received only the acceptance intervention (Branstetter-Rost et al., 2009). The results of this study suggest that values-based action contributes uniquely to pain tolerance beyond acceptance alone. This study is noteworthy because most treatment studies on values-based action in chronic pain have not evaluated this construct separately from acceptance.

Focusing on personal values and engaging in meaningful activity can be difficult in the context of chronic pain. Dahl, Wilson, Luciano, and Hayes (2005), in their book *Acceptance and Commitment Therapy for Chronic Pain*, suggested that for some people, focusing on one's values is a painful reminder of what has been lost due to chronic pain. Their goals and corresponding behaviors are put aside until the pain can be alleviated or managed, which often proves difficult or impossible. Over time, the struggle to control the pain can outweigh the reasons (i.e., values) for wanting to control the pain (e.g., ability to participate in life activities of importance to the individual). Techniques helping patients reconnect with their values are often useful therapeutically, as they function as both context and motivating variables for therapeutic

change (Dahl et al., 2005). Indeed, success in living according to one's values is negatively correlated with disability, depression, and pain-related anxiety among patients with chronic pain (McCracken & Vowles, 2008; McCracken & Yang, 2006). The predictive utility of values remains even when isolated from other constructs of psychological flexibility (acceptance, mindfulness) and operates largely independently of pain intensity (McCracken & Vowles, 2008). In practice though, the constructs of acceptance and values are often studied together, because they are both components of the broader construct of psychological flexibility.

Psychological Flexibility. Several studies have investigated the broader role of psychological flexibility in chronic pain, most of which have defined psychological flexibility based on combinations of measures assessing acceptance and values-based action, among others. A recent study by Vowles and McCracken (2010) examined the usefulness of an ACT treatment for chronic pain by assessing 114 patients after a 3-4 week comprehensive treatment program and then again at a 3-month follow up. The sample consisted of patients with pain in the lower back (44.4%), upper extremity (20.5%), full body (16.2%), lower extremity (11.1%), neck (2.6%), and other sites (5.1%). Participants completed a battery of instruments measuring pain intensity, depression, pain-related anxiety and avoidance, physical and psychosocial disability, pain-related medical visits, and physical functioning. The treatment program was an ACT protocol developed for chronic pain, and the treatment team included professionals from clinical psychology, physical therapy, occupational therapy, nursing, and medicine. Patients were seen 5 days a week, usually in groups, and participated in physical conditioning, psychological approaches (based on the ACT for chronic pain protocol), mindfulness training, activity engagement, skills training, and health education. Improvement (i.e. decreases in pain, depression, anxiety, disability, and medical visits, and an increase in physical ability) was related

to increased psychological flexibility as evidenced by decreased struggling to control pain (i.e., acceptance), increased participation in meaningful activity, and increased awareness of the present moment. In this study, traditional pain coping techniques, such as distraction and relaxation, were unrelated to improvements in functioning.

These results were similar to those obtained by McCracken and Vowles (2007) when examining the revised Brief Pain Coping Inventory (BPCI-2: McCracken,Vowles, & Gauntlett-Gilbert, 2007). A series of hierarchical multiple regression analyses found psychological flexibility (i.e., a combination of acceptance of pain, mindfulness, defusion, and values-based action) to be the strongest predictor of pain-related anxiety, depression, psychosocial disability, medication use, uptime, and medical visits among patients who had a diagnosis of fibromyalgia, musculoskeletal pain, or post-lumbar-surgery pain. Additionally, the regression coefficients for psychological flexibility were significant in 8 of the 9 predictor equations, while regression coefficients for traditional pain management techniques (e.g., pacing, relaxation, positive self-statements) were not significant in any (McCracken & Vowles, 2007). Similarly, McCracken and Velleman (2010) conducted a survey of 239 chronic pain patients contacted through their primary care providers. They found that psychological flexibility was a better predictor of functioning than pain intensity (accounting for 24.1% of the variance vs. 9.2% respectively), a result paralleling that obtained by McCracken and Vowles. In a series of multiple regression analyses, acceptance of pain and values-based action were significant predictors of variables pertaining to functioning and quality of life. Similarly, McCracken and Vowles (2008) reported on 115 patients receiving treatment for chronic pain in the United Kingdom. They found that measures of acceptance of pain and values were both significant predictors of depression and

psychosocial disability, though each construct also afforded differential prediction of other criterion variables.

The research conducted by McCracken and colleagues suggests that components of psychological flexibility are strongly associated with many important of relevance to chronic pain. These findings suggest that treatment approaches targeting these constructs may be more effective for chronic pain than are traditional cognitive-behavioral pain management techniques, although this proposition awaits further empirical verification. This notion is supported indirectly by the relatively scant body of empirical support for the common clinical advice to avoid migraine triggers (Martin, 2009). The potential importance of treatments based on improving psychological flexibility is further bolstered by the promising outcome data on ACT interventions for whiplash associated disorders (WAD) (Wicksell, Ahlqvist, Bring, Melin, & Olsson, 2008; Wicksell, Olsson, & Hayes, 2010), pediatric pain patients (Wicksell, Melin, Lekander, & Olsson, 2009; Wicksell, Olsson, & Hayes, 2011), and among both residential (McCracken & Gutiérrez-Martínez, 2011; McCracken, Vowles, & Eccleston, 2005) and outpatient pain samples (Buhrman et al., 2013; Thorsell et al., 2011; Vowles, Wetherell, & Sorrell, 2009; Vowles, McCracken, & O'Brien, 2011; Wetherell et al., 2011). The results of these studies are relatively consistent in confirming that interventions emphasizing acceptance and values-based action, among other components, are effective not only in reducing pain symptomatology but in improving comorbid psychiatric symptoms and reducing functional impairment, disability, and pain-related anxiety. This significant body of outcome research has culminated in the listing of ACT as an empirically supported treatment for chronic pain by Division 12 of the American Psychological Association (Clerkin et al., 2010). However, there remains a striking paucity of research with ACT and ACT constructs germane to headache.

A recent study conducted by Mo'tamedi, Rezaiemaram, and Tavallaie (2012) investigated the effect of group sessions of ACT on chronic headache patients. Participants were 30 Iranian female patients (63% chronic tension type and 37% migraine without aura). Half were provided 8 group sessions of ACT in addition to medical treatment as usual and the other half were provided treatment as usual alone. Pre and post-tests were administered, and the results showed a significant decrease in headache-related disability and emotional distress (but not pain) for the treatment group. Another recent investigation specific to migraine patients with co-morbid depression demonstrated the benefit of a one-day workshop on ACT and migraine education as an adjunct to treatment as usual. Forty-five migraine patients participated in the one-day training. Post-test measures were administered at a two, six, and twelve week follow-up. The results were consistent even at the twelve week follow up, indicating a significant improvement in depressive symptoms, general functioning, and migraine-related disability (Dindo, Recober, Marchman, Turvey, & O'Hara, 2012). Although these studies resulted in promising findings, they are among the very few empirical studies examining ACT constructs in the population of migraine sufferers.

Current Study

In summary, a growing body of literature has examined the connection between the constructs of psychological flexibility and functioning in chronic pain patients. Consistently, the constructs of acceptance (of pain) and values-based action have been associated with improved functioning, reduced disability, and reduced pain severity. However, these constructs have not been previously examined in migraine patients, despite the high prevalence of and disability associated with migraine. The aforementioned findings on the potentially detrimental effects of avoidant coping on migraine (e.g., Marlowe, 1998), as well as the tendency of migraineurs to persist in activities counterproductive to their values (Abbate-Daga et al., 2007; Boz et al., 2004;

Di Piero et al., 2001; Park et al., 2006), argue further for the need to explore constructs of acceptance and values-based in this medical population. Such work may help to flesh out the underlying processes that contribute to migraine persistence and disability and to inform future behavioral treatment efforts. The purpose of the present study was to examine relationships between two core constructs of psychological flexibility (acceptance of pain, values-based action) and pain characteristics and disability in migraine patients.

The following goals and hypotheses were examined:

Study Goal 1: Assess the relationship between psychological flexibility and migraine characteristics.

> Hypothesis 1: Acceptance of pain and values-based action would significantly predict lower migraine severity, lower migraine frequency, and fewer pain-related medical visits, even after controlling for relevant demographic variables and pain severity.

Study Goal 2: Assess the relationship between psychological flexibility and migraine-related disability.

> Hypothesis 2: Acceptance and values-based action would significantly predict lower headache-related disability, even after controlling for relevant demographic variables and pain severity.

Study Goal 3: Assess the relationship between migraine characteristics, psychological flexibility, and fear of pain.

> Hypothesis 3a: Fear of pain would be positively related to pain intensity, pain severity, and migraine-related disability, and negatively related to the measures of psychological flexibility.

Hypothesis 3b: After accounting for headache severity and migraine-related disability, acceptance of pain and values-based action would be predictive of lower ratings of fear of pain.

METHODOLOGY

Participants

Participants were recruited from the Oxford Neurology Clinic in Oxford, MS, the Wesley Neurology Clinic, Memphis, TN, and the Jackson Clinic (Family Medicine division) in Montgomery, AL. The sample consisted of adult patients meeting physician-confirmed ICHD-II (at both neurology clinics) or ICD-9 (at the Jackson Clinic) diagnostic criteria for migraine, both episodic (with and without aura) and chronic. Clinic patients were recruited by mail or in person when they presented for a scheduled appointment. Of those recruited in person, 64 returned the survey. Two hundred thirty letters were mailed to migraine patients from the Oxford and Jackson clinics, and 45 patients responded. Of these, 6 patients logged on to the online survey but did not complete any measures. The remaining 103 patients responded to the questionnaires included in the study.

Measures

Diagnostic and Treatment Information. Basic information such as headache diagnosis, current medications, and demographic variables such as age, gender, ethnicity, and education level were obtained from medical staff at the participating clinics. This documentation form can be found in Appendix A.

Pain Anxiety Symptoms Scale, Brief Version (PASS-20). The PASS-20 (McCracken & Dhingra, 2002) is a short form version of the Pain Anxiety Symptom Scale (PASS; McCracken, Zayfert, & Gross, 1992). The PASS-20 is a 20-item inventory developed to measure anxiety about pain (Roelofs, McCracken, Peters, Crombez, van Breukelen, &

Vlaeyen, 2004). Items are presented in statement form and respondents rate how often each item occurs using a 6-point response format ranging from "never" (0 points) to "always" (5 points) (McCracken & Dhingra, 2002). Sample statements include "I find it hard to concentrate when I hurt," "I begin trembling when engaged in an activity that increases pain," and "I find it difficult to calm my body down after periods of pain." Like the original PASS, the PASS-20 is comprised of 4 subscales: cognitive anxiety, fear, escape/avoidance, and physiology. Items are summed to yield both subscale scores and an overall score (ranging from 0 – 100), with higher scores indicating greater pain-related anxiety. Results from an analysis of the psychometric properties with a nonclinical sample suggest a cut-off score of 30 on the PASS-20 as indicative of clinically significant pain- related anxiety (Abrams, Carleton, & Asmundson, 2007). The PASS-20 yields internal consistency reliability estimates in the 0.80s and 0.90s for the overall score and in the 0.70s and 0.80s for the subscales (Gauthier, Rodin, Zimmermann, Warr, Moore, Shepherd et al., 2009; McCracken & Dhingra, 2002; Roelofs et al., 2004; Watt, Stewart, Lefaivre, & Uman, 2006). In regards to construct validity, the PASS-20 has demonstrated both convergent and divergent validity. The subscales for the shortened version are highly correlated with the matching subscales on the original PASS (r = 0.93 to r = 0.97). Correlations between related measures (e.g. Visual Analogue Scale for Pain (Price, McGrath, Rafii, & Buckingham, 1983), Beck Depression Inventory (Beck, Ward, & Mendelson, 1961), and Sickness Impact Profile (Bergner, Bobbitt, Pollard, & Martin, Gilson, 1976) and both versions of the PASS were significant at $p < 0.001$ (McCracken & Dhingra, 2002). Factor analysis has revealed a strong four-factor structure corresponding to the four subscales (Abrams et al., 2007; McCracken & Dhingra, 2002; Roelofs et al., 2004). This scale can be found in Appendix B.

The Chronic Pain Acceptance Questionnaire (CPAQ). The CPAQ (McCracken, Vowles, & Eccleston, 2004) is a 20-item Likert-style measure that assesses acceptance and

experiential avoidance but is specific to pain experiences. Statements from the measure are scored to reflect a total score and two subscale scores: Activity Engagement and Pain Willingness, which underscore the notion that acceptance of pain involves both engaging in important activities despite pain *and* being willing to endure pain. Examples of statements assessing activity engagement include "I am getting on with the business of living no matter what my level of pain is" and "There are many activities I do when I feel pain." Examples of items assessing pain willingness include "It's OK to experience pain" and "I would gladly sacrifice important things in my life to control this pain better" (McCracken et al., 2004). Factor analytic studies have confirmed a two-factor structure supporting these subscales (Vowles, McCracken, McLeod, & Eccleston, 2008; Wicksell, Olsson, & Melin, 2009). With regards to psychometric properties, the CPAQ yields internal consistency reliability estimates in the high 0.80s (Gauthier et al., 2009). Both subscales correlated significantly with the Center for Epidemiologic Studies-Depression Scale (CES-D; Radloff, 1977), PASS-20, and Pain Catastrophizing Scale (PCS; Sullivan, Bishop, & Pivik, 1995) (Gauthier et al., 2009). For our purposes, the CPAQ total score was utilized, which ranges from 0-120; higher scores indicate greater acceptance of chronic pain. This questionnaire can be found in Appendix C.

The Chronic Pain Values Inventory (CPVI). The CPVI (McCracken & Yang, 2006) is a 12-item self-report measure designed to assess a chronic pain sufferer's success at living according to his or her personal values (McCracken & Keogh, 2009; McCracken & Yang, 2006). More specifically, the instrument assesses the importance of the individual's values and any potential discrepancy between their importance and the extent to which she engages in behaviors congruent with those values (McCracken & Keogh, 2009; McCracken & Yang, 2006). Values are divided into six domains: family, intimate relations, friends, work, health, and growth or learning. Patients are asked to rate the importance of personal values in each of these domains

and also how successfully they live according to the values in each of the six domains (McCracken & Keogh, 2009). Responses are given on a scale of 0 (not at all important/successful) to 5 (extremely important/successful) and yield two primary scores: an average of the 6 importance scores and an average of the 6 success scores (McCracken & Keogh, 2009; McCracken & Yang, 2006). Scores can range from 0 – 6 for each primary score. The CPVI has clinical utility in that discrepancies between the importance ratings and the success ratings provide useful information in case conceptualization and development of therapeutic goals. However, the success score alone typically is used in research as a measure of values-based action (McCracken & Keogh, 2009; McCracken & Vowles, 2008) and was utilized in that manner for the present study.

The CPVI has demonstrated reliability with a Cronbach's alpha reliability coefficient of 1.82 (McCracken & Yang, 2006). The success score is positively correlated with measures of pain acceptance and patient functioning and negatively correlated with measures of depression, pain anxiety, and disability (McCracken & Keogh, 2009; McCracken & Vowles, 2008; McCracken & Yang, 2006). This inventory can be found in Appendix D.

The Migraine Disability Assessment Scale (MIDAS). The Migraine Disability Assessment Scale is a brief self-report measure of headache-related disability that quantifies limitations on activity and behavior due to headache (Stewart, Lipton, Simon, Von Korff, & Liberman, 1998; Lipton, Stewart, Sawyer, & Edmeads, 1998; Holmes, MacGregor, Sawyer, & Lipton, 2001). The MIDAS consists of 7 items: 5 questions regarding the number of days over the last 3 months during which certain activities (e.g., occupational/school performance, household work, leisure activities) were prevented or limited due to headache and 2 questions pertaining to headache frequency and severity (Stewart et al., 1998). Answers to the first 5 questions comprise the overall score of migraine-related disability (Sauro, Rose, Becker,

Christie, Giammarco et al., 2010). The total score can range from 0 – 270, with higher scores indicating greater impairment. Participants are categorized based on their scores as having: little/no disability, mild disability, moderate disability, or severe disability. Participants scoring 21 or greater are classified as "severely disabled" (Sauro et al., 2010).

The MIDAS has been widely used and has been found to be both reliable and valid. The test-retest coefficient in a population-based sample was 0.84 and the internal reliability coefficient was 0.83 (Stewart et al., 1998). Construct validity for the measure has been demonstrated through significant positive correlations with the Headache Impact Test (HIT-6; Bayliss, Dewey, Dunlap, Batenhorst, Cady, Diamond, et al, 2003) and the Beck Depression Inventory (BDI; Beck, Ward & Mendelson, 1961) (Sauro et al., 2010). The MIDAS can be found in Appendix E.

Headache Impact Test (HIT-6). The HIT-6 is a 6-item Likert-type self-report measure designed to assess the effect of headache on functioning (Kosinski et al., 2003). The HIT-6 measures headache-related disability across the domains of pain, social functioning, cognitive functioning, and psychological distress. Response choices include "never", "rarely", "sometimes", "very often", and "always". The HIT-6 yields a total score calculated as the sum of the 6 items and can range from 36-78. Higher scores indicate greater impairment, and respondents can be classified according to score into one of four categories: little or no impact (36 - 49), some impact (50 - 55), substantial impact (56 - 59), or very severe impact (60 - 78).

The HIT-6 is widely used and has been translated into 27 different languages. The HIT-6 demonstrated good internal consistency (Cronbach's alpha coefficient of 0.90) and test-retest reliability (Cronbach's alpha coefficient of 0.78). Construct validity has been evidenced by strong correlations with other measures of headache related disability and quality of life (Cole, Lin, & Rupnow, 2007; Sauro et al., 2010). The HIT-6 was included in the present study as a

supplement to the MIDAS, given that they assess headache-related disability in different ways. The HIT-6 can be found in Appendix F.

General Health Questionnaire (GHQ 12). The GHQ 12 (Goldberg & Williams, 1988) is the shortest form of the General Health Questionnaire, which was initially a 60-item measure but can also be found in 20, 28, and 30-item versions. The GHQ 12 is a brief self-report measure of general mental health. Twelve items are presented and respondents are asked to rate how prevalent each experience has been for them in the past few weeks. The exact phrasing of the responses varies depending on the item presented. Sample items include "Have you recently felt constantly under strain?" and "Have you recently felt you couldn't overcome your difficulties?" Likert-type response options corresponding to the frequency each item has been experienced are scored using a 0, 1, 2, or 3 point system, with higher scores indicating greater mental distress.

The GHQ 12 has been used in numerous settings with a variety of populations. Obtained internal reliability estimates have been in the 0.80s (Montazeri, Harirchi, Shariati, Garmaroudi, Ebadi & Fateh, 2003; Sriram, Chandrashekar, Isaac, & Shanmugham, 1989; Politi, Piccinelli, & Wilkinson, 1994; Winefield, Goldney, Winefield, & Tiggemann, 1989). In regards to validity, the GHQ 12 is significantly correlated with other measures of mental disorder and negatively correlated with measures of quality of life (McCabe, Thomas, Brazier, & Coleman, 1996; Montazeri et al., 2003; Serrano-Aguilar, Ramallo-Fariña, Trujillo-Martín, Muñoz-Navarro, Perestelo-Perez, & de las Cuevas-Castresana, 2009).

Procedure

Participants were recruited in person during medical appointments and through mailed letters from their physicians' offices. Two methods of completing the battery of aforementioned

surveys were offered: an online link to the surveys and a paper format provided in the office. Both options included an explanation and indication of informed consent to ensure understanding of the voluntary nature of the research, participants' confidentiality and right to withdraw at any time, and their designation of willingness to participate. Participants who chose the paper format completed the questionnaire packet in the waiting room of the clinic prior to or after examination by the physician. These packets were collected by office staff and later retrieved by the research team, except for participants who instead took the packet home for completion and returned it to the clinic via a provided postage-paid envelope. The physicians assessed relevant migraine features and confirmed that the patients met ICHD-II diagnostic criteria for migraine at the neurology clinics and ICD-9 criteria at the family clinic. The patient's current medication regimen and comorbid pain diagnoses were documented by medical staff.

RESULTS

Statistical Analyses

      The data set was first examined for outliers. A boxplot was constructed and 16 outliers were identified. Upon closer inspection of each of the data points, it was determined that the outlying variables were likely not due to measurement error, but rather true extreme scores, and were therefore not excluded from the analyses. Descriptive statistics such as means and standard deviations for each measure were calculated. A correlation matrix was constructed to assess multicollinearity and to evaluate potential covariates for subsequent analyses. A series of t-tests and one-way analyses of variance were used to compare means for demographic variables. Major hypotheses were tested using a series of hierarchical multiple linear regressions for each criterion variable. Criterion variables were: migraine disability as measured by the MIDAS and HIT-6, fear of pain as measured by the PASS-20 total score, migraine severity, migraine frequency, and number of pain-related medical visits within the past 6 months. Headache severity and any identified covariates were entered into the first block of each model (except when migraine severity was the criterion variable). The second block included the processes of psychological flexibility entered simultaneously (CPAQ and CPVI scores), in order to determine the unique variance accounted for by psychological flexibility independent of any association with headache severity or other covariates. These hierarchical regression analyses were repeated for each criterion variable.

Descriptive Statistics

One hundred three patients participated in the study. The sample consisted of 55 patients with episodic migraine (53.39%), 19 with a diagnosis of episodic migraine with aura (18.44%), and 29 with a diagnosis of chronic migraine (28.16%). Ninety participants were female (88.24%) and 12 were male (11.76%). The mean age was 41.45 years (SD = 11.92), with ages ranging from 18 to 81. Ninety-three were Caucasian (91.17%), five were African American (4.90%), two were Asian (1.96%), two identified as "other" (1.96%), and one participant did not answer the question. A small minority of patients did not complete high school (4.90%), 15.69% had a high school education or equivalent, 29.41%, had "some college," 18.60% had a college degree, 8.82% had "some graduate school," and 20.59% had a graduate degree.

Means and standard deviations for each measure are presented in Table 1. Means for measures of psychological flexibility were compared across sex, race/ethnicity, and diagnosis using a t-test and a series of one-way analyses of variance (ANOVAs). There were no statistically significant differences found in either measure of psychological flexibility for race or headache diagnosis. In regards to sex, CPAQ scores for male participants were significantly higher than female participants (M = 71.25 [14.12] vs. 59.47 [17.49], respectively; $t[99] = 2.23$, $p = .028$). Headache severity ratings were significantly higher for female than male participants (M = 7.06 [1.72] vs. 5.50 [1.98], respectively; $t[97] = -2.90$, $p = .005$), as were scores on the PASS-20 (M = 47.45 [19.62] vs. 35.58 [16.59], respectively; t[96] = -1.99, $p = .049$). As such, gender and headache severity were entered as covariates in Block 1 of the subsequent regression models.

A correlation matrix was constructed to assess relations between variables and

potential multicollinearity. These data are presented in Table 2. As expected, the measures of

psychological flexibility were significantly negatively correlated with measures of migraine-

related disability, general psychological distress, and pain anxiety. Measures of disability and

psychological distress were significantly correlated with each other, as were the measures of

psychological flexibility. However, multicollinearity was not considered a concern as none of

the correlations in the matrix exceeded 0.60.

Hypothesis 1: Acceptance of pain and values-based action would significantly predict lower

migraine severity, lower migraine frequency, and fewer pain-related medical visits, even

after controlling for relevant demographic variables and pain severity.

In the first analysis, migraine severity was entered as the criterion variable. Therefore,

the first block included gender alone, and the measures of psychological flexibility (CPAQ

and CPVI) were entered simultaneously in the second block. Both models were significant (p

$= .005$ and $p < 0.0001$). The first model consisting of gender alone accounted for 8% of the

variance in

severity scores, $F (1, 95) = 8.41$, $p = .004$. The second model including both gender and the

measures of psychological flexibility accounted for 18% of the variance ($R^2 = 0.18$) resulting in

a significant R^2 change of 10% ($p = .006$). An examination of the squared semipartial

correlations

indicated that CPVI scores contributed 8% of the unique variance ($p = .004$), while CPAQ

scores contributed less than 1% (see Table 3).

The second regression equation consisted of migraine frequency as the criterion

variable, migraine severity and gender in the first block, and measures of psychological

flexibility added in the second block. The first model was not significant ($p = .272$) and

accounted for only 3% of the variance in frequency of headaches, $F (2, 93) = 1.32$, $p = .272$.

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Although the second model increased the proportion of variance accounted for to 8%, both the overall model, $F(4, 91) = 1.98$, $p = .105$, and the R^2 change were not statistically significant, $F(2, 91) = 2.59$, $p = .08$ (see Table 4).

For the third regression, frequency of pain-related medical visits (number of visits in the past six months) was entered as the criterion variable. Model 1, including only migraine severity and gender, was not significant and accounted for 5% of the variance in frequency of medical visits. The second model, which included the measures of psychological flexibility, trended toward significance ($p = .07$) and accounted for 9% of the variance in frequency of medical visits. The addition of psychological flexibility scores did not provide a statistically significant change in R^2 (4% incremental variance) (see Table 5).

Hypothesis 2: Acceptance and values-based action would significantly predict lower headache- related disability, even after controlling for relevant demographic variables and pain severity.

In the first disability regression, MIDAS scores were entered as the criterion variable. The first model including migraine severity and gender accounted for 11% of the variance in migraine disability as measured by the MIDAS, $F(2, 94) = 5.69$, $p = .005$. The second model, which added the measures of psychological flexibility, was also significant, accounting for 30% of the variance in migraine disability scores, $F(4, 92) = 9.99$, $p < .001$. Not only was the model

significant, the addition of psychological flexibility scores provided a large increase in R^2 of 20%

($p < .001$), indicating that together the CPVI and CPAQ scores contributed significantly to changes in MIDAS scores. CPVI scores accounted for the most variance (10.18%) in MIDAS scores, while CPAQ scores accounted for 3.76% (see Table 6).

In the second disability analysis, migraine disability was represented using the HIT-6 as the criterion variable. The first model with migraine severity and gender accounted for 28% of the variance in migraine disability as measured by the HIT-6, $F(2, 93) = 18.18$, $p < .0001$. The second model, which added the measures of psychological flexibility, accounted for 34% of variance in HIT-6 scores, $F(4, 91) = 11.72$, $p < .001$. This addition of psychological flexibility

scores provided a significant incremental change in R^2 of 0.06 ($p = .020$), indicating that the combination of CPVI and CPAQ scores contributed to changes in HIT-6 scores. CPVI scores contributed a significant 3% of the variance in HIT-6 scores when other variables were held constant ($p = .043$), while CPAQ scores contributed only 1.3%, which was not statistically significant (see Table 7).

Hypothesis 3a: Fear of pain would be positively related to pain intensity, pain severity, and migraine-related disability, and negatively related to the measures of psychological flexibility.

As previously described, a correlation matrix was used to determine the relationship among variables. The PASS-20 was significantly positively related to the measures of migraine- related disability, the MIDAS (r = 0.30; $p = .002$) and HIT-6 (r = 0.56; $p < .0001$). PASS-20 scores were also positively correlated with pain severity (r = 0.54; $p < .0001$) and frequency of pain-related medical visits (r = 0.23; $p = .028$). Regarding the measures of psychological flexibility, the PASS-20 was significantly negatively correlated with the CPAQ (r = - 0.28; $p =.006$) and the CPVI (r = - 0.22; $p = .029$).

Hypothesis 3b: After accounting for headache severity and migraine-related disability,

acceptance of pain and values-based action would be predictive of lower ratings of fear of

pain.

The PASS-20 was designated as the criterion variable for this regression. The first

model with migraine severity, gender, and MIDAS scores entered as predictors was significant

($p < .001$) and accounted for 31% of the variance in pain anxiety, $F(3, 92) = 13.74$, $p < .001$.

The second model, which added the measures of psychological flexibility, was also significant

($p < .001$). However, the model accounted for 33% of the variance, indicating an R-square

change of only 0.02, which was not statistically significant (see Table 8). The next regression

included migraine severity, gender, and HIT-6 scores in the first model. The model was

significant ($p <$

.001) and accounted for 42% of the variance in pain anxiety, $F(3, 92) = 21.86$, $p < .001$. The

second model, which added the measures of psychological flexibility, was also significant ($p <$

.001). However, the model accounted for 43% of the variance, which indicated a minor R-

square change of 0.01 that was not significant (see Table 9).

Sensitivity Analyses

In order to determine the effect of general psychological distress, the previously

performed regressions were re-run to also include the GHQ-12 scores as covariates in Block 1.

As with the previous regressions, measures of psychological flexibility were not significant

predictors of headache frequency or of pain-related medical visits after accounting for

psychological distress, gender and migraine severity. Additionally, after controlling for general

psychological distress and gender, psychological flexibility was no longer predictive of

migraine severity. However, psychological flexibility remained significantly associated with

migraine-related disability as measured by the MIDAS ($p < .0001$). The measures of psychological flexibility accounted for 12% of incremental variance ($p = .001$). CPVI scores contributed a significant 7% of the variance when other variables were held constant, while CPAQ scores did not contribute significantly. Psychological flexibility was not predictive of migraine-related disability when measured by the HIT-6.

Finally, the aforementioned regressions with the PASS-20 as the criterion variable were re-run in a similar fashion adding the measure of general psychological distress (GHQ-12) in the first block. Results were similar to the regressions without the GHQ-12. Blocks 1 and 2 of both models were significant ($p < .001$ for all four models), but the R-squared change resulting from adding the measures of flexibility was not statistically significant (both incremental R^2s = 0.03).

DISCUSSION

Numerous studies have revealed the benefit of psychological flexibility on functioning in chronic pain patients, with an established association between increases in flexibility and decreases in disability and pain severity (McCracken & Velleman, 2010; McCracken & Vowles, 2008). Specifically, the constructs of acceptance (of pain) and values-based action have been identified as mechanisms of change in these studies. However, the extent to which these variables are relevant among migraineurs remains understudied and largely unknown, despite migraineurs' tendency to engage in avoidance behaviors and activities counterproductive to their values in efforts to reduce pain (Abbate-Daga et al., 2007; Boz et al., 2004; Di Piero et al., 2001; Park et al., 2006). The current study was designed to evaluate the relationships between two core constructs of psychological flexibility (i.e., acceptance of pain, values-based action) and both pain characteristics and disability in migraine patients. Consistent with studies in the broader field of chronic pain (Buhrman et al., 2013; McCracken & Gutiérrez-Martínez, 2011; McCracken, Vowles, & Eccleston, 2005; Thorsell et al., 2011; Vowles, McCracken, & O'Brien, 2011; Vowles, Wetherell, & Sorrell, 2009; Wetherll et al., 2011), the current study found that constructs of psychological flexibility are associated with improved functioning in migraine patients, particularly reduced disability and pain severity. Importantly, these relations with psychological flexibility remained even after controlling for relevant covariates.

Associations with Headache Pain and Disability

As anticipated, inverse relationships were found between the measures of psychological flexibility and migraine severity, disability, and pain-related anxiety. This suggests that higher levels of acceptance of pain and values-based action are associated with lower levels of pain, disability, and fear of pain. The CPVI was also negatively correlated with medical visits, indicating that people who engage in more values-based behaviors seek medical treatment less often. Greater psychological flexibility was also predictive of lower severity ratings of migraine pain. Possibly the most notable finding regarding the first hypothesis was that although the regression model predicting pain severity was statistically significant, a closer examination of the squared semipartial correlation coefficients revealed that this effect was driven by the CPVI scores, such that values-based behavior was more strongly associated with pain severity than was acceptance of pain. Interestingly, neither pain severity nor psychological flexibility was predictive of headache frequency or pain-related medical visits.

As proposed in the second hypothesis, psychological flexibility was predictive of improved functioning in migraine patients as measured by two different disability instruments. Both pain acceptance and values-based behavior were significant predictors of migraine disability as measured by the MIDAS, even after accounting for migraine severity. Nearly 20% of the variance in MIDAS scores (a medium-to-large effect size) was accounted for by psychological flexibility even after controlling for relevant demographic variables and pain severity (Cohen, 1998). When disability was measured by the HIT-6, values-based behavior was a significant predictor, although pain-acceptance was not. The reason for this discrepancy in results is unclear; however, the items on the HIT-6 refer to how the respondent felt (e.g. "When you have a headache, how often do you wish you could lie down?") whereas the MIDAS requests a specific number of days during which the individual did not engage in important

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activities. Possibly the HIT-6 does not entirely capture the "activities engagement" aspect of the CPAQ. For instance, someone high in pain acceptance might be able to recognize this desire to lie down (accept the feeling) but continue with a values-based activity such as attending her child's school play anyway. In this case, she might answer, "Always" on HIT-6 questions such as "When you have a headache, how often do you wish you could lie down" and thus appear to experience greater disability than on the MIDAS.

Importantly, psychological flexibility was predictive of pain severity and disability but not migraine frequency or number of medical visits. One possible explanation is that psychological flexibility is principally associated with pain perception and functioning rather than more basic aspects of pain symptomatology. This argument is consistent with the theoretical tenets of ACT, in which the primary goal of treatment is improved functioning rather than symptom reduction per se. It is likely that when an individual participates in more meaningful activities, she experiences improvement in overall well-being and functioning even if her pain symptoms or frequency remain unchanged. Values-based behavior has been consistently associated with reductions in depressive symptoms (Dindo et al., 2012; McCracken & Vowles, 2008; Twohig, et al., 2006), and increases in optimism have been linked to decreases in pain sensitivity in an experimental setting (Hanssen, Peters, Vlaeyen, Meevissen, &Vancleef, 2013). Further, individuals who are not avoiding meaningful activities are more likely to engage in social interactions and less likely to experience loneliness, a risk factor for development of pain, depression, and fatigue (Jaremka et al., 2013). Alterations in how one perceives and conceptualizes pain in relation to her functioning may thus affect changes in psychological pain perception that are not reflected in symptom reduction.

Regarding the third hypothesis, fear of pain was significantly correlated with migraine severity and migraine-related disability as measured by both the MIDAS and HIT-6, consistent

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with previous studies linking pain anxiety to increased pain severity, disability, and chronicity across numerous pain conditions (Leeuw et al., 2007; Samwel, Kraaimaat, Crul & Evers, 2007). As expected, fear of pain was negatively correlated with both measures of psychological flexibility. However, pain acceptance and values-based behavior were not significantly predictive of lower pain anxiety after accounting for migraine-related disability, migraine severity, and gender. It has been suggested that some mediating factors between pain anxiety and disability are avoidance and catastrophizing, commonly used coping mechanisms in migraine patients (Samwel et al., 2007; Lake, 2009) that are associated with pain severity, disability, and chronicity (Drahovzal, Stewart, & Sullivan, 2006; Holroyd, Drew, Cottrell, Romanek, & Heh, 2007; Turner, Mancl, & Aaron, 2004). A more recent study (Wideman & Sullivan, 2011) found that catastrophizing contributed uniquely to pain-related disability while avoidance contributed uniquely to pain severity. The constructs of psychological flexibility are in direct opposition to catastrophizing and avoidance, the factors mediating the effect of fear of pain and pain severity and disability; thereby possibly removing the association between psychological flexibility and fear of pain. In other words, the negative associations between psychological flexibility and severity and disability (mediated by the effect of psychological flexibility on catastrophizing and avoidance) are responsible for the negative association between psychological flexibility and fear of pain. Therefore, controlling for severity and disability removed the association between fear of pain and psychological flexibility.

When a series of sensitivity analyses were run in order to determine the effect of general psychological distress, psychological flexibility remained predictive of disability as measured by the MIDAS. Although the size of the initial effect of psychological flexibility was reduced, (20% of variance reduced to 12%), it approximated Cohen's convention for a medium effect size of 13% (Cohen, 1998). Thus, although decreased general psychological distress appears to be of

importance in headache-related disability, values-based behavior still exerts significant unique importance in predicting disability. The predictive ability of values-based behavior may be attributable to the importance of meaning and purpose in functioning. In addition to ACT proponents, several theorists have suggested that a sense of purpose in life can be integral in mental health, resilience, and even recovery from various medical conditions (McKnight & Kashdan, 2009, Weinberg, 2013).

In the current study, values-based behavior was a more significant predictor of disability than was pain acceptance. This is not an unprecedented finding among studies that have assessed the unique importance of values-based behavior. In a 2009 study by Branstetter-Rost et al., participants who received a values-based intervention added to an acceptance intervention demonstrated a higher level of pain tolerance on a cold-pressor task than those who received only the acceptance intervention. Similarly, McCracken and Vowles (2008), using a series of hierarchical regressions, found that values-based behavior was a significant predictor of more criterion variables (depression, depression-related interference with functioning, physical disability, psychosocial disability, and work status) than was acceptance. These results indicate that values-based behavior may be an important mechanism of action in improved functioning both in conjunction with acceptance and independently. In another chronic pain study conducted by Vowles and McCracken (2008), pain acceptance was significantly associated with most measures of functioning immediately following an ACT treatment, but at follow-up values-based behavior was more strongly associated with functioning. The authors speculated that perhaps acceptance is a more important construct early in treatment because it fosters motivation to participate in valued activities. Although more research is needed to determine whether the various constructs comprising psychological flexibility are temporally influenced, findings of this study and others support the notion that values-based behavior is associated with pain-

related disability independently of pain acceptance.

This conclusion is consistent with the philosophical tenets of ACT, which purport that the development of a more flexible behavioral repertoire (as opposed to merely symptom reduction) reduces experiential avoidance and therefore increases goal-directed activity. As noted previously, however, migraineurs often engage in experiential avoidance as a coping strategy, a tendency which for some may manifest as avoidance of possible headache triggers. In light of the findings of the current study and in conjunction with growing challenges to the advice to avoid headache triggers (Martin & Macleod, 2009), an alternative approach of increasing pain acceptance and values-based behavior may have useful clinical implications that are yet fully realized in this population. Two studies have shown promise in applying ACT principles to chronic headache sufferers (Dindo, Recober, Marchman, Turvey, & O'Hara, 2012; Mo'tamedi, Rezaiemaram, & Tavallaie, 2012), and the present study provides additional evidence for the importance of related constructs in migraine-related disability.

Limitations and Future Directions

Although the current investigation offers a valuable addition to the relevant body of literature, as with any study, there are methodological limitations and areas for potential improvement. Rather than an experimental design, this study used a cross-sectional survey and record review as the method of data collection. Although hierarchical regression is commonly used for quantifying associations between variables, no causal relationships can be discerned from these analyses. Further research using longitudinal designs may offer clarification as to whether high psychological flexibility produces reductions in disability or whether low disability instead leads to greater psychological flexibility. A second limitation pertains to sample size, as studies with a larger number of participants would offer valuable support to the findings of this investigation. Although a larger study would be informative, our sample size was informed by an

a priori power analysis that indicated 100 participants were required, assuming a conservative effect size ($f^2 = .10$), a power level of .80, and an alpha level of .05.

Thirdly, most of the participants in the study were diagnosed by a neurologist using ICHD-II criteria, and the remainder of the participants were diagnosed by general physicians using ICD-9 criteria. Although the ICD-9 criteria are subsumed under the ICHD-II criteria, the latter are more specific and used most frequently by headache researchers. A sample consisting strictly of patients adhering to ICHD-II criteria may offer results that could be interpreted with additional confidence. Finally, although the investigation was conducted using a clinical sample derived from three different facilities across three different states, racial/ethnic diversity was not high, and efforts to recruit more diverse participants could offer more generalizable results.

To establish causal relations a treatment study in which constructs of psychological flexibility are targeted and migraine pain/disability are measured pre- and post-treatment would be informative. For example, the *ACT Treatment of Chronic Pain: A Four-Session Mixed Individual and Group Protocol* (Dahl et al., 2005) is a brief intervention designed for a period of three to four weeks. The measures utilized in the current study could be administered prior to and after completion of this protocol, and again at 4 months and 1 year to determine long-term effects. A statistically significant increase in the constructs of pain acceptance and values-based behavior coinciding with a decrease in measures of severity, frequency, and/or disability would be more indicative of causation than the results found in the current correlational study. Similar studies have been conducted with constructs of psychological flexibility and other medical conditions including diabetes and have shown that increases in psychological flexibility lead to an increase in adjustment and coping (Gregg et al., 2007). Although the present study focused on acceptance and values specifically, research involving psychological flexibility and medical

conditions should not be limited to the constructs of acceptance and values-based behavior. Additional studies examining the relationship between migraine and other ACT constructs such as defusion or mindfulness would be informative and clinically relevant.

Conclusion

This study examined the relationships among pain acceptance, values-based behavior, pain anxiety, frequency of pain-related medical visits, and migraine severity and frequency. Specifically, higher levels of pain acceptance and values-based behavior were associated with lower levels of migraine disability and pain severity, even after accounting for relevant covariates of gender and pain severity. These findings indicate that migraine patients who exhibit high levels of psychological flexibility experience lower pain severity and greater overall functioning than individuals with lower psychological flexibility. Clinical implications of this study include awareness of the constructs of psychological flexibility and the potential for supplementing and improving migraine treatment through the use of ACT techniques.

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    152.

APPENDIX

APPENDIX A: VARIABE MEANS AND

STANDARD DEVIATIONS

Table 1. Variable Means and Standard Deviations

Measure	*N*	*M*	*SD*
Migraine Disability Assessment Scale	98	36.86	43.33
Headache Impact Test	97	63.28	6.16
General Health Questionnaire	96	13.09	5.96
Chronic Pain Acceptance Questionnaire	100	61.05	17.46
Pain Anxiety Symptom Scale, Brief Version	97	45.86	19.52
Chronic Pain Values Inventory	98	3.29	1.05
Headache Frequency	97	25.60	24.47
Headache Severity	98	6.85	1.82

APPENDIX B: CORRELATIONS AMONG MEASURES

Table 2. Correlations Among Measures

Measure	1	2	3	4	5	6	7	8	9	10
1 Education	1	-.099	-.118	- .201	.095	- .237*	.191	-.058	.013	-.210*
2 MIDAS	--	1	.519**	.350**	-.352**	.304**	-.472**	.261*	.437**	.329**
3 HIT-6	--	--	1	.397**	-.265**	.585**	-.379**	.154	.097	.529**
4 GHQ-12	--	--	--	1	-.187	.437**	-.445**	.259*	.092	.340**
5 CPAQ	--	--	--	--	1	- .279**	.339**	-.053	.052	-.203*
6 PASS-20	--	--	--	--	--	1	-.222*	.228*	-.085	.539**
7 CPVI	--	--	--	--	--	--	1	-.255*	-.145	-.333**
8 Medical Visits	--	--	--	--	--	--	--	1	.160	.214*
9 Frequency	--	--	--	--	--	--	--	--	1	-.107
10 Severity	--	--	--	--	--	--	--	--	--	1

Note. Education= *Highest level of education completed,* MIDAS = *Migraine Disability Assessment Scale,* HIT-6 = *Headache Impact Test,* GHQ = *General Health Questionnaire,* CPAQ = *Chronic Pain Acceptance Questionnaire,* PASS 20 = *Pain Anxiety Symptom Scale, Brief Version,* CPVI = *Chronic Pain Values Inventory,* Medical Visits = *Frequency of Pain-Related Medical Visits,* Frequency = *Migraine Frequency,* Severity = *Severity of Migraine Pain.*

*Correlation is significant at the .05 level (2-tailed)

**Correlation is significant at the .01 level (2-tailed)

APPENDIX C: HIERARCHICAL MULTIPLE REGRESSION PREDICTING
MIGRAINE SEVERITY

Table 3. Hierarchical Multiple Regression Predicting Migraine Severity (n=96)

	B	95% CI for B	P-Value	R^2	
Step 1				0.08	
Gender	1.57	0.49, 2.63	.005		
Step2				0.18	**Semi-Partial Correlation**
Gender	1.27	0.21, 2.32	.019		
CPAQ	-0.004	-0.03, 0.02	.689		-0.04
CPVI	-0.514	-0.85, -0.17	.004		-0.28

APPENDIX D: HIERARCHICAL MULTIPLE REGRESSION PREDICTING
MIGRAINE FREQUENCY

Table 4. Hierarchical Multiple Regression Predicting Migraine Frequency (n=95)

	B	95% CI for B	P-Value	R^2	
Step 1				0.03	
Severity	-1.06	-3.91, 1.79	.463		
Gender	-9.66	-25.86, 6.58	.240		
Step2				0.08	**Semi- Partial Correlation**
Severity	-2.07	-4.97, 0.95	.181		-0.14
Gender	-9.66	-25.84, 6.52	.239		-0.12
CPAQ	0.13	-0.17, 0.43	.399		0.09
CPVI	-5.95	-11.16, -0.74	.026		-0.23

APPENDIX E: HIERARCHICAL MULTIPLE REGRESSION PREDICTING PAIN-
RELATED MEDICAL VISITS

Table 5. Hierarchical Multiple Regression Predicting Pain-Related Medical Visits (n=92)

	B	95% CI for B	P-Value	R^2	
Step 1				0.05	
Severity	0.51	0.05, 0.97	.030		
Gender	-0.87	-3.37, 1.63	.492		
Step2				0.09	**Semi- Partial Correlation**
Severity	0.37	-0.11, 0.85	.127		0.16
Gender	-0.97	-3.48, 1.55	.447		-0.08
CPAQ	0.01	-0.04, 0.06	.763		0.03
CPVI	-0.84	-1.68, 0.00	.050		- 0.20

APPENDIX F: HIERARCHICAL MULTIPLE REGRESSION PREDICTING
MIDAS SCORES

Table 6. Hierarchical Multiple Regression Predicting MIDAS Scores (n=96)

	B	95% CI for B	P-Value	R^2	
Step 1				0.11	
Severity	8.14	3.30, 12.97	.001		
Gender	-6.98	-33.49, 19.53	.603		
Step2				0.30	**Semi- Partial Correlation**
Severity	4.59	0.02, 9.15	.049		0.17
Gender	-14.81	-38.89, 9.27	.225		-0.11
CPAQ	-0.52	-0.96,-0.06	.028		-0.19
CPVI	-14.83	-22.86,-6.81	<.001		-0.32

APPENDIX G: HIERARCHICAL MULTIPLE REGRESSION PREDICTING
HIT-6 SCORES

Table 7. Hierarchical Multiple Regression Predicting HIT-6 scores (n=95)

	B	95% CI for B	P-Value	R^2	
Step 1				**0.28**	
Severity	1.80	1.18, 2.41	<.001		
Gender	0.12	-3.27, 3.51	.946		
Step2				**0.34**	**Semi- Partial Correlation**
Severity	1.53	0.89, 2.16	.049		0.41
Gender	-0.50	-3.84, 2.84	<.001		-0.03
CPAQ	-0.04	-0.11, 0.02	.190		-0.11
CPVI	-1.15	-2.27,-0.04	.043		-0.17

APPENDIX H: HIERARCHICAL MULTIPLE REGRESSION PREDICTING
PASS-20 INCLUDING MIDAS

Table 8. Hierarchical Multiple Regression Predicting PASS 20 including MIDAS (n=95)

	B	95% CI for B	P-Value	R²	
Step 1				**0.31**	
Severity	5.07	3.02, 7.11	<.001		
Gender	3.73	-6.87, 14.33	.486		
MIDAS	0.07	-0.02, 0.16	.116		
Step2				**0.33**	**Semi- Partial Correlation**
Severity	5.09	3.02, 7.17	<.001		0.42
Gender	2.10	-8.70, 12.90	.700		0.03
MIDAS	0.06	-0.04, 0.16	.239		0.10
CPAQ	-0.18	-0.39, 0.03	.098		-0.14
CPVI	0.88	-2.95, 4.71	.648		0.04

APPENDIX I: HIERARCHICAL MULTIPLE REGRESSION PREDICTING
PASS-20 INCLUDING-6 HIT

Table 9. Hierarchical Multiple Regression Predicting PASS 20 including HIT-6 (n=95)

	B	95% CI for B	P-Value	R^2	
Step 1				**0.42**	
Severity	3.23	1.17, 5.30	.003		
Gender	3.01	-6.72, 12.73	.541		
HIT-6	1.32	0.73, 1.91	<.001		
Step2				**0.43**	**Semi- Partial Correlation**
Severity	3.37	1.28, 5.46	.002		0.26
Gender	1.91	-7.95, 11.77	.701		0.03
HIT-6	1.31	0.69, 1.92	<.001		0.36
CPAQ	-0.15	-0.34, 0.05	.142		-0.12
CPVI	1.57	-1.80, 4.94	.357		0.07

APPENDIX J: DIAGNOSTIC, TREATMENT,
AND DEMOGRAPHIC INFORMATION

Diagnostic, Treatment, and Demographic Information

1. **Diagnosis:**

   a. **Episodic Migraine Without Aura**

   b. **Episodic Migraine With Aura**

   c. **Chronic Migraine With Aura**

   d. **Chronic Migraine Without Aura**

2. **Current Medication(s):**

Medication: **Dosage:**   **Date prescribed:**

Age: _____

Gender (circle one):   Male   Female   Transgender

Race (circle one):   Caucasian   African American   Asian   Hispanic/Latino

                Native American/Pacific Islander   Other: _____

Highest Level of Education (Circle One):

Completed: 1st 2nd 3rd 4th 5th 6th 7th 8th 9th 10th 11th
           H.S. Diploma   GED   Some College   College
           Diploma Some Graduate School Graduate Degree

When was initial migraine diagnosis made?_____(month)/_____(year)

In the past 6 months, how many visits has patient made to a doctor's office (or emergency room) for PAIN?___medical visits for pain

In the past 6 months, about how many medical visits has patient made OVERALL (include visits to your regular doctor, specialists, and Urgent Care or Emergency room)? ____medical visits overall

APPENDIX K: PASS-20

PASS-20

Please read each item carefully, and then rate how often each statement applies to your life using the following scale:

0	1	2	3	4	5
Never	**Seldom**	**Sometimes**	**Often**	**A Lot**	**Always**

1) I can't think straight when in pain. _____

2) During painful episodes it is difficult for me to think of anything besides the pain _____

3) When I hurt I think about pain constantly _____

4) I find it hard to concentrate when I hurt _____

5) I worry when I am in pain _____

6) I go immediately to bed when I feel severe pain _____

7) I will stop any activity as soon as I sense pain coming on _____

8) As soon as pain comes on I take medication to reduce it _____

9) I avoid important activities when I hurt _____

10) I try to avoid activities that cause pain _____

11) I think that if my pain gets too severe, it will never decrease _____

12) When I feel pain I am afraid that something terrible will happen _____

13) When I feel pain I think that I might be seriously ill _____

14) Pain sensations are terrifying _____

15) When pain comes on strong I think that I might become paralyzed or more disabled

_____

16) I begin trembling when engaged in an activity that increases pain_____

17) Pain seems to cause my heart to pound or race_____

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18) When I sense pain I feel dizzy or faint _____

19) Pain makes me nauseous _____

20) I find it difficult to calm my body down after periods of pain _____

APPENDIX L: CPAQ

CPAQ

Directions: Below you will find a list of statements. Please rate the truth of each statement as it applies to you by circling a number. Use the following rating scale to make your choices. For instance, if you believe a statement is "Always True", you would circle the 6 next to that statement.

0	1	2	3	4	5	6
Never True	Very rarely True	Seldom True	Sometimes True	Often True	Almost Always True	Always True

1. I am getting on with the business of living no matter what my level of pain is	0	1	2	3	4	5	6
2. My life is going well, even though I have chronic	0	1	2	3	4	5	6
3. It's O.K. to experience pain	0	1	2	3	4	5	6
4. I would gladly sacrifice important things in my life to control this pain better	0	1	2	3	4	5	6
5. It's not necessary for me to control my pain in order to handle my life well	0	1	2	3	4	5	6
6. Although things have changed, I am living a normal life despite my chronic pain	0	1	2	3	4	5	6
7. I need to concentrate on getting rid of my pain	0	1	2	3	4	5	6
8. There are many activities I do when I feel pain	0	1	2	3	4	5	6
9. I lead a full life even though I have chronic pain	0	1	2	3	4	5	6
10. Controlling pain is less important than other goals in my life	0	1	2	3	4	5	6
11. My thoughts and feelings about pain must change before I can take important steps in my	0	1	2	3	4	5	6
12. Despite the pain, I am now sticking to a certain course in my life	0	1	2	3	4	5	6
13. Keeping my pain level under control takes first priority whenever I am doing something	0	1	2	3	4	5	6
14. Before I can make any serious plans, I have to get some control over my pain	0	1	2	3	4	5	6
15. When my pain increases, I can still take care of my responsibilities	0	1	2	3	4	5	6
16. I will have better control over my life if I can control my negative thoughts about pain	0	1	2	3	4	5	6
17. I avoid putting myself in situations where pain might increase	0	1	2	3	4	5	6
18. My worries and fears about what pain will do to me are true	0	1	2	3	4	5	6

19. It's a relief to realize that I don't have to change my pain to get on with my life	0	1	2	3	4	5	6
20. I have to struggle to do things when I have pain	0	1	2	3	4	5	6

APPENDIX M: CPVI

CPVI

Many people with chronic pain find that their pain and other symptoms are barriers to engaging in activities that are personally important to them. These people have **"VALUES"** but they are not living according to their values.

For example, you may want to be a loving partner, a warm and supportive parent, a helpful and reliable friend, a person who keeps physically fit and able, or a person who is always learning new skills, but you may find yourself in circumstances where you are not living that way.

For each of the areas listed below consider how you most want to live your life. Then rate how IMPORTANT each domain is for you. This is NOT about how well you are doing in each area – it is about how important it is to you. Rate the importance you place in each domain using any number on the scale from 0 (not at all important) to 5 (extremely important). Each area need not be important to you - **rate an area low if it is not important to you personally**.

0 Not at all Important	1 Slightly Important	2 Somewhat Important	3 Moderately Important	4 Very Important	5 Extremely Important

Consider each area according to your values, the important ways that you most want to live your life in each domain.	IMPORTANCE Of This Domain To You
1. FAMILY: Participation in your relationships with your parents, children, other close relatives, people you live with, or whoever is your "family."	
2. INTIMATE RELATIONS: Being the kind of partner you want to be for your husband/wife or closest partner in life.	
3. FRIENDS: Spending time with friends, doing what you need to maintain friendships, or providing help and support for others as a friend.	
4. WORK: Engaging in whatever is your occupation, your job, volunteer work, community service, education, or your work around your own home.	
5. HEALTH: Keeping yourself fit, physically able, and healthy just as you would most want to do.	
6. GROWTH AND LEARNING: Learning new skills or gaining knowledge, or improving yourself as a person as you would most want.	

In this section we want you to look at how much SUCCESS you have had in living according to your values. Many times when people have chronic pain they find it difficult to live their life as they want to live it.

For each of the areas of life listed below consider again how you most want to live your life. Then rate how <u>SUCCESSFUL </u>you have been living according your values during the past two weeks. These questions are <u>not </u>asking how successful you want to be but how successful you have been. Rate your success using any number on the scale from 0 (not at all successful) to 5 (extremely successful).

0	1	2	3	4	5
Not at all Successful	**Slightly Successful**	**Somewhat Successful**	**Moderately Successful**	**Very Successful**	**Extremely Successful**

Consider each area according to your values, the important ways that you most want to live your life in each domain.	SUCCESS At Living Your Values
1. FAMILY: Participation in your relationships with your parents, children, other close relatives, people you live with, or whoever is your "family."	
2. INTIMATE RELATIONS: Being the kind of partner you want to be for your husband/wife or closest partner in life.	
3. FRIENDS: Spending time with friends, doing what you need to maintain friendships, or providing help and support for others as a friend.	
4. WORK: Engaging in whatever is your occupation, your job, volunteer work, community service, education, or your work around your own home.	
5. HEALTH: Keeping yourself fit, physically able, and healthy just as you would most want to do.	
6. GROWTH AND LEARNING: Learning new skills or gaining knowledge, or improving yourself as a person as you would most want.	

APPENDIX N: MIDAS

Write in your answer for each question below.

1. On how many days <u>in the last 3 months </u>did you miss work or school because of your headaches?

_____days

2. How many days <u>in the last 3 months </u>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 <u>in the last 3 months </u>did you not do household work because of your headaches?

_____days

4. How many days <u>in the last 3 months </u>was your productivity in household work reduced by half of 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 <u>in the last 3 months </u>did you miss family, social or leisure activities because of your headaches?

_____days

6. On how many days <u>in the last 3 months </u>did you have any headache?
(If a headache lasted more than 1 day, count each day.)

_____days

7. On a scale of 0 - 10, <u>on average </u>how painful were these headaches?
(where 0 = no pain at all and 10 = pain as bad as it can be.)

_____days

APPENDIX O: HIT-6

HIT-6

This questionnaire was designed to help you describe and communicate the way you feel and what you cannot do because of headaches.

To complete, please <u>circle one answer for each question</u>.

1) When you have headaches, how often is the pain severe?

   Never   Rarely   Sometimes   Very Often   Always

2) How often do headaches limit your ability to do usual daily activities including household work, school, or social activities?

   Never   Rarely   Sometimes   Very Often   Always

3) When you have a headache, how often do you wish you could lie down?

   Never   Rarely   Sometimes   Very Often   Always

4) In the past 4 weeks, how often have you felt too tired to do work or daily activities because of your headaches?

   Never   Rarely   Sometimes   Very Often   Always

5) In the past 4 weeks, how often have you felt fed up or irritated because of your headaches?

   Never   Rarely   Sometimes   Very Often   Always

6) In the past 4 weeks, how often did headaches limit your ability to concentrate on work or daily activities?

   Never   Rarely   Sometimes   Very Often   Always

APPENDIX P: GHQ

General Health Questionnaire

We want to know how your health has been in general over the last few weeks. Please read the questions below and each of the four possible answers. Circle the response that best applies to you. Thank you for answering all the questions.

Have you recently:

1. been able to concentrate on what you're doing?
(1) better than usual
(2) same as usual
(3) less than usual
(4) much less than usual

2. lost much sleep over worry?

(1) Not at all
(2) no more than usual
(3) rather more than usual
(4) much more than usual

3. felt that you are playing a useful part in things?

(1) more so than usual
(2) same as usual
(3) less so than usual
(4) much less than usual

4. felt capable of making decisions about things?

(1) more so than usual
(2) same as usual
(3) less than usual
(4) much less than usual

5. felt constantly under strain?

(1) Not at all
(2) no more than usual
(3) rather more than usual
(4) much more than usual

6. felt you couldn't overcome your difficulties?

(1) Not at all

(2) no more than usual
(3) rather more than usual
(4) much more than usual

7. been able to enjoy your normal day to day activities?

(1) more so than usual
(2) same as usual
(3) less so than usual
(4) much less than usual

8. been able to face up to your problems?

(1) more so than usual
(2) same as usual
(3) less than usual
(4) much less than usual

9. been feeling unhappy or depressed?

(1) not at all
(2) no more than usual
(3) rather more than usual
(4) much more than usual

10. been losing confidence in yourself?

(1) not at all
(2) no more than usual
(3) rather more than usual
(4) much more than usual

11. been thinking of yourself as a worthless person?

(1) not at all
(2) no more than usual
(3) rather more than usual
(4) much more than usual

12. been feeling reasonably happy, all things considered?

(1) more so than usual
(2) same as usual
(3) less so than usual
(4) much less than usual

EDUCATION

Pre-Doctoral Internship; August 2011 – July 2012
Central Alabama Veterans Health Care System (APA Accredited); Tuskegee, AL

Master of Arts in Clinical Psychology; December 2009
University of Mississippi; University, MS

Bachelor of Science in Psychology; May 1997
Spring Hill College; Mobile, AL

CLINICAL EXPERIENCE

**Pre-Doctoral Intern, Central Alabama Veterans Health Care System
Tuskegee, AL and Montgomery, AL; August 2011 – July 2012**
Post Traumatic Stress Disorder Clinical Team- Major Rotation
- Provided psychoeducational group services including anger management and stress management
- Provided evidence-based individual and group psychotherapy services to veterans in the Post Traumatic Stress Disorder Clinic
- **Assessments Administered:** Clinical Interview, Wechsler Adult Intelligence Scale- 4th Edition (WAIS-IV), Minnesota Multiphasic Personality Inventory- 2nd Edition (MMPI-2), Thematic Apperception Test, Benton Visual Retention Test 5th Edition

Outpatient Mental Health Clinic - Major Rotation
- Provided short-term individual psychotherapy services to veterans in the Outpatient Mental Health Clinic at both campuses of CAVHCS
- Facilitated group psychotherapy sessions for depression and PTSD

Primary Care/ Health Psychology – Major Rotation
- Provided brief assessment and psychotherapy interventions in a healthcare setting
- Facilitated group psychoeducation for veterans with high risk health conditions including diabetes, obesity, and smoking
- Conducted evaluations for transplant candidates

Home Based Primary Care – Minor Rotation
- Participated on an interdisciplinary team to provide in-home care to veterans
- Assisted with brief in-home assessment and report of psychosocial needs

Additional Clinical Responsibilities
- Conducted thorough psychological assessments including Clinical Interview, Wechsler Adult Intelligence Scale- 4th Edition (WAIS-IV), Minnesota Multiphasic Personality Inventory- 2nd Edition (MMPI-2), Personality Assessment Inventory (PAI), Thematic Apperception Test, Benton Visual Retention Test 5th Edition, Rorschach, PTSD Checklist – Military Version, Mini Mental State Exam (MMSE), Beck Depression Inventory (BDI)
- Attended didactic seminars within the VA
- Presented case summaries, literature review, and assessment reports to clinical team in a professional capacity

Graduate Student Therapist, Psychological Services Center
University of Mississippi, University, MS; August 2004 – January 2010
- Provided evidence-based individual psychotherapy services to university students, adults and children from local community
- Conducted intake evaluations; presented cases to treatment team; assisted in the development of a comprehensive treatment plans
- Conducted psychological and psychoeducational assessments
- **Assessments Administered:** Wechsler Adult Intelligence Scale - 3rd Edition (WAIS-III), Wechsler Memory Scale - 3rd Edition (WMS-III), Minnesota Multiphasic Personality Inventory- 2nd Edition (MMPI-2), Personality Assessment Inventory (PAI), Impact of Event Scale, Beck Depression Inventory-II, Structured Clinical Interview, Outcome Questionnaire, Learning and Study Strategies Inventory (LASSI)

Practicum Student, Communicare Community Mental Health Center
Oxford, MS; August 2009 – August 2010
- Provided individual and group psychotherapy services to a diverse population
- Administered psychological measures to inform treatment planning
- Participated on a multidisciplinary team providing comprehensive outpatient treatment
- Assisted with transition between inpatient and outpatient care as needed
- **Assessments Administered:** Beck Depression Inventory-II, Beck Anxiety Inventory, Substance Abuse Subtle Screening Interview (SASSI), Mini Mental State Exam (MMSE)

Practicum Student, North Mississippi Medical Center Tupelo,
MS; August 2006 – May 2007

- Provided individual and group psychotherapy services in an inpatient and outpatient setting
- Provided individual psychotherapy as part of an Employee Assistance Program
- Administered psychological measures to inform treatment planning
- Participated on a multidisciplinary team providing comprehensive treatment
- Assisted with transition between inpatient and outpatient care as needed
- Administered neuropsychological assessments one day per week
- **Assessments Administered:** Wechsler Adult Intelligence Scale - 3rd Edition (WAIS-III), Wechsler Memory Scale - 3rd Edition (WMS-III), Mini Mental Status Examination, Trail Making Test, California Verbal Learning Test-II, Test of Memory Malingering

Practicum Student, Desoto County School System Desoto,
MS; August 2005 – May 2006

- Provided individual and group psychotherapy services and social skills training to Desoto County students , grades K-12 at both traditional and alternative schools
- Provided in classroom behavioral training for students and consultation to teachers
- Assisted with assessment of Autism Spectrum Disorders
- Conducted psychological assessments for individual education planning
- **Assessments Administered:** Autism Diagnostic Interview Revised (ADI-R), Childhood Autism Rating Scale (CARS), Autism Diagnostic Observation Schedule (ADOS), Wechsler Intelligence Scale for Children (WISC- III), Vineland

Practicum Student, North Mississippi Regional Center
Oxford, MS and Hernando, MS; August 2004 – May 2005

- Provided individual psychotherapy services to individuals with intellectual and developmental disabilities
- Conducted regular cognitive and behavioral assessments
- Provided home based and daycare visits for consultation related to behavioral modification and parent training
- **Assessments Administered:** Wechsler Adult Intelligence Scale - 3rd Edition (WAIS-III), Wechsler Memory Scale - 3rd Edition (WMS-III), Mini Mental Status Examination, Purdue Pegboard, Vineland

Behavioral Health Patient Care Assistant, Good Samaritan Hospital
San Jose, CA; June 2002 – August 2003
- Provided individual supportive services to inpatients hospitalized for emotional/mental disorders
- Assisted with cognitive behavioral group therapy sessions

Director of Social Services, Cogburn Nursing Center
Mobile, AL; April 2000 – May 2002
- Developed and assisted in the implementation of individual behavior plans for residents
- Met with patients individually to assess and meet psychosocial needs
- Arranged appropriate community services as needed for individual residents (e.g. transportation, legal assistance, volunteer services)
- Acted as liaison between and among patients and their families and physicians, nurses, and other facility staff to optimize patient care
- Developed and presented educational in-service trainings for staff

TEACHING EXPERIENCE

Teaching Assistant, Elementary Statistics (2 classes) and General Psychology, University of Mississippi
Department of Clinical Psychology; August 2008 – May 2009
- Graded undergraduate homework and tests
- Conducted regular study groups and individual instruction several times per week
- Substituted for instructor as needed

Instructor, Orientation to the Major, University of Mississippi
Department of Psychology; August 2007 – May 2008
- Instructed course for undergraduate students interested in a career in psychology

Director, Undergraduate Resource Center, University of Mississippi
Department of Psychology; August 2007 – May 2008
- Assisted undergraduate students with academic and career development
- Instructed undergraduate students preparing for the GRE

RESEARCH EXPERIENCE

   Principle Researcher, Doctoral Dissertation
   University of Mississippi, August 2010 – November 2013
   - **Research Project:** Psychological flexibility in migraine patients: The role of acceptance and values-based action

   Principle Researcher, Master's Thesis
   University of Mississippi; August 2004 – December 2009
   - **Research Project:** Perceived psychological coercion and posttraumatic stress: A preliminary study of serious mental illness in inpatient settings

   Program Evaluator, MAP Grant, Center for Substance Abuse Prevention
   Mississippi Department of Health; August 2003 – May 2006

   Co-Investigator, Picture Success
   Mississippi Department of Health; August 2003 – October 2006

   Graduate Research Team Member, Meaning and Assessment Research Lab
   University of Mississippi; August 2005 – May 2009

   Graduate Research Team Member, Multi-Cultural/ Cross Cultural Research Lab
   University of Mississippi; August 2007 – May 2009

   Graduate Research Team Member, Investigation of Coercion and Mandated Treatment Research Lab
   University of Mississippi; August 2003 – May 2004

   Undergraduate Research Assistant, Social Psychology Lab
   University of Mississippi; August 2003 – May 2004

PUBLICATIONS AND PROFESSIONAL PRESENTATIONS

Foote, H. (2008) *Writing the Graduate School Essay* (Worshop, Undergraduate Resource Center, University of Mississippi, 2008), University, MS.

Foote, H. (2007). *Setting and Achieving Goals: Road Trip to Getting What You Want.*
(Power Point presentation, Spirit of Women Annual Conference. 2007). Tupelo, MS.

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