



Published in final edited form as:

*Pain Med.* 2004 June ; 5(2): 178–186. doi:10.1111/j.1526-4637.2004.04031.x.

## Cognitive-Behavioral Group Treatment for Disabling Headache

Justin M. Nash, PhD<sup>\*</sup>, Elyse R. Park, PhD<sup>‡</sup>, Barbara B. Walker, PhD<sup>\*</sup>, Norman Gordon, MD<sup>†</sup>, and Robert A. Nicholson, PhD<sup>\*</sup>

<sup>\*</sup>Centers for Behavioral and Preventive Medicine, Brown Medical School and The Miriam Hospital, Lifespan Academic Medical Center, Providence, Rhode Island <sup>†</sup>Department of Clinical Neurosciences, Brown Medical School and The Miriam Hospital, Lifespan Academic Medical Center, Providence, Rhode Island <sup>‡</sup>Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts

### Abstract

**Objectives**—Severe, disabling headache is costly to individual sufferers, through pain and reduced functioning, and to society, through decreased work productivity and increased health care use. First-line prophylactic agents combined with triptans do not adequately benefit many disabled headache sufferers. We sought to investigate whether a cognitive-behavioral treatment targeting the psychological and behavioral factors that contribute to disabling headache may provide additional benefit and whether using a group format may provide a more intensive clinic-based treatment without increasing the cost of service delivery.

**Design**—We developed and piloted a cognitive-behavioral group treatment for chronic, disabling headache. We evaluated its effectiveness in decreasing headache, reducing symptomatic medication use, and improving quality of life.

**Setting**—A behavioral headache management program of an academic medical center.

**Patients**—Sixty-two individuals suffering from primary headache disorder with moderate to severe headache-related disability who completed treatment.

**Interventions**—Individuals completed a pretreatment evaluation, the 10-session cognitive-behavioral group treatment, and a 1-month-posttreatment evaluation.

**Outcome Measures**—The impacts of treatment on headache (frequency, intensity, and duration), medication use, and quality of life were assessed.

**Results**—Separate multivariate analyses of variance revealed significant improvements in headache, symptomatic medication use, and quality of life. Overall, 50% of participants experienced at least a 50% reduction in headache frequency from pre- to posttreatment.

**Conclusions**—The findings provide preliminary evidence that delivering a clinic-based, group-format cognitive-behavioral treatment to moderately to severely disabled headache sufferers can decrease headache activity, reduce symptomatic medication use, and improve quality of life.

### Keywords

Cognitive-Behavioral Treatment; Psychological Treatment; Group Treatment; Disability; Disabling Headache

## Introduction

Headache sufferers with frequent, severe pain, presence of psychiatric comorbidity, and elevated levels of emotional distress often experience moderate to high levels of disability. The lack of effective care for many of these headache sufferers is becoming recognized as a public health problem [1,2]. The World Health Organization Global Burden of Disease Study ranked severe migraine in the *highest* disability class [3,4]. The burden of these headache conditions falls not only on individual sufferers, but also on the national economy in work loss [5] and increased health care use [6].

Employers bear the burden of the indirect costs of headache, with an estimated loss of the equivalent of 12 work days annually from the average migraine sufferer [7]. The most disabled migraine sufferers account for the bulk of lost work productivity [7] and experience unemployment rates as high as four times the national average [6]. Migraine that is disabling creates a considerable drain on the health care system; severely disabled migraine sufferers account for four times the health care costs relative to those without activity limitations [6]. Targeting treatment to the most disabled segment of headache sufferers may be the most cost-effective strategy for providing the greatest benefit to both the individual sufferer (by reducing pain and disability) and society (by reducing work loss and health care use) [1,2,7,8].

Many who are disabled by headache experience limited benefit from pharmacotherapy regimens that combine first-line prophylactic agents with triptans [9,10]. In addition, while standard behavioral interventions are well established in providing a 40–60% headache reduction in the average individual with headache [11,12], those with disabling levels of headache do not respond well to behavioral interventions when delivered alone, especially those delivered in home-based treatment formats [11,13]. Treatment effectiveness for these individuals may be enhanced if treatment directly addresses the psychological and behavioral factors, as well as the biological factors, that contribute to the condition [11,14,15]. These factors typically include comorbid psychiatric conditions [14,16–20] and the use of poor coping skills [21,22]. Ineffective coping can also contribute to unregulated lifestyle behaviors (e.g., delaying or skipping meals, keeping a variable sleep schedule, overusing caffeine, and consuming alcohol) that can serve as triggers for headache attacks.

More intensive cognitive-behavioral treatments that provide patient education, self-regulation skills training (e.g., relaxation training), and stress and pain coping skills training can be added to standard medical care to address the psychological, behavioral, and lifestyle needs of disabled headache sufferers [14,15,23–27]. The U.S. Headache Consortium guidelines highlight the need to evaluate drug therapy combined with cognitive-behavioral treatment [28].

Delivering a cognitive-behavioral treatment in a group format has the advantage of providing headache sufferers who are disabled with intensive intervention without a corresponding increase in the cost of delivering the service. With group-format treatment, more individual sufferers can be comprehensively treated with fewer clinic resources (e.g., 10 patients, 15 provider contact hours) than would be used with either an individual clinic-based treatment (10 patients, 100 provider contact hours) or a home-based approach (10 patients, 30 provider contact hours). Despite its efficiency, remarkably few studies have evaluated the effects of cognitive-behavioral treatment delivered in a group format for headaches [29–31]. Even fewer have focused on headache sufferers with more severe conditions, whether treatment is delivered individually or in a group format. Scharff and Marcus [26] evaluated an interdisciplinary group treatment for intractable headache sufferers who had previously failed standard treatments. Improvements occurred in over two thirds of participants, with treatment

consisting of five weekly 3-hour group sessions with instruction from a physician (headache education, medication management, lifestyle changes), physical therapist (cervical anatomy, neck/shoulder exercise, use of heat/ice), occupational therapist (posture, body mechanics), and psychologist (relaxation training, stress management). The lack of studies evaluating the effectiveness of group-format treatment for headache is particularly surprising given the widespread use of cognitive-behavioral group treatment for other pain conditions [32].

We developed and pilot tested a group-format cognitive-behavioral treatment for difficult to treat headache patients with chronic and disabling headaches. The protocol was adapted from empirically supported cognitive-behavioral treatments delivered in individual formats [24, 33]. Unlike the multidisciplinary treatment reported by Scharff and Marcus [26], our treatment was cognitive-behavioral in nature and did not include medication management or physical therapy. However, we did have educational material presented by neurologists, exercise physiologists, and dieticians. We also structured the treatment to be delivered in ten 90-minute sessions instead of the five 3-hour sessions delivered in the Scharff and Marcus protocol. Treatment was implemented while headache sufferers continued with their customary medical care. We evaluated the impact of treatment on multiple measures of outcome: headache activity, medication use, and quality of life.

## Methods

### Participants

A total of 80 primary headache patients with moderate to severe headache-related disabilities initiated cognitive-behavioral group treatment conducted within a behavioral headache management program of an academic medical center. Patients were referred from physicians in the community for behavioral services.

Eligible patients included: A) Those diagnosed with migraine headache, tension-type headache, or both using International Headache Classification system criteria [34]; and B) Those who had moderate to high levels of headache-related disabilities (i.e., classified as either Grade III or IV on the Chronic Pain Index [6]). Those not participating in group treatment typically had scheduling conflicts, were not interested in a group-format treatment, experienced a headache problem of minimal severity that was best managed using a home-based cognitive-behavioral approach [23,35], or had an uncontrolled psychiatric condition (e.g., severe major depressive episode), medical condition (e.g., deafness), or other characteristic (e.g., illiterate) that precluded learning self-management strategies in a group setting.

Data were not available on the number or characteristics of patients who were evaluated but not referred for group treatment. Of the 80 participants who were referred and started treatment, 78% (N = 62) were judged to be treatment completers (i.e., they attended at least six sessions), with 48% (N = 30) of completers attending all 10 meetings. Females comprised 86% (N = 69) of the sample, with ages ranging from 20–79 (mean:  $42.23 \pm 12.88$  SD) years, and all participants held at least a high school diploma or its equivalent (48% [N = 38] held a bachelor's degree or higher). Sixty-eight percent (N = 42) were classified as Grade III disability, and 32% (N = 20) were classified as Grade IV. Headaches were experienced on average for 18.04 ( $\pm 13.72$  SD) years. Forty-four percent of participants (N = 35) were classified as having migraine headaches, 17% (N = 14) had tension-type headaches, and 39% (N = 31) had both migraine and tension-type headaches. At the time of assessment, participants were experiencing on average 20.40 ( $\pm 9.87$  SD) headaches monthly, with an average pain severity of 7.19 ( $\pm 1.78$  SD) on an 11-point Likert-type scale with anchors of 0 (no headache) and 10 (extremely painful—my headache is so painful I can't do anything), and these headaches typically lasted 11.33 ( $\pm 5.41$  SD) hours. Also, 44% (N = 35) of the sample suffered from a DSM-IV comorbid psychiatric condition. Of those, 63% (N = 22) had a primary mood disorder,

17% (N = 6) had a primary anxiety disorder, and 20% (N = 7) had both a mood and an anxiety disorder.

Regarding medication use, 75% (N = 60) had failed at least one trial of a prophylactic agent in the past, and 49% (N = 39) had failed at least two trials. At the beginning of the program, 88% (N = 71) were taking a prescriptive agent (made up of 12% [N = 10] prescribed only prophylactic medication, 29% [N = 23] prescribed only acute medication, and 48% [N = 38] prescribed both a prophylactic and an acute medication), 7% (N = 6) were taking over-the-counter agents only, and 4% (N = 3) were not currently taking medication to manage headaches. In this naturalistic study, we did not place constraints on medication changes during the treatment protocol. However, we did monitor and record any medication changes, especially changes in prophylactic medications that can directly impact headache frequency.

## Procedure

Participants participated in the following three phases of the study: A) Pretreatment evaluation; B) 10-session cognitive-behavioral group treatment protocol; and C) Reevaluation 1 month after completing the group treatment.

**Pretreatment Evaluation**—At the pretreatment evaluation, participants completed a series of self-report measures and under-went a structured diagnostic and biobehavioral evaluation. The evaluation included established measures to assess quality of life and level of headache-related disability. The evaluation also included a questionnaire to gather demographic data and assess headache frequency, duration, and intensity, and past and current medication use. The 75-minute interview by a licensed clinical psychologist was conducted to make a headache diagnosis using the International Headache Society Classification System [34] and to assess for comorbid psychiatric conditions using DSM-IV criteria.

**Treatment Description**—The 10-session (90-minute duration each) cognitive-behavioral treatment group was led by a licensed psychologist and co-led by a predoctoral intern or postdoctoral fellow in clinical psychology. Specialists from different disciplines, including neurologists, psychologists, dietitians, and exercise physiologists, presented 30-minute educational lectures. While information was provided about type and effective use of medication, medication management remained under the direction of the treating physician.

The treatment included three components or modules: patient education, relaxation training, stress and pain coping training. The modules, delivered from standardized manuals, were conducted concurrently and not in sequential fashion; portions of each module were covered in each treatment session. The enrollment format was open; the group was ongoing with individual participants entering at various time points and exiting after completing 10 sessions. Six to 12 participants were typically in the group at one time. Upon completion of 10 sessions, participants received a certificate commending them for their efforts in learning headache self-management skills.

**Orientation**—Prior to their first group session, all participants attended a 1-hour orientation that provided the following: treatment overview; rationale for cognitive-behavioral treatment; orientation to self-management training; initial instruction in daily monitoring of headache and lifestyle behaviors; and the first exercise in progressive muscle relaxation training. The orientation also emphasized the importance of developing realistic expectations for outcome (e.g., headaches could be reduced in frequency and better controlled but were not likely to be eliminated).

**Headache Education Module**—Participants were instructed about headache types, causes, triggers, and management strategies (including use of medication and behavioral strategies). Particular emphasis was placed on ways to identify and modify lifestyle behaviors that could serve as headache triggers (e.g., problem foods, eating schedule, sleep habits, caffeine consumption). To help with this process, participants filled out diaries that included daily recordings of their meal schedules, sleep schedules, caffeine consumption, alcohol and problem food consumption, and exercise schedules. These diaries were used to identify specific lifestyle behaviors that were unregulated and could be modified. Participants were also provided educational materials including a book [36,37] and a series of fact sheets (from the American Council on Headache Education and The National Headache Foundation).

**Relaxation Training Module**—The relaxation training protocol (along with supporting audiotapes and written materials) was developed by Holroyd and colleagues [24,33,38,39] and adapted for use in a group-treatment protocol. The relaxation training skills were taught using progressive muscle relaxation techniques. Participants learned a series of four relaxation exercises that started with longer forms of relaxation and culminated in incorporating brief relaxation techniques (cue-controlled, recall, and autogenic relaxation) into their daily routines. Participants proceeded with the sequence of exercises at their own pace. Written materials and audiotapes corresponding to each exercise assisted individuals in learning and applying relaxation skills through home practice.

**Stress and Pain Coping Training Module**—The cognitive-behavioral stress and pain coping training protocol and supporting audiotapes and written materials were also developed by Holroyd and colleagues [24,33] and adapted for use in a group format. Participants learned cognitive coping skills and problem solving strategies designed to alter stress and emotional responses that can trigger, exacerbate, or maintain headache activity. Specifically, participants learned skills that focused on identifying problem situations, developing an awareness of the components (physiological, emotional, cognitive) of the stress reaction, and applying both cognitive-restructuring and problem-solving skills. Participants also learned pain management strategies designed to limit the emotional and behavioral impact of headaches, including relaxation, stress coping skills, and other techniques (e.g., attention diversion strategies, pain sensation reinterpretation techniques). Participants were provided written materials and audiotapes to assist with learning these skills.

**Session Structure**—Each session was typically divided into three parts. The first third was focused on reviewing and troubleshooting difficulties related to the weekly home assignment (i.e., reading, regulating lifestyle behavior, and skills training). In the middle third, new educational material was presented. The last third was focused on new skill development (e.g., relaxation or stress and pain coping skills training). As much as possible, the group process was used to build cohesion, facilitate adherence, allow for problem solving, and share knowledge and experiences. Each session concluded with the assignment of weekly homework and presentation of certificates for those who were completing the treatment.

**Posttreatment Reevaluation**—The posttreatment reevaluation occurred 1 month following the end of group treatment (i.e., about 4 months after beginning treatment). The posttreatment reevaluation was conducted by mail and included a reassessment of headache activity, medication use, and quality of life. The disability measure was not readministered during the reevaluation because the time window for the instrument (6 months) would overlap with the first assessment.

## Measures

**Headache Activity**—To assess for treatment impact on headache and the use of medication, participants completed the Headache Questionnaire. It included single-item measures of pain duration, intensity, and frequency. Headache duration was assessed by participants indicating the average number of hours a headache lasted. Intensity was assessed on a commonly used 11-point Likert-type scale with scores ranging from 0–10 (0 = no headache, 2 = slight headache, only noticed when attention is focused on it; 4 = mild headache, can be ignored most of the time; 6 = painful, but can continue with activity; 8 = very painful, concentration difficult but can perform undemanding tasks; 10 = extremely painful, my headache is so painful I can't do anything) [24,33,40,41]. Frequency was assessed by having participants indicate the number of headaches experienced during the past month.

**Disability Measure**—The Chronic Pain Index [42] was used to classify individuals according to their headache-related disability grades. This index, a predecessor to the Migraine Disability Assessment Scale (MIDAS) [43], is a 7-item scale consisting of three pain intensity items and four disability items assessing responses over a 6-month period. An algorithm is applied to these seven items to place individuals in one of five classifications: Grade 0 (pain free), Grade I (low disability–low intensity), Grade II (low disability–high intensity), Grade III (high disability–moderately limiting), and Grade IV (high disability–severely limiting). This grading system has demonstrated strong cross-sectional and prospective relationships with measures of headache impact, depression, and use of health care services [42]. Although participants who were classified as Grade I and Grade II participated in group treatment, only those classified as Grade III or Grade IV were included in the present study.

**Medication Use**—Participants listed all headache medications they were currently taking, including the name, number of days per month the medication was used, and the number of pills consumed when used. The total number of acute medication pills taken per month was calculated by multiplying the number of pills consumed per day by the number of days used in a month. The total number of days per month using acute medication was defined as the number of days of acute medication use.

**Quality of Life**—To assess the impact of treatment on quality of life, the Medical Outcome Studies (MOS) General Health Survey Short-Form 36 (SF-36) [44] was used. The MOS SF-36 is a 36-item instrument that assesses impacts of chronic medical problems on patient functioning in eight areas: physical functioning, physical role functioning, emotional role functioning, social functioning, vitality, mental health, health perception, and bodily pain. Internal consistency reliability coefficients range from 0.81 to 0.88. Considerable support for the validity of the instrument also exists [45]. This instrument is the most commonly used general quality-of-life measure in the headache literature and has been found to be sensitive to change in numerous headache treatment studies.

**Statistical Analyses**—All analyses were conducted using the Statistical Package for the Social Sciences (SPSS) for Windows version 10.1. Repeated measures multivariate analysis of variance (MANOVA) was performed on three headache variables (frequency, severity, and duration), two indices of symptomatic medication use, and the eight subscales of the MOS SF-36. This was followed by examining univariate F values in order to determine which dependent variables contributed to the significant differences.

Chi-Square analyses and Mann-Whitney U-tests were conducted to compare those who completed treatment (N = 62) with those who did not (N = 18). The two groups did not differ in regard to demographic variables (age, gender, marital status, years of education, headache



type), outcome-related variables, or any other factor that could theoretically influence outcome (e.g., years of pain, previous or current use of prophylactic or acute prescribed agents).

Pre- and posttreatment data were available for 81% (N = 50) of those who completed treatment. However, one individual was missing postintervention data for the headache variables, one was missing data on medication use, and four were missing data for the MOS SF-36 variables; these individuals were included in the analyses for which they had complete data. Chi-Square analyses and Mann-Whitney U-tests were conducted to compare treatment completers who had pre- and posttreatment data (N = 50) with those treatment completers who had only pretreatment data (N = 12). The two groups did not differ in regard to demographic variables (age, gender, marital status, years of education, headache type), outcome-related variables, or any other factor that could theoretically influence outcome (e.g., years of pain, previous or current use of prophylactic or acute prescribed agents).

Prior to analysis, data were checked for fit between scale distribution and the assumptions of normality for both univariate and multivariate analyses. P-P plots, pairwise linearity, homogeneity of variance/covariance matrices, skewness, and kurtosis were checked and found to be satisfactory. To assess for potential univariate outliers, we converted values to standard scores and used a cutoff of  $\pm 3$ , per recommendations by Tabachnick and Fidell [46], and found no outliers. Mahalanobis distance was calculated, where appropriate, in order to screen for multivariate outliers using  $P < 0.001$ , with no outliers identified. Multicollinearity diagnostics were also conducted, and multicollinearity was not found to be a problem.

## Results

### Headache Activity

Levels of headache intensity, duration, and frequency showed significant improvements. Table 1 shows the means and standard deviations for each subscale pretreatment and posttreatment, univariate F values, effect sizes, and 95% confidence intervals. Results revealed significant differences between pre- and posttreatment values for all measures of headache activity. In regard to headache frequency, 50% (N = 25) of participants experienced at least a 50% reduction headache frequency from pre- to posttreatment.

### Medication Use

Medication use showed significant improvements for both the number of acute medication pills taken per month and the number of days in which acute medication was taken. Table 2 shows the means and standard deviations for each subscale pretreatment and posttreatment, univariate F values, effect sizes, and 95% confidence intervals. At the beginning of the program, 54% (N = 27) of participants were taking a preventive medication, 40% (N = 20) were taking acute medication, and 6% (N = 3) were not taking any medication to manage headaches. At the conclusion of the program, 44% (N = 22) of participants were taking a preventive agent, 38% (N = 19) were taking acute medication, and 18% (N = 9) were not taking any medication to manage headaches. Of the 20 participants who were taking acute medication on at least 20 days monthly (and who completed treatment and provided posttreatment data), 16 reduced their acute medication below the 20 days per month threshold. In regard to preventive medication use, at the beginning of the program, 54% (N = 27) of individuals were taking prophylactic medication. At the end of treatment 44% (N = 22) were taking prophylactic medication. This difference was not significant.

### Quality of Life

Quality of life as measured by the subscales of the MOS SF-36 showed overall significant improvements at the end of the program. Table 3 shows the means and standard deviations for

each subscale pretreatment and posttreatment, univariate F values, effect sizes, and 95% confidence intervals. Results revealed significant differences between pretreatment and posttreatment values for six of the SF-36 subscales: social functioning, physical role functioning, mental health, vitality, pain, and general health perception.

## Discussion

While continuing with their customary medical care, the moderately to severely disabled headache sufferers in this study participated in a cognitive-behavioral treatment protocol that was designed to address the range of factors contributing to more disabling headache conditions. In the study, disabled headache sufferers who completed group treatment experienced significant improvements in headache frequency, intensity, and duration, medication use, and quality of life.

The findings from the current cognitive-behavioral group treatment are consistent with those reported by Scharff and Marcus [26] for intractable headache sufferers. While both treatments had 15 hours of contact time and included headache education, lifestyle modification, relaxation training, and stress-management training, there were some important differences in treatment structure and treatment components. Treatment structure in the Scharff and Marcus study was in the form of five weekly 3-hour sessions while in the present study the treatment was administered over 10 weekly 90-minute sessions. The Scharff and Marcus treatment was more multidisciplinary in nature by including components (medication management and physical therapy) that were not part of the intervention in this study. Participants in the present study, however, did continue to have their medications managed by their ongoing provider.

First-line interventions delivered alone may not sufficiently address the range of biological, psychological, and behavioral factors contributing to disabling headache conditions. As a result, many moderately to severely disabled headache sufferers experience inadequate relief. Cognitive-behavioral treatments (such as the current intervention) targeting emotional distress, unregulated lifestyle behaviors (caffeine, disrupted sleep schedule, irregular eating patterns), and poor coping skills can be delivered in conjunction with standard medical care. The combination of modalities may provide a more comprehensive treatment approach that may better meet the needs of those with moderately to severely disabling headaches and provide greater relief than is available with single-modality interventions.

Delivering the cognitive-behavioral treatment in a clinic-based group format provided for more intensive treatment than is typically available with standard home-based cognitive-behavioral treatment protocols. When delivered in a group format, the more intensive cognitive-behavioral treatment is not necessarily accompanied by increased costs in service delivery. A group-format treatment allows a greater number of individual sufferers to be comprehensively treated with fewer clinic resources, thus potentially providing a cost-effective mode of delivery.

Findings from the current study are encouraging, but limitations are acknowledged. The absence of a control/comparison group limits any conclusion that improvements in these headache sufferers would not have occurred naturally, as a result of regression to the mean or a result of demand characteristics. Also, without formal evaluations of how much participants learned and how well they applied headache management skills, the extent to which improvements can be attributed to treatment is limited. The breadth and strength of the positive outcomes in this group, while preliminary in nature, suggest that this intervention is ready to undergo evaluation in a randomized clinical trial. Future trials can also strengthen the methodology by basing headache outcome on daily headache recordings analyzed using an intent-to-treat analysis. In addition, trials can determine whether: A) There is a differential treatment response with migraine and tension-type headaches; B) The level of disability



improved with treatment; and C) Certain demographic characteristics (e.g., psychiatric comorbidity) are related to outcome. With further empirical scrutiny, there is potential for difficult-to-treat headache patients who are moderately to severely disabled to experience benefits in multiple domains from a cost-effective intervention that can be administered feasibly in a clinical practice setting.

## References

1. Lipton RB, Stewart WF, Simon D. Medical consultation for migraine: Results from the American Migraine Study. *Headache* 1998;38:87–96. [PubMed: 9529763]
2. Rasmussen BK. Epidemiology and socio-economic impact of headache. *Cephalalgia* 1999;19(suppl 25):20–3. [PubMed: 10668114]
3. Menken M, Munsat TL, Toole JF. The global burden of disease study: Implications for neurology. *Arch Neurol* 2000;57:418–20. [PubMed: 10714674]
4. Murray CJ, Lopez AD. Regional patterns of disability-free life expectancy and disability-adjusted life expectancy: Global Burden of Disease Study. *Lancet* 1997;349:1347–52. [PubMed: 9149696]
5. Lipton RB, Stewart WF, Von Korff M. Migraine impact and functional disability. *Cephalalgia* 1995;15 (suppl 15):4–9. [PubMed: 8749239]
6. Von Korff M, Ormel J, Keefe FJ, Dworkin SF. Grading the severity of chronic pain. *Pain* 1992;50:133–49. [PubMed: 1408309]
7. Von Korff M, Stewart WF, Simon DJ, Lipton RB. Migraine and reduced work performance: A population-based diary study. *Neurology* 1998;50:1741–5. [PubMed: 9633720]
8. Stewart WF, Lipton RB, Simon D. Work-related disability: results from the American migraine study. *Cephalalgia* 1996;16:231–8. discussion 215. [PubMed: 8792034]
9. Ramadan NM, Schultz LL, Gilkey SJ. Migraine prophylactic drugs: Proof of efficacy, utilization and cost. *Cephalalgia* 1997;17:73–80. [PubMed: 9137841]
10. Rothrock JF. Clinical studies of valproate for migraine prophylaxis. *Cephalalgia* 1997;17:81–3. [PubMed: 9137842]
11. Holroyd KA. Assessment and psychological management of recurrent headache disorders. *J Consult Clin Psychol* 2002;70:656–77. [PubMed: 12090375]
12. Nash JM. Psychologic and behavioral management of tension-type headache: Treatment procedures. *Curr Pain Headache Rep* 2003;7:475–81. [PubMed: 14604507]
13. Lipchik GL, Nash JM. Cognitive-behavioral issues in the treatment and management of chronic daily headache. *Curr Pain Headache Rep* 2002;6:473–9. [PubMed: 12413406]
14. Mathew NT. Chronic refractory headache. *Neurology* 1993;43(suppl 3):S26–33. [PubMed: 8502384]
15. Holroyd, KA.; Lipchik, GL. Psychological management of recurrent headache disorders: Progress and prospects. In: Gatchel, RJ.; Turk, DC., editors. *Psychosocial factors in pain*. The Guilford Press; New York: 1999. p. 193-212.
16. Breslau N, Andreski P. Migraine, personality, and psychiatric comorbidity. *Headache* 1995;35:382–6. [PubMed: 7672954]
17. Breslau N, Chilcoat HD, Andreski P. Further evidence on the link between migraine and neuroticism. *Neurology* 1996;47:663–7. [PubMed: 8797461]
18. Breslau N, Schultz LR, Stewart WF, Lipton RB, Lucia VC, Welch KM. Headache and major depression: Is the association specific to migraine? *Neurology* 2000;54:308–13. [PubMed: 10668688]
19. Holroyd KA, Malinoski P, Davis MK, Lipchik GL. The three dimensions of headache impact: Pain, disability and affective distress. *Pain* 1999;83:571–8. [PubMed: 10568866]
20. Verri AP, Cecchini A Proietti, Galli C, Granella F, Sandrini G, Nappi G. Psychiatric comorbidity in chronic daily headache. *Cephalalgia* 1998;18(suppl 21):45–9. [PubMed: 9533671]
21. Andrasik F. Stress, personality, and headache: searching new territories [editorial]. *Cephalalgia* 1999;19:541. [PubMed: 10448537]
22. Siniatchkin M, Riabus M, Hasenbring M. Coping styles of headache sufferers. *Cephalalgia* 1999;19:165–73. [PubMed: 10234464]

23. Holroyd, KA.; Lipchik, GL.; Penzien, DB. Psychological management of recurrent headache disorders: Empirical basis for clinical practice. In: Dobson, KS.; Craig, KD., editors. Best practice: Developing and promoting empirically supported interventions. Sage Publishers; Newbury Park: 1998. p. 193-212.
24. Holroyd KA, O'Donnell FJ, Stensland M, Lipchik GL, Cordingley GE, Carlson BW. Management of chronic tension-type headache with tricyclic antidepressant medication, stress management therapy, and their combination: A randomized controlled trial. *JAMA* 2001;285:2208-15. [PubMed: 11325322]
25. Gauthier JG, Ivers H, Carrier S. Nonpharmacological approaches in the management of recurrent headache disorders and their comparison and combination with pharmacotherapy. *Clin Psychol Rev* 1996;16:543-71.
26. Scharff L, Marcus DA. Interdisciplinary outpatient group treatment of intractable headache. *Headache* 1994;34:73-8. [PubMed: 8163369]
27. Campbell JK, Penzien D, Wall EM. Evidenced-based guidelines for migraine headache: Behavioral and physical treatments. *Neurology*. [serial on-line]. Available at: <http://www.aan.com/professionals/practice/pdfs/gl0089.pdf>.
28. Ramadan NM, Silberstein SD, Freitag FG, Gilbert TT, Frishberg BM. Evidence-based guidelines for migraine headache in the primary care setting: Pharmacological management for prevention of migraine. *Neurology*. [serial on-line]. Available at: <http://www.aan.com/professionals/practice/pdfs/gl0090.pdf>.
29. Haddock CK, Rowan AB, Andrasik F, Wilson PG, Talcott GW, Stein RJ. Home-based behavioral treatments for chronic benign headache: A metaanalysis of controlled trials. *Cephalalgia* 1997;17:113-18. [PubMed: 9137849]
30. Napier DA, Miller CM, Andrasik F. Group treatment for recurrent headache. *Adv Med Psychother* 1997-98;9:21-31.
31. Rowan AB, Andrasik F. Efficacy and costeffectiveness of minimal therapist contact treatments of chronic headache: A review. *Behav Ther* 1996;27:207-34.
32. Keefe, FJ.; Beupre, PM.; Gil, KM.; Rumble, ME.; Aspnes, AK. Group therapy for patients with chronic pain. In: Turk, DC.; Gatchel, RJ., editors. Psychological approaches to pain management: A practitioner's handbook. 2nd edition. Guilford Press; New York: 2002. p. 234-55.
33. Holroyd KA, Nash JM, Pingel JD, Cordingley GE, Jerome A. A comparison of pharmacological (amitriptyline HCL) and nonpharmacological (cognitive-behavioral) therapies for chronic tension headaches. *J Consult Clin Psychol* 1991;59:387-93. [PubMed: 2071723]
34. Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. Headache Classification Committee of the International Headache Society. *Cephalalgia* 1988;8(suppl 7):1-96.
35. Nash J, Holroyd KA. Home-based behavioral treatment for recurrent headache: A cost-effective alternative. *Am Pain Soc Bull* 1992;2:1-6.
36. Rapoport, A.; Sheftell, F. Headache relief: A comprehensive, up-to-date, medically proven program that can control and ease headache pain. Simon and Schuster; New York: 1990.
37. Rapoport, A.; Sheftell, F. Conquering headache. 2nd edition. Empowering Press; Hamilton, Canada: 1998.
38. Holroyd KA, France JL, Cordingley GE, Rokicki LA, Kvaal SA, Lipchik GL, McCool HR. Enhancing the effectiveness of relaxation-thermal biofeedback training with propranolol hydrochloride. *J Consult Clin Psychol* 1995;63:327-30. [PubMed: 7751496]
39. Holroyd, KA.; French, D.; Nash, JM.; Tobin, DL.; Eichenburger-McCune, RL. Stress management for tension headaches: A treatment program for controlling headaches. Ohio University Headache Project; Athens OH: 1995.
40. McKee, M. Headache diary. In: Tollison, CD.; Kunkel, RS., editors. Headache diagnosis and treatment. Williams & Wilkins; Baltimore: 1993. p. 321-7.
41. Blanchard, EB.; Andrasik, F. Management of chronic headaches: A psychological approach. Pergamon Press; Elmsford, NY: 1985.
42. Von Korff M, Stewart WF, Lipton RB. Assessing headache severity. New directions. *Neurology* 1994;44(suppl 4):S40-6. [PubMed: 8008224]

43. Stewart WF, Lipton RB, Dowson AJ, Sawyer J. Development and testing of the Migraine Disability Assessment (MIDAS) Questionnaire to assess headache-related disability. *Neurology* 2001;56(suppl 1):S20–8. [PubMed: 11294956]
44. Stewart AL, Greenfield S, Hays RD, Wells K, Rogers WH, Berry SD, McGlynn EA, Ware JE Jr. Functional status and well-being of patients with chronic conditions. Results from the Medical Outcomes Study *JAMA* 1989;262:907–13. *JAMA* 1989;262:2542. Erratum in.
45. Ware, JE.; Shebourne, CD.; Davies, AR.; Stewart, AL. The MOS short-form general health survey: Development and test in a general population. P-7444 ed. The Rand Corp; Santa Monica, CA: 1988.
46. Tabachnick, BG.; Fidell, LS. Using multivariate statistics. 4th edition. Allyn & Bacon; Boston: 2001.

**Table 1**

Results of assessments of headache variables pretreatment and posttreatment (N = 49)

| Variable           | Pretreatment |      | Posttreatment |       | F value | $\eta^2$ | CI         |
|--------------------|--------------|------|---------------|-------|---------|----------|------------|
|                    | mean         | SD   | mean          | SD    |         |          |            |
| Headache frequency | 20.94        | 9.93 | 12.69         | 10.92 | 26.39*  | 0.36     | 5.02–11.47 |
| Headache severity  | 6.93         | 1.75 | 5.77          | 2.33  | 8.91†   | 0.16     | 0.38–1.96  |
| Headache duration  | 11.55        | 5.50 | 7.73          | 6.00  | 18.05*  | 0.27     | 2.01–5.62  |

\*  $P > 0.0001$ †  $t > 0.01$ ;for all univariate analyses, degrees of freedom were 1,48; CI = 95% confidence interval. For the MANOVA: Wilks'  $\lambda = 0.55$ , approximate  $F(3,46) = 12.50$ ,  $P > 0.0001$ ,  $\eta^2 = 0.45$ .

**Table 2**  
Results of assessments of medication use pretreatment and posttreatment (N = 49)

| Variable                               | Pretreatment |       | Posttreatment |       | F value            | $\eta^2$ | CI          |
|--|--------------|-------|---------------|-------|--------------------|----------|-------------|
|  | mean         | SD    | mean          | SD    |                    |          |             |
| Number of pills taken per month        | 76.44        | 21.25 | 34.02         | 13.66 | 8.25*              | 0.15     | 12.73–72.11 |
| Days per month taking acute medication | 20.73        | 5.86  | 11.71         | 5.61  | 20.24 <sup>†</sup> | 0.30     | 4.99–13.05  |

\*  $P < 0.01$ ;

<sup>†</sup>  $P < 0.001$

for all univariate analyses, degrees of freedom were 1,48; CI = 95% confidence interval. For the MANOVA: Wilks'  $\lambda = 0.70$ , approximate  $F(2,47) = 9.93$ ,  $P < 0.001$ ,  $\eta^2 = 0.30$ .

**Table 3**  
Results of assessments of MOS SF-36 subscale scores pretreatment and posttreatment (N = 46)

| Variable                  | Pretreatment |       | Posttreatment |       | F value            | $\eta^2$ | CI          |
|---------------------------|--------------|-------|---------------|-------|--------------------|----------|-------------|
|                           | mean         | SD    | mean          | SD    |                    |          |             |
| Physical functioning      | 76.52        | 25.05 | 78.91         | 25.49 | 0.64               | NS       |             |
| Social functioning        | 48.64        | 28.04 | 69.29         | 25.24 | 21.37 <sup>†</sup> | 0.32     | 11.65–29.65 |
| Physical role             | 19.57        | 29.77 | 53.26         | 38.23 | 33.45 <sup>†</sup> | 0.43     | 21.96–45.43 |
| Emotional role            | 50.00        | 43.18 | 57.25         | 43.70 | 1.29               | NS       |             |
| Mental health             | 53.74        | 20.96 | 62.52         | 21.15 | 11.20 <sup>†</sup> | 0.20     | 3.50–14.07  |
| Vitality                  | 33.37        | 19.21 | 48.70         | 21.15 | 27.52 <sup>†</sup> | 0.38     | 9.44–21.21  |
| Pain                      | 32.30        | 16.57 | 50.11         | 21.38 | 22.03 <sup>†</sup> | 0.33     | 10.16–25.45 |
| General health perception | 55.11        | 20.58 | 61.26         | 22.45 | 4.74*              | 0.10     | 0.46–11.85  |

\*  $P < 0.05$

<sup>†</sup>  $P < 0.001$ ;

for all univariate analyses, degrees of freedom were 1,45; CI = 95% confidence interval. For the MANOVA: Wilks'  $\lambda = 0.44$ , approximate  $F(8,38) = 6.06$ ,  $P < 0.001$ ,  $\eta^2 = 0.56$ .

NS = not significant.