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Understanding and Promoting Resiliency in Patients with Chronic Headache

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Abstract Even among patients with the same type and severity of headache, there is considerable variability in functional outcomes. Some individuals are resilient, able to thrive despite pain, whereas others find that pain is an overwhelming burden that comes to define their lives. A substantial body of evidence suggests that patients' cognitive, emotional, and behavioral coping responses to their pain play a significant role in determining their long-term health. Resilient pain responses, which are shaped by both qualities of the individual and his/her social environment, can be learned and thus hold promise as targets for treatment. We draw on recent empirical findings that identify which pain beliefs, appraisals, and behaviors in response to pain are key to resilient and non-resilient coping among patients with chronic headache. We discuss how pain self-efficacy and pain acceptance set the stage for adaptive behaviors that have been linked to sustained well-being and good quality of life. We then describe psychosocial and behavioral interventions that show promise in promoting resilience among headache patients and conclude by considering areas ripe for further inquiry.

Keywords Headache · Resilience · Functional health · Acceptance · Self-efficacy · Values-based action

This article is part of the Topical Collection on *Headache*

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Introduction

Headache disorders are among the most common disorders of the nervous system and impose significant suffering, disability, and financial cost on patients. Prevalence rates of active headache disorders among adults worldwide are 11 % for migraine, 42 % for tension-type headache, and 3 % for chronic daily headache, and headaches are considered among the top ten disabling conditions for men and women [1]. Prophylactic treatment often includes pharmacological (e.g., tricyclic antidepressants, anticonvulsants) and/or non-pharmacological (e.g., biofeedback, cognitive-behavioral therapy, physical therapy) approaches, but many patients continue to experience clinically significant levels of headache pain. These patients vary considerably in how they fare over time; some individuals are resilient, able to thrive despite pain, whereas others find that pain is an overwhelming burden that comes to define their lives. The recognition that so many patients fare well is prompting a paradigm shift in chronic pain research and practice, from one that attends primarily to symptoms and deficits to one that emphasizes resilience and strengths. From a resilience perspective, a fundamental aim is to identify what responses to pain, patient characteristics, and resources are most likely to promote well-being, optimize functional health, and sustain a good life.

A substantial body of evidence suggests that pain patients' cognitive, emotional, and behavioral coping responses to their pain play a significant role in determining their long-term health. These pain responses, which are shaped by both qualities of the individual and his/her social environment, can be learned and thus hold promise as targets for treatment. As illustrated in Fig. 1, we focus here on two key resilient appraisals of headache pain and one's ability to cope with it, i.e., pain self-efficacy and pain acceptance. These resilient appraisals set the stage for adaptive behaviors that have been

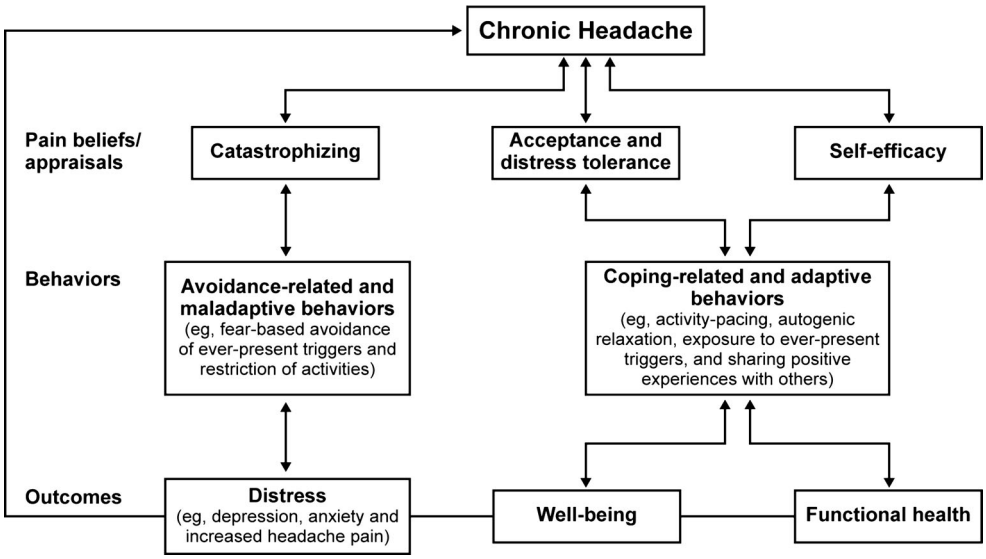

Fig. 1 Model outlining key resilient and non-resilient responses affecting functional outcomes and chronic headache symptoms

linked to sustained well-being and good quality of life among individuals with chronic pain. We also highlight the detrimental impact of an important "non-resilient" appraisal, pain catastrophizing, which is a potent predictor of poor outcomes. We then describe interventions that show promise in promoting resilience among headache patients and conclude by considering areas ripe for further inquiry.

Pain-Related Appraisals and Coping Behaviors

Often times, pain intensity is perceived to be the primary predictor of functioning by both patients and practitioners. As a consequence, treatment efforts are mainly aimed at alleviating the pain. However, effective management of chronic pain is heavily influenced by beliefs and/or appraisals of the pain condition, its corresponding symptoms, and the pain's anticipated impact on current and future life activities [2]. Such pain-related beliefs and appraisals have been shown to impact both psychological and physical functioning in pain patients, including those with chronic headache. For example, if a patient believes that his/her functioning and well-being depends entirely on alleviating the headache symptoms, then the ensuing feelings of discouragement and distress over persistent headache pain will facilitate poorer functioning. Alternatively, if success were measured by *how* one copes with the headache, then the outcome of persistent pain will not necessarily elicit feelings of failure. One of the goals of a resilience-based approach to pain management is learning to adopt positive, adaptive thoughts while minimizing negative, maladaptive thoughts. Accordingly, pain-related self-efficacy is a cognitive appraisal characterized by positive expectancies about one's ability to effectively manage pain (e.g., "I can usually find a way to care for myself and get through the day when I have a headache"), and it has been linked to improved health outcomes in a number of intervention studies (for a review, see [3]). On the other hand, pain-related catastrophizing consists of excessive negative expectancies about coping with pain (e.g., "I worry that this pain will never end"), and it has consistently predicted poor adjustment to chronic pain (for a review, see [4, 5]).

Of the many pain-related appraisals that contribute to the resilient management of pain, self-efficacy emerges as one of the most important. Specifically, research suggests that despite experiencing chronic pain, maintaining or boosting confidence in one's ability to manage and cope with the pain predicts less disability in terms of physical and mental health [6–8]. That is, self-efficacy has been shown to be related to less interference in daily activities and fewer depressive symptoms. Among patients experiencing chronic headache specifically, similar findings have been reported (i.e., less disability and fewer depressive symptoms; [9, 10•]).

While self-efficacy predicts improved functioning in pain patients, catastrophizing about pain consistently is a strong predictor of a range of negative outcomes. For instance, pain-related catastrophizing has been linked to greater pain intensity, emotional distress, and disability [4, 11]. Like self-efficacy, catastrophizing contributes to the relation between pain intensity and functioning, albeit in the opposite direction. Gillanders et al. reported that the level of pain is not a sole predictor of emotional and physical functioning in chronic pain patients; multiple psychological variables, including catastrophizing, determine functioning as well [12••]. This suggests that negative perceptions of pain are highly predictive of disability and impact disability beyond the effects of pain intensity alone. In addition to overall functioning, catastrophizing has been linked to a heightened use of health care services and more frequent and longer durations of hospital visits [4]. The role of catastrophizing as a determinant of functional outcomes has not been extensively studied in

patients with chronic headache. However, findings from the available research conducted in samples of individuals with chronic headache conditions suggest that catastrophizing predicts impaired functioning in these patients as well (e.g., [13]).

In essence, both self-efficacy and catastrophizing represent characteristic ways of appraising pain, which are linked with pain-coping responses. Studies that have incorporated both self-efficacy and catastrophizing appraisals have found that the two appraisals lead to distinctly different types of coping responses (e.g., [14–16]) While self-efficacy promotes resiliency through adaptive methods of coping, catastrophizing predicts emotional and physical dysfunction through poor methods of coping. Pain patients who catastrophize perceive their pain to be threatening, stressful, and unpredictable, which creates a hypervigilance to pain and avoidance of potential pain-related triggers. As a result, attention becomes so narrowly focused on avoiding pain that self-regulation becomes limited as cognitive resources are depleted and meaningful life pursuits are ignored [17]. Despite their best efforts, patients are unable to avoid pain over time. The inability to control pain can generate a sense of helplessness, leading to maladaptive emotions and behaviors (e.g., depressive symptoms, less engagement in social activities), and create a downward spiral toward increased disability. Of note, within chronic headache sufferers, Martin reported that attempting to avoid headache triggers due to fear of pain is not an effective management technique, particularly when the triggers are ubiquitous, because avoidance ironically creates an increased sensitivity to pain [18]. Rather than avoiding triggers, direct coping with triggers is recommended. Specifically, very long exposure to specific headache triggers of visual disturbance, stress, or noise, when paired with relaxation, decreases the headache pain response to that trigger, whereas short exposure increases it [19–21]. Improving pain-related self-efficacy is a method shown to reduce avoidance-related behaviors [14].

Even when patients manage their pain well, there are times when the experience of pain cannot be controlled. In these circumstances, accepting the pain as part of their current experience is the most adaptive response. Many patients have the misconception that acceptance is the same as giving up or giving in and passively letting pain take over. On the contrary, pain acceptance (and acceptance of unwanted experiences in general) requires active engagement with the pain symptoms via a willingness to acknowledge and "make room" for the reality of the moment of pain and suffering that already has occurred, as opposed to insisting that it be different than it is. Paradoxically, this allows for a richer life.

We consider acceptance to be a "bridge concept" between managing pain and living a fuller life. A willingness to tolerate negative experiences, including pain, is associated with better emotional, physical, and social functioning among individuals living with chronic pain. For example, among a sample of 144 chronic pain patients, measures of general psychological acceptance of uncomfortable experiences (e.g., unwanted emotional experiences, memories, thoughts, urges, other physical symptoms) and acceptance of pain accounted for greater variance in psychosocial and physical functioning than did pain intensity [22]. Likewise, in a study of 150 chronic pain patients, those who responded to pain with acceptance experienced better physical functioning [12••], suggesting that responding to pain with greater acceptance helped to sustain patients' functional health.

Among headache patients, Foote et al. observed that acceptance of pain and values-based action accounted for 10 % of unique variance in headache severity and up to 20 % in headache-related disability [23••]. In a study of 64 migraine sufferers, Chiros and O'Brien found that those endorsing higher levels of pain-related acceptance engaged in a higher level of activity and needed to use fewer coping strategies on a daily basis [24]. In a study of headache patients engaged in mindfulness-based cognitive therapy, an approach that targets acceptance, pain acceptance was one of the critical factors differentiating those who responded to treatment with fewer headaches from non-responders [25]. Thus, acceptance may act to free one up to focus on positive engagement with one's experience, act according to one's values, and ultimately achieve a better quality of life, rather than spend precious energy on resisting the pain.

When the focus shifts from pain reduction to that of living a good life, overall functioning and quality of life often improves [26]. A basic principle of positive psychology and resilience is that of a "broaden and build" approach, which aims to broaden one's awareness and engage in curiosity, exploration, and creating a novel experience out of everyday activities [27]. For example, people who survived extreme situations without the development of post-traumatic stress disorder were often those who exhibited interest, curiosity, appreciation, and with actions focused on their values and maintenance of social connectedness [28]. In the example of chronic headache, taking action on one's values and intentions likely increases a sense of agency and purpose and minimizes the chance of being hijacked by the threat of unrelenting pain and worsening of the pain cycle. Thus, responding skillfully to headache pain may include compassionately acknowledging the headache (i.e., acceptance) and then choosing to direct one's focus outside of the stimulus of the pain onto something that is rewarding and fulfilling (i.e., values-based action). The ability to appreciate something of meaning outside of the immediate threat of pain, such as one's important values, can both decrease distress and improve the quality of life [29].

One of the important domains of life that both promotes effective pain management and brings purpose, meaning, and well-being is that of social relationships. Many studies support the notion that social support is a critical factor for maintaining health and enhancing function [30]. If patients with pain are able to seek support from those who are empathic and

understanding of their pain experience (versus over-solicitous and/or critical), then positive adaption can be enhanced [31]. In fact, a systematic review of studies investigating relationships among family functioning, pain, and pain-related disability in youth with chronic pain observed that pain-related disability was more often related to family functioning than pain intensity [32]. On the other hand, poor family relations can fuel distress and isolation, perpetuating a cycle of increased pain and disability. For example, among patients with recurrent headache, both loneliness and psychological distress mediated the link between exposure to interpersonal violence and recurrent headache [33]. Interventions that are aimed at improving social relatedness show promise in potentially facilitating positive adaptation to chronic pain conditions [34], but systematic research from patients with headaches is currently lacking.

Interventions for Headache Resilience

In general, behavioral treatment approaches have been shown to promote both better treatment adherence and improvement in the management of headache pain and related stress [35]. As with any behavioral treatment in headache, effectiveness will be optimized with the recognition and management of complicating factors, such as medication overuse, psychiatric comorbidity, maladaptive stress responses, and sleep disorders [36].

Cognitive-Behavioral Therapy

The management of any chronic condition depends on recognizing how cognitions and behaviors, either in response to the physical symptoms themselves or in response to psychosocial stressors, influence functioning and potentially perpetuate or worsen the headache symptoms. Cognitive-behavioral therapy (CBT) is widely accepted and promoted as a standard approach in the treatment of patients with headaches [37, 38]. An important focus of CBT for headache management is recognizing how an individual's cognitive appraisals, readiness for change, and locus of control influence headache management [39]. In addition, CBT for headache teaches stress management and pain-coping skills [35].

Recognition of avoidance behaviors and how they can perpetuate or worsen symptoms is another important component of CBT, as alluded to above. Interestingly, with migraine triggers, the generally recommended approach has been to identify and avoid triggers [40]. More recently, Martin has challenged this practice [18]. He has tested the concept of prolonged exposure to triggers in a number of studies, and his findings suggest that, particularly with triggers that are ubiquitous in the environment such as stress, approach strategies generally are more adaptive in the long term than avoidance strategies.

Randomized controlled trials (RCTs) support CBT's benefit in chronic pain populations for both adults [41] and children [42]. According to practice guidelines for migraine headaches, "relaxation training, thermal biofeedback combined with relaxation training, electromyographic biofeedback, and cognitive-behavioral therapy may be considered as treatment options for prevention of migraine (Grade A treatments). Specific recommendations regarding which of these to use for specific patients cannot be made" [40]. In children with headaches, CBT is comparable to pharmaceutical treatments and is generally very effective [37]. Unfortunately, there remains surprisingly few large RCTs among subsets of headache patients, e.g., tension-type headaches [43], chronic post-traumatic headache (CPTH; [44]), and migraine [18, 45], often with only modest effect sizes. In a recent RCT of group CBT versus wait-list control in CPTH patients, CBT did not show benefit for headache and pressure pain thresholds and only a small effect on quality of life, psychological distress, and the overall experience of symptoms. Wait-list controls showed evidence of spontaneous remission over time [44]. More studies are needed to clarify the optimal duration of treatment, setting (e.g., individual-, group-, or internet-based), and the specific patient groups most benefitted by CBT, as well as comparisons to other behavioral therapies such as mindfulness-based treatments.

Mindfulness-Based Stress Reduction

Mindfulness-based stress reduction (MBSR), an intervention developed by Kabat-Zinn [46] to treat and manage chronic disorders, teaches participants to broaden awareness and pay attention to present moment experiences with intention, without judgment, and with acceptance and compassion. MBSR, typically delivered in group format lasting 8 weeks, focuses on shifting one's relationship with an experience from controlling it (doing) to responding skillfully (being) and increase one's ability to accept to make room for physical discomfort and difficult emotions. The core of MBSR consists of mindfulness exercises designed to practice having greater awareness of sensations, emotions, and thoughts and to promote more effective responses to stress. In theory, MBSR may help patients with headache by decreasing reactivity, downregulating pain perception pathways, benefitting comorbid depression and anxiety, improving body awareness and self-care, increasing parasympathetic tone and muscle relaxation, and enhancing positive reappraisals and distress tolerance [47].

Rosenzweig and colleagues evaluated whether patients with different types of chronic pain responded similarly to an 8-week MBSR intervention [47]. Findings suggested that benefits varied according to pain condition, with patients with chronic headache/migraine ($n = 15$) experiencing the smallest

improvement in pain- and health-related quality of life compared to those with arthritis ($n = 32$), fibromyalgia ($n = 27$), and a variety of other less prevalent conditions (e.g., reflex sympathetic dystrophy). An RCT of 60 patients with tension-type headache assigned to MBSR versus treatment as usual found significantly reduced pain severity for the MBSR intervention group after the intervention and follow-up and higher mindful awareness scores compared to the control group at the posttest session [48]. Further, McGuire et al. tested an open-label, online version of MBSR in 221 adults with chronic headache and reported clinically significant pre-to-post reductions in pain severity, pain interference, anxiety, depression, headache impact, and medication intake [49].

Mindfulness-Based Cognitive Therapy

Mindfulness-based cognitive therapy (MBCT) for pain incorporates strategies from both CBT and MBSR to facilitate mindfulness, pain acceptance, and maladaptive cognitions such as catastrophic thinking. Day et al. reported on 21 headache sufferers who went through MBCT [25]. Of these, 14 (11 migraine, 2 tension headache, and 1 with daily persistent headache) were classified as treatment responders (≥50 % improvement in pain intensity and/or pain interference) and 7 (all with migraine) as non-responders (<50 % improvement). Results indicated that change in pain-related cognitions were a key factor underlying treatment response, as was amount of meditation practice, acceptance, and increased mindfulness. Interestingly, headache management self-efficacy improved regardless of pain response, suggesting that it may be necessary but not sufficient for pain reduction.

Acceptance and Commitment Therapy

Acceptance and commitment therapy (ACT), developed by Steven Hayes, focuses on acceptance and mindfulness processes, and commitment and behavior change processes, to produce psychological flexibility. Core processes include acceptance, cognitive defusion (i.e., noticing thoughts as "just thoughts" and not as barriers for action), being present, awareness of "observing self," values, and committed action. Treatment attempts to create a more a conscious, present, flexible approach to psychological experiences; it also attempts to strengthen the commitment and behavior change processes that enhance values-based action [29].

In an RCT of group ACT versus treatment as usual for 30 female patients with chronic headache, a significant reduction in disability and affective distress, but not in reported sensory aspect of pain, was observed in the treatment group in comparison with the control group [50]. Further, Dindo et al. tested a 1-day ACT intervention for 60 patients with migraine and depression compared to treatment as usual [51]. There were significant improvements in headache frequency, headache severity, medication use, and headache-related disability for the ACT patients compared to controls at 3 months post-intervention. However, the treatment by time interaction was not significant between groups, suggesting that the magnitude of the improvement did not differ between ACT and control patients. ACT thus shows promise as a treatment option for headache sufferers, but as with the other behavioral modalities, further studies are needed.

Relaxation Training

There are several techniques designed to induce relaxation, including autogenic relaxation, visualization, paced breathing, and biofeedback training. Relaxation training is a tool that can be combined with any of the other behavioral treatments to increase one's ability to manage stress and anxiety and muscle tension. These strategies have been well established for the treatment of migraine [52•, 53].

Conclusions

Empirical evidence elaborating the role of resilience factors in the treatment of chronic headache pain is in its infancy. Nevertheless, findings generated from the broader literature on resilience to chronic pain have yielded clues regarding promising avenues for the treatment of headache pain going forward. In particular, a resilience framework points to the value of targeting not only pain reduction but also promotion of well-being and life satisfaction despite pain as part of a comprehensive treatment approach. This may be especially relevant for headache sufferers, who may get caught in a maladaptive cycle of avoidance that is overly focused on trying to evade or control their exposure to headache triggers. Wise management of daily life to manage triggers that exacerbate pain is a part of resilient pain coping, no doubt. But when this becomes their primary focus, patients miss out on opportunities for engaging in activities that bring meaning and joy to their lives. Thus, the most effective treatment approach is likely one that incorporates efforts to promote pain acceptance, which can help patients learn that they can live a full life even in the presence of pain.

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Compliance with Ethical Standards

Conflict of Interest Cynthia M. Stonnington, Dhwani J. Kothari, and Mary C. Davis declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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- •• Of major importance

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