

Perceived Self-efficacy and Headache-Related Disability

Douglas J. French, PhD; Kenneth A. Holroyd, PhD; Cornelia Pinell, PhD; Peter T. Malinoski, MS;
Francis O'Donnell, DO; Kimberly R. Hill, MSc

Background.—Headache-specific self-efficacy refers to patients' confidence that they can take actions that prevent headache episodes or manage headache-related pain and disability. According to social cognitive theory, perceptions of self-efficacy influence an individual's adaptation to persistent headaches by influencing cognitive, affective, and physiological responses to headache episodes as well as the initiation and persistence of efforts to prevent headache episodes.

Objective.—The objective of the present study was to construct and validate a brief measure of headache specific self-efficacy and to examine the relationship between self-efficacy and headache-related disability.

Methods.—A sample of 329 patients seeking treatment for benign headache disorders completed the Headache Management Self-Efficacy Scale and measures of headache-specific locus of control, coping, psychological distress, and headache-related disability. A subset of 262 patients also completed 4 weeks of daily headache recordings.

Results.—As predicted, patients who were confident they could prevent and manage their headaches also believed that the factors influencing their headaches were potentially within their control. In addition, self-efficacy scores were positively associated with the use of positive psychological coping strategies to both prevent and manage headache episodes and negatively associated with anxiety. Multiple regression analyses revealed that headache severity, locus-of-control beliefs, and self-efficacy beliefs each explained independent variance in headache-related disability.

Key words: tension-type headache, self-efficacy, disability

Abbreviations: HSE Headache Self-efficacy Scale, CTTH chronic tension-type headache, HMSE Headache Management Self-efficacy Scale, HSLC Headache-Specific Locus of Control Scale, HDI Headache Disability Inventory, ICE-H Interview of Coping Efforts - Headache version, BDI Beck Depression Inventory, TAI Trait Anxiety Inventory, STAI State-Trait Anxiety Inventory, HI Headache Index

(*Headache* 2000;40:647-656)

Individuals with similar headache problems may differ dramatically in their adaptation to their headache disorder. Social psychological research suggests

that such individual differences in adaptation are partially determined by two types of beliefs individuals hold about their headache problems: beliefs about the factors that influence the onset and course of headache episodes (perceived locus of control) and beliefs about their ability to take actions to influence the onset or course of headache episodes (perceived self-efficacy).

Locus of control refers to the belief that the factors that influence headache episodes and headache relief are within the individual's control (eg, triggered by diet or self-imposed work pressure), or outside the individual's control, either influenced by chance or fate (eg, inherited vulnerability, hormonal fluctuations)

From the Département de Psychologie, Université de Moncton, Moncton, NB, Canada (Dr. French); the Department of Psychology, Ohio University, Athens (Drs. Holroyd and Pinell, Ms. Hill, and Mr. Malinoski) and OrthoNeuro, Westerville, Ohio (Dr. O'Donnell). Dr. Pinell is now at Arizona School of Professional Psychology, Phoenix.

Address all correspondence to Dr. Douglas J. French, Département de Psychologie, Université de Moncton, Moncton, NB, Canada, E1A3E9.

Accepted for publication March 5, 2000.

or by the actions of health professionals (rather than the individual's actions). In general, an external locus of control, particularly the belief that headaches are determined by chance or fate, has been associated with poor adjustment, while an internal locus of control has been associated with positive adjustment, not only in individuals with recurrent headache disorders¹ but also in individuals coping with other chronic pain problems.²⁻⁶ For example, medication consumption, psychological consequences of headache episodes, and preferences for self-regulatory or drug therapies were influenced by perceived locus of control, even when individual differences in the severity of headache problems were statistically controlled.^{7,8}

Individual differences in perceived self-efficacy or confidence that one can take actions that will help prevent or manage headache episodes have also been related to an individual's adaptation to headache problems. A sense of personal efficacy is believed to enhance adaptation to pain problems, and a sense of personal inefficacy to undermine adaptation to pain problems, because perceptions of personal efficacy are associated with active efforts to prevent and manage pain,⁹ increased pain tolerance,^{10,11} diversion of attention from pain rather than dwelling on the aversiveness of pain sensations,¹² benign interpretations of ambiguous bodily sensations rather than worry about bodily sensations,¹² fewer overt pain behaviors,¹³ increased levels of physical activity,¹⁴⁻¹⁶ and physiological responses to pain that are less likely rather than more likely to contribute to pain chronicity over time.¹⁷

Locus of control and self-efficacy beliefs are expected to be related because an individual generally must believe that the factors influencing their headaches are potentially within their control if they are to believe they can take actions that will influence the occurrence and severity of their headaches. However, locus of control and self-efficacy beliefs need not be related: an individual may believe the factors influencing their headaches are *potentially* within one's control (ie, include potentially modifiable work stresses or triggers) but lack confidence in their ability to take the actions necessary to modify these factors.⁵ In this case, an internal locus of control would be coupled with low sense of personal efficacy.

Martin et al¹⁸ published the 51-item Headache Self-efficacy Scale (HSE) intended to assess headache sufferers "beliefs about their ability to prevent headaches when confronted with personally relevant headache triggers." As predicted, they found that even when headache severity was controlled, young adults with higher self-efficacy beliefs about the prevention of headaches exhibited lower levels of depression and anxiety, fewer somatic symptoms, and better adjustment to their headache-related problems. The HSE has a number of limitations. It is lengthy (51 items) and uses a cumbersome format that requires the respondent to identify headache triggers and complete a self-efficacy rating for each identified trigger. Scale scores are calculated by summing ratings only on identified triggers. Accordingly, an individual with a high degree of self-confidence but only one identified trigger would appear more self-efficacious than an individual with a high degree of confidence across many situations. The length and scoring are such that the HSE is impractical to use in many clinical situations, and scores may be ambiguous. In addition, the HSE assesses only self-efficacy beliefs about the prevention of headaches and not self-efficacy beliefs about managing headaches or headache-related disability. It was thought that efficacy beliefs about headache prevention may represent only one dimension of headache-related self-efficacy and that headache prevention may be less relevant to the migraine sufferer given the relatively sudden onset and episodic nature of migraine. These limitations may account for its relatively limited use over the last 5 years.

The goal of the present study was to construct and validate a brief self-efficacy measure with a simplified item and scoring format to assess individuals' perceptions of their ability to take actions to prevent and to manage headaches and headache-related disability. Drawing on self-efficacy theory we posited that: (1) self-efficacy beliefs would be correlated with, but distinguishable from, locus-of-control beliefs; (2) higher levels of self-efficacy would be associated with lower levels of headache-related disability; (3) higher levels of self-efficacy would be associated with greater use of positive psychological coping strategies to prevent and to manage headaches; and (4)

self-efficacy and locus-of-control beliefs would account for additional variance in headache-related disability beyond that explained by headache severity.

METHODS

Participants.—A total of 329 patients (77% women) seeking treatment for frequent headaches constituted the patient sample. Patients were seen at two clinics: one clinic served the urban Columbus, Ohio and surrounding suburban areas, and one served southern Ohio and western West Virginia. All patients received a tension-type headache diagnosis; 29% of patients also received a migraine diagnosis. Patients were predominantly white (94%), but included black (3%), Native American (2%), and Asian (1%) patients. The mean age (\pm SD) was 36.6 ± 11.8 years (range, 17 to 65 years). The median annual family income was between \$30,000 and \$45,000.

Patients reported problem headaches for an average of 12.4 years (range 0.5 to 54, median 10.9 years). The mean number of days per month with tension-type headaches was 22.6, with 31% of patients reporting tension-type headaches 7 days per week and 59% of patients reporting tension-type headaches at least 5 days per week. Patients reported a mean pain rating for their typical headache of 5.7 (SD = 1.15) on a 10-point scale, corresponding roughly to the anchor “It is painful but I can continue what I am doing.” The mean headache duration was 7.7 hours when the headache was treated (SD = 6.2, median = 5.0) and 12.1 hours when the headache was untreated (SD = 5.2, median = 16.0).

Patients taking antidepressant medication or other prophylactic headache medications, or using anti-anxiety medication on a regular basis (≥ 15 days per month) were not included in our sample. This reduced the possibility that patients’ responses to psychosocial measures or daily headache recordings would be altered by the effects or side effects of these medications. Patients with comorbid pain disorders other than headache as a primary complaint also were not included in our sample. This reduced the possibility that patients’ responses to our measures would reflect the presence of a pain disorder other than headache.

In addition to the standard battery of diagnostic and psychosocial assessments completed by all pa-

tients (N = 329), the patients who appeared to meet IHS diagnostic criteria for chronic tension-type headache (CTTH)¹⁹ at the initial evaluation (subsample A; n = 262) were invited to complete 4 weeks of daily headache recordings for diagnostic purposes. Patients with a confirmed diagnosis of CTTH who agreed to enter a randomized controlled trial (subsample B; n = 201) moved into the treatment phase of the study and were assigned to one of four 8-week treatment conditions: (1) tricyclic medication (amitriptyline/nortriptyline)+clinical management; (2) placebo+clinical management; (3) tricyclic medication + stress management; or (4) placebo + stress management. Stress management therapy was developed specifically to reduce headache severity and headache-related disability and included training in the use of relaxation, cognitive coping, and problem solving skills to prevent headaches and manage head pain.²⁰⁻²² Patients were re-evaluated on all measures 1 month following completion of the 8-week treatment phase. Patient demographics did not differ significantly across study samples.

MEASURES

Headache Management Self-efficacy Scale (HMSE).—This scale consists of 25 items rated on a 7-point scale that ranges from 1 = strongly disagree to 7 = strongly agree. Items were generated by individuals experienced in the treatment of chronic headache problems and include items inquiring about individuals’ confidence in their abilities to prevent headache episodes (eg, “I can prevent headaches by changing how I respond to stress”) and to manage head pain (eg, “I can do things that will control how long a headache lasts”). Following established content-description procedures, the initial pool of scale items was developed by first reviewing existing measures of pain-related self-efficacy (including the HSE of Martin et al¹⁸), disability, and coping to identify relevant content areas. Expert consultation suggested adequate content sampling. Finally, initial pilot testing revealed redundant or ambiguous items which were subsequently eliminated or reworded to improve clarity. The HSE is presented in the Appendix.

Headache-Specific Locus of Control Scale (HSLC).—The HSLC⁸ is a 33-item scale (5-point,

1 = strongly disagree to 5 = strongly agree) with Internal, Professional, and Chance subscales that measure the belief that factors influencing headache episodes and headache relief are internally controlled, controlled by health care professionals, or dictated by chance, respectively. The HSLC has been shown to predict medication consumption, psychological consequences of headache episodes, such as depression, and preference for self-regulatory drug therapies, even when the severity of headache problems is controlled.^{7,8}

Headache Disability Inventory (HDI).—The HDI²³ was designed to assess “the burden of chronic headaches,” using 25 items that inquire about the perceived impact of headaches on emotional functioning (eg, “I feel desperate because of my headaches”) and daily activities (eg, “Because of my headaches, I am less likely to socialize”). Items were designed specifically to assess the concerns of individuals with recurrent headache disorders. The HDI appears to exhibit reasonable short-term (1 week, $r=0.93-0.95$) and longer-term (2 months, $r=0.76-0.83$) stability, and patient reports on the HDI appear to be reasonably congruent with spouse reports.^{23,24} Although the authors organized items into emotional and functional subscales, factor analysis of HDI items in our sample revealed all items loaded on a single factor. Therefore, we included only the total HDI score in all analyses.

Interview of Coping Efforts - Headache Version (ICE-H).—The ICE-H²⁵ is a 6-item structured interview designed to assess coping strategies an individual uses to prevent and to manage headache episodes. Patient responses to standardized questions (eg, “When you anticipate having a headache or feel a headache is likely to occur, what do you do, if anything?”) are categorized as either positive psychological coping (eg, systematic attempts to reduce muscle tension, cognitive restructuring, coping self-statements, etc), palliative coping (eg, ignoring pain, lying down, taking a bath, etc), or medication coping. Average frequency of coping within each coping category was calculated for both prevention and control of headache episodes using a scale ranging from 0 (not at all frequent; 0% of the time) to 4 (frequently; 75% to 100% of the time). Interrater reliability for classifying

patient responses into the three coping categories is excellent, with Cohen’s index κ of 0.96 for positive psychological coping, 0.95 for palliative coping, and 1.00 for medication coping. Support has been provided for the construct validity of the ICE-H.²⁵

Beck Depression Inventory (BDI).—The BDI²⁶ is a 21-item instrument designed to assess the presence and severity of depressive symptoms in adults and adolescents. Individual items consist of four statements reflecting a continuum of depressive severity; item scores are summed to derive a total score. The BDI has been widely used in the assessment of individuals with recurrent headache disorders.²⁷

The Trait Anxiety Inventory (TAI).—The TAI, a subscale of the State-Trait Anxiety Inventory (STAI),²⁸ is a 20-item self-report measure designed to assess relatively enduring symptoms of anxiety and like the BDI has been widely used in the assessment of individuals with recurrent headache disorders.²⁷

Headache Index (HI).—Using a “headache diary,”^{21,29} patients recorded the occurrence and severity of their headaches four times daily during a 4-week period using an 11-point scale (0=no headache to 10=incapacitating headache – “I can’t do anything when experiencing this level of pain”). The HI is the average of the 28 ratings taken each week, including zeros. This method of headache self-monitoring has been widely used in the evaluation of both pharmacological and nonpharmacological treatments for headache.

RESULTS

Headache Management Self-efficacy Scale (HMSE) Factor Structure.—In order to determine if HMSE items could be appropriately grouped into headache prevention and headache management subscales, a factor analysis with a specified two-factor solution was conducted on the total sample ($N=329$). A maximum likelihood (ML) procedure was used for factor extraction; oblimin rotation was used for the 25 HMSE items because it was hypothesized that the two factors would be correlated. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was satisfactory ($KMO=.89$).

A two-factor pain prevention and pain control solution was not supported. The first factor accounted

for 28% of variance in the items (eigenvalue = 7.06). The second factor accounted for only 6.8% of the variance (eigenvalue = 1.69) calling into question the two-factor solution. The two-factor ML solution also left 35% of the residual correlations greater than .05 in absolute magnitude, reflecting relatively poor model fit. The factor analysis was re-run specifying a one-factor solution which yielded a single self-efficacy factor (eigenvalue = 7.0) accounting for 28.0% of the variance. Accordingly, HMSE total score was employed in all subsequent analyses. (To ensure an adequate statistical test of the proposed two-factor model, the HMSE was readministered to 141 patients who completed a posttreatment re-evaluation as part of a larger outcome study. A one-factor solution also proved optimal on this data, with the factor accounting for 47.3% of the variance.)

Reliability of the HMSE.—Cronbach's α demonstrated excellent internal consistency for the 25-item total scale ($\alpha = .90$). Corrected item-total correlations ranged from .27 to .66 (mean .49).

Construct Validity of the HMSE.—Basic descriptive statistics for the study measures are presented in Table 1 and their intercorrelations are presented in Table 2. Construct validity was assessed by examining the association between the HMSE and the HSLC, coping activities (ICE-H), headache-related disability (HDI), and psychological distress (BDI;TAI).

As shown in Table 2, the positive correlation between the HMSE and the HSLC Internal subscale ($r = 0.40$) suggests that individuals who believe the factors that influence their headaches are within their control are more confident in their ability to take actions to prevent and manage their headaches. Similarly, a moderate negative relationship between the HSLC Chance subscale and the HMSE ($r = -0.64$) indicates that individuals who believe the onset and course of their headaches are primarily influenced by chance or fate are unlikely to believe they can take actions to prevent or manage their headaches. No significant correlation was demonstrated between the HMSE and the HSLC Professional subscale, indicating that the belief that health care professionals play an important role in the management of the individual's headaches is held by individuals with both high and low self-efficacy. As predicted, correlations be-

tween measures of headache self-efficacy and locus of control, while significant, are low enough to suggest the scales effectively discriminate the two constructs.

The relationship between headache self-efficacy and coping was examined in subsample B ($n = 201$) in two ways. First, we determined if, as would be predicted by self-efficacy theory, individuals who were using positive psychological coping strategies in efforts to prevent or to manage headaches obtained higher HMSE scores than individuals who did not use these positive coping strategies. Due to a significant skew in the coping data, Mann-Whitney U tests were employed to test these effects. Of the 201 patients completing the ICE-H prior to treatment, 55 reported continuous head pain and therefore could not engage in preventive coping. Of the remaining 146 patients, those who used positive psychological strategies to prevent headaches ($n = 18$) had higher self-efficacy scores ($M = 123.41$ versus 109.82; $U = 737.5$, $z = -2.47$; $P < .05$) than patients who did not use positive psychological coping strategies to prevent headaches ($n = 128$). Similarly, patients who used positive psychological strategies to manage headaches ($n = 28$) had higher self-efficacy scores ($M = 118.25$ versus 107.95; $U = 1808.5$; $z = -2.15$; $P < .05$) than patients who did not ($n = 173$). It is noteworthy that few patients used positive psychological coping strategies to prevent headaches (9%) or to manage headaches (14%).

Secondly, the correlations between HMSE scores and use of positive psychological coping strategies to prevent and manage headaches were examined. Due to the small number of patients who used positive psychological coping strategies prior to treatment, this analysis could not be conducted using pretreatment data. For this reason, correlations between coping scores and the HMSE were examined following treatment ($n = 165$). In addition, due to a significant skew in the distribution of the ICE-H scores, Spearman correlation coefficients were calculated. As may be seen in Table 2, self-efficacy scores were positively associated with the use of positive psychological coping strategies for prevention ($r = 0.54$) and management ($r = 0.55$) of headaches. Thus, individuals who felt confident they could take actions to prevent and manage headaches in fact engaged in more active

Table 1.—Descriptive Statistics for Study Measures

Measure	Mean (SD)	Range	No. of Patients
Headache Management Self-efficacy Scale	110.29 (20.90)	48–163	329
Headache-Specific Locus of Control subscales			
Internal	36.36 (8.00)	11–52	329
Chance	30.85 (8.11)	13–51	329
Professional	28.88 (6.24)	11–47	329
Headache Disability Inventory	39.42 (19.46)	2–96	329
Headache Index	2.74 (1.42)	0.22–7.33	329
Beck Depression Inventory	9.08 (6.96)	0–35	329
State-Trait Anxiety Inventory State	40.05 (10.62)	20–73	329
State-Trait Anxiety Inventory Trait	42.16 (10.75)	20–70	329
ICE-H: P; Interview of Coping Efforts-Headache Version-average frequency of positive psychological coping: prevention	1.53 (1.73)	0–4	132*
ICE-H: T; Interview of Coping Efforts-Headache Version-average frequency of positive psychological coping: tolerance	1.68 (1.68)	0–4	165*

*Of the 165 patients completing the ICE-H following treatment, 33 reported constant headache pain and therefore did not have an opportunity to engage in preventive coping. The remaining 132 reported headache-free periods and could provide preventive coping ratings.

coping activities directed toward the prevention and management of headaches.

Headache Management Self-efficacy Scale scores were negatively correlated with HDI scores, indicating that higher levels of self-efficacy were associated with lower levels of headache-related disability. Headache Management Self-efficacy Scale scores also were neg-

atively correlated with HI scores calculated from daily headache diaries, indicating that more severe headaches are associated with lower levels of self-efficacy. Trait anxiety, as measured by the TAI, correlated weakly but significantly with the HMSE, while self-reported level of depression as measured by the BDI was not related to HMSE scores.

Table 2.—Correlations Between Study Measures

	HMSE	HSLC-I	HSLC-C	HSLC-P	HDI	HI	BDI	TAI	ICE-H: P*	ICE-H: T*
HMSE	—									
HSLC-I	.40‡	—								
HSLC-C	-.64‡	-.26‡	—							
HSLC-P	.04	.21‡	.11	—						
HDI	-.24‡	.24‡	.25‡	.17‡	—					
HI	-.29‡	-.05	.17‡	.04	.29‡	—				
BDI	-.09	.29‡	.15‡	.12†	.52‡	.13†	—			
TAI	-.13†	.36‡	.13†	.04	.55‡	.18‡	.80‡	—		
ICE-H: P*	.54†	.52‡	-.48‡	-.20†	-.11	-.20†	.14	-.18†	—	
ICE-H: T*	.55†	.45‡	-.45‡	-.28‡	-.09	-.11	.08	-.12	.73‡	—

HMSE indicates Head Management Self-efficacy Scale; HSLC-I, Headache-Specific Locus of Control Internal; HSLC-C Headache-Specific Locus of Control Chance; HSLC-P Headache-Specific Locus of Control Professional; HDI, Headache Disability Inventory; HI, Headache Index; BDI, Beck Depression Inventory; TAI, Trait Anxiety Inventory; ICE-H:P, Interview of Coping Efforts-Headache Version-Prevention; and ICE-H:T, Interview of Coping Efforts-Headache Version-Tolerance.

*Due to the small number of patients reporting positive psychological coping strategies before beginning treatment, correlations between coping scores and the other study measures were examined at the end of treatment.

† $P < .05$; ‡ $P < .001$.

Incremental Prediction of Disability.—A multiple regression analysis was conducted to examine the relative contribution of headache severity, locus-of-control beliefs, and perceived self-efficacy to the prediction of headache-related disability. Although headache severity would be expected to influence headache-related disability, social learning theory predicts that disability is also influenced by locus of control and self-efficacy beliefs. In other words, self-efficacy and locus-of-control beliefs should explain individual differences in disability beyond that explained by headache severity alone.

A hierarchical multiple regression analyses using data from the 262 patients who completed the HI, HMSE, HSLC, and HDI (subsample A; initial evaluation and 4 weeks of headache monitoring) was conducted (see Table 3). In the first step, the relationship between headache severity (as indexed by HI) and headache-related disability (HDI) was assessed. As hypothesized, HI was a significant predictor accounting for 8.4% of the variance in HDI (adjusted $R^2 = .080$; $F_{1,259} = 23.7$; $P < .001$). The addition of HSLC significantly increased the amount of HDI variance explained from 8.3% to 13.8% (adjusted $R^2 = .131$; $F_{1,259} = 16.3$; $P < .001$) thereby improving the prediction of disability.

Table 3.—Hierarchical Regression Analysis Predicting Headache-Related Disability

Variable	B	SEB	Cumulative		
			β	R^2	ΔR^2
Step 1					
HI	3.89	.80	0.29*	.08*	.08
Step 2					
HI	4.05	.77	.30*		
HSLC Internal	.55	.14	.06*	.14*	.05
Step 3					
HI	2.94	.78	.22*		
HSLC Internal	.86	.15	-.36*		
HMSE	-.28	.06	-.30*	.21*	.07

HI indicates Headache Index; HSLC, Headache-Specific Locus of Control; and HMSE, Headache Management Self-efficacy Scale.

* $P < .001$.

Finally, when HMSE scores were added to the regression equation containing HI and HSLC, the percentage of HDI variance explained again increased significantly from 13.8% to 20.6% (adjusted $R^2 = .197$; $F_{1,258} = 34.13$; $P < .001$). In other words, self-efficacy contributes significant and unique information to the prediction of disability beyond that explained by headache severity and locus-of-control beliefs. These findings highlight the importance of both self-efficacy and locus-of-control beliefs in understanding disability.

COMMENTS

The HMSE appears to be a psychometrically sound measure of an individual’s perception that they can engage in behaviors that will prevent or manage their recurrent headaches. Statistical reliability of the measure was supported by the high level of internal consistency across items indicating a relatively homogenous set of items. Validity of the HMSE was demonstrated by its significant relationships to other theoretically related constructs such as headache-specific locus of control, coping, and headache-related disability.

Patients who were confident that they could take actions to prevent or manage their headaches also believed their headaches were influenced by factors within their control and were unlikely to believe their headaches are due to chance or fate. As predicted by social learning theory,³⁰ the moderate size of the observed relationship between perceived self-efficacy and locus of control would suggest that these two types of beliefs are related but not identical.

Social learning theory also predicts that patients with low self-efficacy would be less likely to engage in positive psychological coping than patients with high self-efficacy as they lack confidence in their ability to engage in necessary coping activities. In other words, individuals with low levels of self-efficacy will be less likely than individuals with high self-efficacy to take actions to prevent or manage headache episodes and if they take actions will be less likely to persist in their coping efforts.³¹ Consistent with this hypothesis, high self-efficacy was positively associated with the use of positive psychological coping strategies both to prevent headaches and to manage headache problems.

Headache severity was positively, albeit weakly, associated, with disability accounting for only 8.4%

of the disability variance. Both locus of control and self-efficacy beliefs contributed uniquely to individual differences in disability beyond headache severity. These findings provide support for the contention that individual differences in adaptation to headache disorders are explained in part by individuals' beliefs about their headaches. These findings also suggest that other variables involved in the determination of headache-related disability need to be identified, as the present ensemble of predictor variables (HI, self-efficacy, and locus of control) accounted for only roughly 21% of the disability variance.

Clinically, information from the HMSE may help health care professionals identify individuals who lack confidence in their headache management skills and thus are unlikely to engage in behavior that may be necessary for the effective management of their headache disorder. By providing educational information and, when necessary, identifying and challenging unrealistic or self-defeating beliefs about their ability to manage their headaches, patients may be encouraged to take a more active role in the management of their headaches. Researchers interested in investigating therapeutic mechanisms underlying the effectiveness of nondrug therapies also are likely to find the HMSE useful.³²⁻³⁶

In sum, the HMSE appears to be a psychometrically sound measure of patient's confidence in their ability to prevent and manage their headaches. As predicted by social learning theory, self-efficacy appeared to be a determinant of both patient's efforts to cope with their headache problems and headache-related disability. The HMSE may thus provide useful information for clinicians and investigators who are interested in facilitating effective self-management of headache disorders or in understanding the impact of headaches on functioning and quality of life.

Acknowledgments: This study was supported by grants from the State of Ohio and the National Institutes of Health (NINDS #NS32374).

REFERENCES

1. Scharff L, Turk DC, Marcus DA. The relationship of locus of control and psychosocial-behavioral response in chronic headache. *Headache*. 1995;35:527-533.
2. Fisher K, Johnston M. Emotional distress and control cognitions as mediators of the impact of chronic pain on disability. *Br J Health Psychol*. 1998;3:225-236.
3. Haerkaepaeae K, Jaervikoski A, Vakkari T. Associations of locus of control beliefs with pain coping strategies and other pain-related cognitions in back pain patients. *Br J Health Psychol*. 1996;1:51-63.
4. Pastor MA, Salas E, Lopez S, Rodriguez J, Sanchez S, Pascual E. Patient's beliefs about their lack of pain control in primary fibromyalgia syndrome. *Br J Rheumatol*. 1993;32:484-489.
5. Schiaffino KM, Revenson TA. The role of perceived self-efficacy, perceived control, and causal attributions in adaptation to rheumatoid arthritis: distinguishing mediator from moderator effects. *Personal Soc Psychol Bull*. 1992;18:709-718.
6. Schiaffino KM, Revenson TA, Gobfsky A. Assessing the impact of self-efficacy beliefs on adaptation to rheumatoid arthritis. *Arthritis Care Res*. 1991;4:150-157.
7. VandeCreek L, O'Donnell F. Psychometric characteristics of the Headache-Specific Locus of Control scale. *Headache*. 1992;32:239-241.
8. Martin NJ, Holroyd KA, Penzien DB. The headache-specific locus of control scale: adaptation to recurrent headaches. *Headache*. 1990;30:729-734.
9. Lefebvre JC, Keefe FJ, Affleck G, et al. The relationship of arthritis self-efficacy to daily pain, daily mood, and daily pain coping in rheumatoid arthritis patients. *Pain*. 1999;80:425-435.
10. Keefe FJ, Lefebvre JC, Maixner W, Salley AN, Caldwell DS. Self-efficacy for arthritis pain: relationship to perception of laboratory pain stimuli. *Arthritis Care Res*. 1997;10:177-184.
11. Litt MD. Self-efficacy and perceived control: cognitive mediators of pain tolerance. *J Pers Soc Psychol*. 1988; 54:149-160.
12. Keefe FJ, Kashikar-Zuck S, Robinson E, et al. Pain coping strategies that predict patient's and spouse's ratings of patient's self-efficacy. *Pain*. 1997;73:191-199.
13. Buckelew SP, Parker JC, Keefe FJ, et al. Self-efficacy and pain behavior among subjects with fibromyalgia. *Pain*. 1994;59:377-384.
14. Buckelew SP, Huyser B, Hewett JE, et al. Self-efficacy predicting outcome among fibromyalgia subjects. *Arthritis Care Res*. 1996;9:97-104.
15. Anderson KO, Dowds BN, Pelletz RE, Edwards WT, Peeters-Asdourian C. Development and initial validation of a scale to measure self-efficacy beliefs in patients with chronic pain. *Pain*. 1995;63:77-84.

16. Dolce JJ, Crocker MF, Moletteire C, Doleys DM. Exercise quotas, anticipatory concern and self-efficacy expectancies in chronic pain: a preliminary report. *Pain*. 1986;24:365-372.
17. O'Leary A. Self-efficacy and health: behavioral and stress-physiological mediation. *Cogn Ther Res*. 1992; 16:229-245.
18. Martin NJ, Holroyd KA, Rokicki LA. The Headache Self-Efficacy Scale: adaptation to recurrent headaches. *Headache*. 1993;33:244-248.
19. Headache Classification Committee of the International Headache Society. Classification and diagnostic criteria for headache disorders, cranial neuralgias, and facial pain. *Cephalgia*. 1988;8(suppl 7):10-73.
20. O'Donnell FJ, Holroyd KA, Cordingly GE, et al. Antidepressant medication and stress management therapy in the management of chronic tension-type headache: results from the OU/NIH trial [abstract]. *Headache*. 1999;39:373.
21. Holroyd KA, Nash JM, Pingel JD, Cordingly GE, Jerome A. A comparison of pharmacological (amitriptyline HCL) and nonpharmacological (cognitive-behavioral) therapies for chronic tension headaches. *J Consult Clin Psychol*. 1991;59:387-393.
22. Tobin DL, Holroyd KA, Baker A, Reynolds RV, Holm JE. Development and clinical trial of a minimal contact, cognitive-behavioral treatment for tension headache. *Cogn Ther Res*. 1988;12:325-339.
23. Jacobson GP, Ramadan NM, Aggarwal SK, Newman CW. The Henry Ford Hospital Headache Disability Inventory (HDI). *Neurology*. 1994;44:837-842.
24. Jacobson GP, Ramadan NM, Norris L, Newman CW. Headache Disability Inventory (HDI): short-term test-retest reliability and spouse perceptions. *Headache*. 1995;35:534-539.
25. Hill KR, Holroyd KA, Lipchik GL, French D, Pinnell C, Davis MK. Coping and chronic tension-type headache [abstract]. *Headache*. 1999;39:359.
26. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Arch Gen Psychiatry*. 1961;4:561-571.
27. Penzien DD, Rains JC, Holroyd KA. Psychological assessment of the recurrent headache sufferer. In: Tollison CD, Kunkel RS, eds. *Headache: Diagnostic and Interdisciplinary Treatment*. Baltimore, Md: Urban & Schwarzenberg; 1993:39-50.
28. Spielberger CD. *Manual for the State-Trait Anxiety Inventory (Form Y)*. Palo Alto, Calif: Consulting Psychologists Press; 1983.
29. Holroyd KA, Holm JE, Hursey KG, et al. Home-based behavioral treatment versus abortive pharmacological treatment. *J Consult Clin Psychol*. 1988;56: 218-223.
30. Bandura A. *Self-efficacy: The Exercise of Control*. New York, NY: WH Freeman & Co; 1997.
31. Bandura A. *Social Learning Theory*. Upper Saddle River, NJ: Prentice Hall; 1977.
32. French DJ, Gauthier JG, Roberge C, Bouchard S, Nouwen A. Self-efficacy in the thermal biofeedback treatment of migraine sufferers. *Behav Ther*. 1997; 28:109-125.
33. Rokicki LA, Holroyd KA, France CR, Lipchik GL, France JL, Kvaal SA. Change mechanisms associated with combined relaxation/EMG biofeedback training for chronic tension headache. *Appl Psychophysiol Biofeedback*. 1997;22:21-41.
34. Blanchard EB, Kim M, Herman CU, Steffek BD, Nicholson NL, Taylor AE. The role of perceived success in the thermal biofeedback treatment of vascular headache. *Headache Q*. 1994;5:231-236.
35. Blanchard EB, Kim M, Herman CU, Steffek BD. Preliminary results of the effects on headache relief of perception of success among tension headache patients receiving relaxation. *Headache Q*. 1993;4:249-253.
36. Holroyd KA, Penzien DB, Hursey KG, et al. Change mechanisms in EMG biofeedback training: cognitive changes underlying improvements in tension headache. *J Consult Clin Psychol*. 1984;52:1039-1053.

Appendix.—Headache Management Self-efficacy Scale (HMSE) ©1999

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

	Strongly Disagree 1	Moderately Disagree 2	Slightly Disagree 3	Neither Agree or Disagree 4	Slightly Agree 5	Moderately Agree 6	Strongly Agree 7
1)							
2)							
3)							
4)							
5)							
6)							
7)							
8)							
9)							
10)							
11)							
12)							
13)							
14)							
15)							
16)							
17)							
18)							
19)							
20)							
21)							
22)							
23)							
24)							
25)							

Note: The scores on the following items are inverted: 2, 6, 8, 11, 14, 16, 18, 20, 23.