

The Headache-Specific Locus of Control Scale: Adaptation to Recurrent Headaches

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Accepted for publication: October 20, 1990.

SYNOPSIS

This paper describes the development, psychometric properties, and construct and incremental validity of a Headache-Specific Locus of Control Scale (HSLC). The HSLC is a 33 item scale designed specifically for recurrent headache sufferers. It assesses the individual's perceptions that headache problems and headache relief are determined primarily by: the individual's behavior (Internal factors), Health Care Professionals, or Chance factors. The psychometric properties of the HSLC were satisfactory. Among our findings were that: (1) the belief that headache problems and relief are determined by chance factors was associated with higher levels of depression, physical complaints, reliance on maladaptive pain coping strategies ($p < .001$), and greater headache-related disability ($p < .01$); (2) the belief that headache problems and relief are influenced primarily by the ministrations of health care professionals was associated with higher levels of medication use ($p < .01$) and preference for medical treatment ($p < .001$); and (3) the belief that headache problems are determined by the individual's responses and behaviors was associated with a preference for self-regulation treatment ($p < .01$). These findings suggest adaptation to headache problems is influenced not only by the frequency and severity of the headache episodes, but by locus of control beliefs. The assessment of locus of control beliefs may provide useful information not typically obtained from standard medical evaluations.

Key words: locus of control, psychometric, scale.

(*Headache* 30:729-734, 1990)

INTRODUCTION

Individuals with similar recurrent headache problems may differ dramatically in factors they believe influence the onset and course of their headaches. Social psychological research suggests that such beliefs may be important determinants of the individual's response to headache episodes and to the health care system, influencing for example the individual's receptiveness to different treatment options, the disability and psychological symptoms experienced during headache episodes, and the strategies that are used to cope with headaches.^{1,2}

Internal versus external locus of control refers to the extent to which an individual believes (expects) that the occurrence of events such as headache episodes are within one's control (i.e., contingent upon one's own behavior). If the individual perceives the onset and occurrence of headaches to be primarily influenced by chance or fate (e.g., hormonal fluctuations, inherited vulnerability), or the intervention of powerful others (e.g., physician ministrations), she is said to have an *external* locus of control orientation. Conversely, if the individual believes that the onset and course of her headaches is primarily influenced by her own behavior (e.g., diet, "pushing myself too hard"), she is said to have an *internal* locus of control orientation.³

In the last decade, a significant body of research has examined the relationship between individuals' beliefs about the locus of control of health problems and the likelihood they will engage in preventative health behaviors, such as breast self-examination, medical and dental check ups and discontinuing smoking (e.g.,^{4,5,6,7,8}). Unfortunately, available measures for use in health research inquire about the perceived locus of control of the individual's health in general³ but not the perceived locus of control of specific disorders such as headaches. As a result, these measures may not be appropriate for examining the role locus of control beliefs play in individual's adaptation to recurrent headache disorders.⁹ Because recurrent headache sufferers are likely to have considerable personal experience with disabling headaches they may well have different beliefs about the relative role of internal and external factors in their headaches than in their health in general. Information from general locus of control measures may therefore provide only limited information about headache-related beliefs. Also, the specific factors that are likely to be perceived as influencing headache disorders may be quite different than the variables that are perceived as most relevant to other health problems, or to general health status. Consequently, the mere substitution of the word "headaches" for "health" in these questionnaires is not likely to provide accurate information.

The present study attempts to remedy the limitations of existing locus of control scales by presenting a scale designed specifically for assessing recurrent headache sufferers' beliefs about the factors that influence the onset and course of their headaches. Information about the development of the scale, its reliability and factor structure is presented first. We next determine if headache sufferers' locus of control beliefs are related to five categories of variables: headache-related disability, psychological symptoms, preferences for treatment, strategies for coping with headaches, and medication use. Finally, the incremental validity of the scale is examined by determining the ability of the scale to provide information beyond that provided by a more general locus of control measure.

METHOD

Subjects.

Two-hundred and seven recurrent headache sufferers were identified in a survey of a large sample of college students. This sample included tension, migraine, and mixed headache sufferers. Overall, the mean age of subjects was 19 years, and the sample was 78% female.

Over 1000 college students were first administered a screening questionnaire¹⁰ that inquired about the subject's headache history and headache symptoms. Individuals who appeared to meet diagnostic criteria for migraine headache on the basis of their questionnaire responses and whose headaches appeared to present problems for them were scheduled for a subsequent diagnostic interview. During the diagnostic interview additional information was obtained about the individual's headaches (e.g., onset, location, quality of headaches, presence or absence of vascular symptoms and other associated symptoms), possible precipitants (e.g., family history, menstruation, association with stress, and diet), and relevant medical and surgical history. Tension headache sufferers were required to meet three of the following five diagnostic criteria: (a) headaches occur at least three days per week, (b) headaches are usually bilateral and located primarily in the forehead region although it might, at times, begin in the occipital or suboccipital regions, (c) headaches are typically described as feeling like a "cap" or "band" around the head, (d) headaches are usually described as a continuing "dull ache," and (e) the subject has had an independent diagnosis of tension or muscle contraction headache. Migraine headache sufferers were required to meet three of the following diagnostic criteria: (a) headaches usually accompanied by nausea or vomiting, (b) headaches usually begin on one side of the head, (c) headache pain is described as pulsating or throbbing, (d) sensitivity to light during headaches, (e) one or more first degree relatives have a diagnosis of migraine or vascular headache, (f) headache is usually preceded by visual changes, hemi-paresthesias, transient hemiparesis, or noticeable speech difficulty, (g) headache episodes occur at least once a month, and (h) the subject has had an independent diagnosis of migraine or vascular headache. Subjects were diagnosed as mixed headache sufferers if either they reported two types of headaches, and one met the criteria for migraine and the other met the criteria for tension headache; or if (a) they failed to meet the criteria for either migraine or tension headache, (b) reported headaches characterized by at least one of the descriptive criteria from both migraine and tension headaches, as described above, and (c) met the minimum frequency and severity criteria for migraine headache.

A sample of young recurrent problem headache sufferers rather than a patient sample was selected for two reasons. Because less than 50% of recurrent headache sufferers seek professional treatment for their headache problems and locus of control beliefs are likely to be associated with treatment seeking behavior, patient samples may exhibit a restricted range of locus of control responses. Individuals who have adapted to a long-term chronic pain problem may also exhibit a restricted range of locus of control beliefs. By identifying a general sample of young recurrent headache sufferers we hoped to identify individuals with a wide range of beliefs about the causes of their headache problems and the sources of headache relief.

Measures and Procedures.

HSLC Scale Items. Potential Headache-Specific Locus of Control Scale (HSLC) items (28 items) were generated by professionals with experience in the treatment of headache sufferers or taken directly (17 items) or adapted (19 items) from a version of the Multidimensional Health Locus of Control Scale³ that had been altered for headache sufferers.¹¹ Items were designed to assess the belief that the locus of control of headache problems and headache relief is internal or resides within the individual (e.g., When I drive myself too hard I get headaches), or External, either residing with Health Care Professionals (e.g., Following the doctor's medication regimen is the best way for me not to be laid-up with a headache), or controlled by Chance factors (e.g., I'm just plain lucky for a month when I don't get headaches). An effort was made to generate items which reflected commonly held beliefs about the determinants of headache occurrence and headache relief. The response format for all items was a five-point Likert-type scale with the following values: 1 = "strongly disagree," 2= "moderately disagree," 3="neutral," 4= "moderately agree" and 5= "strongly agree."

Subjects also completed measures that would allow us to examine the construct validity of HSLC subscales by examining theoretically expected relationships between HSLC subscales and psychological symptoms, disability, coping strategies, and treatment preferences.

Symptoms. Subjects completed the Beck Depression Inventory (BDI),¹² and the Wahler Physical Symptoms Inventory (WPSI).¹³ The BDI is a 21 item self-report measure of depression widely used to assess symptoms of depression not only in psychiatric patients, but in recurrent headache and chronic pain sufferers.¹⁴ The WPSI consists of 42 items assessing common somatic complaints often reported by individuals experiencing psychological distress and has previously been used to assess somatic complaints that frequently accompany recurrent headache disorders.¹⁵

Disability. The Sickness Impact Profile (SIP)¹⁶ is a measure which assesses disability with items reflecting sickness-related behavior changes from the patient's perspective. This instrument has been used with many populations, including chronic pain patients. For the purposes of this study, the instructions were altered to refer to disability due to headaches, and the physical impairment scale, which is not appropriate for use with benign headache sufferers, was not used in the calculation of the total impairment index.

Coping Strategies. The 76-item Coping Skills Questionnaire (CSQ)¹⁷ was designed to measure strategies for coping with pain. The catastrophizing subscale was employed as a measure of maladaptive coping. The CSQ has previously been used primarily with chronic pain patients; in this population catastrophizing has been found to be associated with poor psychological adjustment.¹⁸

Treatment Preferences. Subjects completed a home-made Treatment Preferences Questionnaire containing two five-point Likert-type format items describing treatment options for recurrent headaches. The treatments described were medical treatment such as prescription medication, and self-regulation treatment such as relaxation training.

General locus of control Finally, subjects completed the Internal-External Locus of Control Scale (I-E Scale).¹ The I-E Scale consists of 29 items designed to assess an individual's belief about the locus of control of reinforcements. Due to the broad item content, it is considered a measure of generalized beliefs about the world rather than beliefs about a specific life domain. This instrument was included to evaluate the incremental validity of the HSLC, that is to determine if the more specific HSLC could account for variance in criterion variables that could not be explained by the more general I-E scale.

Analyses and Hypotheses.

Scale Construction. Responses to preliminary HSLC items were subjected to principal components factor analysis, and the resulting structure was rotated to an orthogonal solution. Final subscale items were selected on the basis of their individual Measure of Sampling Adequacy (MSA) values and factor loadings. Both temporal and internal stability of the subscales were assessed for the HSLC. Test-retest reliability was measured over a three week period, and Chronbach's alpha coefficient was calculated for each of the subscales.

Construct and Incremental Validity. Construct validity was assessed by examining expected relationships between the HSLC subscales and psychological symptoms, disability, coping, and treatment preferences. Because relationships between headache activity and some of these criterion variables might be expected, partial correlation analyses were conducted with headache frequency and intensity controlled. To examine incremental utility of the HSLC relative to a more general locus of control measure, partial correlations were calculated with variance due to headache frequency and intensity and general locus of control removed. Finally, a forward-entry multiple regression analysis was performed to further examine the total variance in the criterion variables that might be accounted for by multiple predictor variables.

In evaluating construct validity the following predictions were made: The belief that headache problems and relief are controlled by chance factors will be associated with higher levels of (1) psychological symptoms (BDI) and (2) physical symptoms (WPSI), (3) greater disability (SIP), and (4) greater use of the coping strategy of catastrophizing. The belief that headache problems and relief are primarily determined by the ministrations of health care professionals will be associated with (1) higher current levels of medication use and (2) a preference for medical treatment. The belief that headache problems and relief are determined by the individual's responses and behaviors will be associated with an expressed preference for self-regulation treatment.

RESULTS

Test construction. Principal components analysis of responses to potential HSLC items yielded the hypothesized three factor solution of internal items, health-care-professionals items, and chance items. This structure was consistent with the factor structures identified for adaptations of the Multidimensional Health Locus of Control Scale (MHLC) for headache sufferers as well as for the factor structure of the more general MHLC.

Table 1 shows the factors, the items for each factor and their respective loadings, and the internal reliability of each subscale. Correlations between the three subscales were minimal; the only significant correlations were $r = -.17$ between the Internal subscale and Chance subscale, and $r = .24$ between the Health Care Professionals subscale and Chance subscale. HSLC subscales also exhibited only minimal correlation with the general I-E Scale; only the Chance subscale exhibited a significant but small correlation ($r = .16, p < .05$).

Table 1
The Headache-Specific Locus of Control Scale: Items, Factor Loadings and Internal Reliabilities

Factor Loadings

Health Care Professionals locus of control (Alpha = .88)

- .79 Following the doctor's medication regimen is the best way for me not to be laid-up with a headache.
- .77 Health professionals keep me from getting headaches.
- .76 My headaches can be less severe if medical professionals (doctors, nurses, etc.) take proper care of me.
- .74 I usually recover from a headache when I get proper medical help.
- .73 Having regular contact with my physician is the best way for me to control my headaches.
- .70 My doctor's treatment can help my headaches.
- .64 If I don't have the right medication my headaches will be a problem.
- .59 Only my doctor can give me ways to prevent my headaches.
- .58 When I have headaches, I should consult a medically trained professional.
- .55 When my doctor makes a mistake I am the one to suffer with headaches.
- .54 Just seeing my doctor helps my headaches.

Internal locus of control (Alpha = .86)

- .79 When I drive myself too hard I get headaches.
- .73 By not becoming agitated or overactive I can prevent many headaches.
- .71 When I worry or ruminate about things I am more likely to have headaches.
- .76 My actions influence whether I have headaches.
- .66 My headaches are worse when I'm coping with stress.
- .64 If I remember to relax I can avoid some of my headaches.
- .64 I can prevent some of my headaches by avoiding certain stressful situations.
- .63 I can prevent some of my headaches by not getting emotionally upset.
- .61 I am directly responsible for some of my getting headaches.
- .51 When I have not been taking proper care of myself, I am likely to experience headaches.
- .48 My headaches are sometimes worse because I am over-active.

Chance locus of control (Alpha = .84)

- .70 When I have a headache, there is nothing I can do to affect its course.
- .70 My headaches are beyond all control.
- .68 I'm likely to get headaches no matter what I do.
- .66 Often I feel that no matter what I do, I will still have headaches.
- .66 I am completely at the mercy of my headaches.
- .64 No matter what I do, if I am going to get a headache, I will get a headache.
- .58 I'm just plain lucky for a month when I don't get headaches.
- .55 It's a matter of fate whether I have a headache.
- .52 When I get headaches I just have to let nature run its course.
- .50 Luck plays a big part in determining how soon I will recover from a headache.
- .48 My not getting headaches is largely a matter of good fortune

HSLC subscale means and standard deviations for the student headache sufferer sample were as follows: Internal $x = 40.19$, $s = 7.52$; Health Care Professionals $x = 23.45$, $s = 8.04$; and Chance $x = 28.01$, $s = 7.84$. The three subscales had satisfactory internal consistency, with alpha coefficients ranging from .84 to .88 (see Table 1). Test-retest reliability was examined over a three-week interval; the Pearson product-moment correlation coefficients for the sub-scales were as follows: Internal $r = .75$, Health Care Professionals $r = .78$, and Chance $r = .72$.

Construct Validity. Correlations between HSLC subscales and target variables are presented in Table 2. Of primary interest are the predicted correlations between HSLC subscales and criterion variables, which are highlighted in bold print. It can be seen that all hypothesized correlations are statistically significant, though small in magnitude. As predicted, the belief that the occurrence of headaches and headache relief is determined by chance factors was associated with increased symptoms of depression, physical complaints, and increased disability (all at least $p < .001$). Chance scores were also positively associated with the use of catastrophizing as a strategy for coping with pain ($p < .001$). The belief that headaches are primarily influenced by the ministrations of health care professionals was positively associated with both current medication use ($p < .01$) and the expression of a preference for medical treatment ($p < .001$). In contrast, the belief that the occurrence of headaches can be influenced by the headache sufferer's behavior was associated with preference for self-regulation treatments, such as relaxation training ($p < .01$).

Table 2
Correlations Between Headache-Specific Locus of Control Subscales and Other Measures

	Internal	Health Care	Chance
<u>Psychological Variables</u>			
<u>Symptoms</u>			
Depression (BDI)	.22***	.03	.27***
Physical Symptoms (WPSI)	.24***	.12*	.28***
Disability (SIP)	.16**	.19**	.23**
<u>Coping Strategy</u>			
Catastrophizing	.07	.26***	.44***
<u>Medication Use</u>			
	.11	.20**	.03
<u>Treatment Preferences</u>			
Self-regulation treatment	.21**	.02	.00
Medical treatment	.06	.45***	.29***
<u>Headache Activity</u>			
Frequency	.16**	-.00	.24***
Intensity	.04	-.15*	-.24***

* $p < .05$ ** $p < .01$ *** $p < .001$

Several other correlations also reached statistical significance. Of note is the finding that Internal scores were also positively correlated with depression, physical complaints, and disability (all at least $p < .001$) suggesting that when headaches occur chronically, the belief that the individual can (or should) be able to influence headaches may be associated with increased psychological distress and disability. In addition individuals who believed that

headache relief was determined by the ministrations of Health Care Professionals tended to use catastrophizing to cope with headache pain ($r = .26, p < .001$).

As might be expected, HSLC subscales exhibited significant correlations with the two measures of headache severity (Table 2). Therefore, for each predicted relationship partial correlations were calculated with headache frequency and severity controlled. This analysis was designed to determine if relevant HSLC subscales accounted for significant variance in relevant dependent measures that was independent of the variance explained by headache frequency and intensity. All predicted relationships remained significant when headache frequency and intensity were controlled (at least $p < .01$) indicating that the HSLC subscales accounted for significant variance in all dependent measures beyond that attributable to headache frequency and intensity.

Incremental Utility. The general locus of control measure unlike the specific HSLC subscales was only correlated with two criterion variables (BDI: $r = .33, p < .001$; and WPSI: $r = .20, p < .01$). To determine if the HSLC accounted for variance in criterion variables not explained by a more general locus of control measure, all predicted correlations were recalculated with not only the variance due to headache frequency and headache intensity controlled, but also with variance associated with general locus of control partialled out. All hypothesized correlations between relevant HSLC subscales and the criterion variables remained significant (at least at $p < .05$). This indicates that in recurrent headache sufferers, the HSLC accounts for variance not explained by a more general locus of control measure.

Multiple regression analysis was also performed using the HSLC subscale scores, headache frequency and intensity and general locus of control to predict depression (BDI), physical symptoms (WPSI), disability (SIP), catastrophizing (CSQ-C), medication use, and treatment preferences. At least one HSLC subscale entered all six regression equations. In contrast the general locus of control scale was included in only one of the six regression equations (BDI). This analysis provides further support for the incremental utility of the HSLC scale.

DISCUSSION

Recurrent headache sufferers' beliefs about their headache disorder as assessed by the Headache-Specific Locus of Control Scale were associated with all aspects of individuals' adaptation to their headache disorder that were examined. The belief that the control and relief of headache problems is primarily influenced by the ministrations of health care professionals was associated with preference for medical treatment and higher current levels of medication use. The belief that chance or fate played the primary role in the onset or severity of headache episodes was associated with higher levels of depression, physical symptoms, disability, and use of catastrophizing as a strategy for coping with headaches. Finally, the belief that one's actions can influence the onset and severity of headache episodes was associated with preference for self-regulation treatment. All these relationships also remained significant when headache frequency and intensity were statistically controlled. This suggests that the individuals' response to their headache problems may be influenced not only by the frequency and intensity of their headaches, but also independently by the individuals' beliefs about their headache disorder.

These findings suggest that to understand the headache sufferers' adaptation to their disorder, attention needs to be paid not only to medical aspects of the disorder but to patients' perceptions of the factors that influence their headache disorder. For example, the above results suggest that (1) The belief that headaches are primarily influenced by chance factors is associated with higher levels of psychological symptoms and disability; (2) Greater use and possibly overuse of medication may be more likely to occur in headache sufferers with high Health Care Professionals locus of control scores, as compared to individuals who believe their headaches are likely to be influenced by their own actions; and (3) Headache sufferers with high internal locus of control scores may have a preference for self-regulatory treatments (e.g., biofeedback) and thus do better with these treatments than individuals who believe their headache disorder is likely to be influenced by medical professionals or chance factors. Thus, assessment of individuals' beliefs about their headache disorder may add significantly to information obtained in more typical medical diagnostic evaluations.

HSLC Scale. The psychometric properties of the HSLC scale support its use to assess headache sufferers' beliefs about the factors that influence the onset and course of headache episodes. The HSLC appears reliable, possessing good internal consistency within subscales, and an acceptable Pearson Product-moment correlation coefficient for three-week test-retest reliability. Correlational analyses also provided support for the construct validity of the scales; expected relationships between HSLC subscales and theoretically relevant criterion variables were consistently confirmed. In addition, the incremental utility of this headache-specific scale relative to a more general locus of control scale was demonstrated. The latter finding confirms a rarely tested tenant of locus of control theory, namely, that specific locus of control beliefs give more accurate prediction of an individual's behavior in that specific domain than general locus of control beliefs.

There are several limitations to this study that should be noted. While the relationships found between the HSLC subscales and target variables (i.e.

disability, depression, medication use) were statistically significant, the correlation coefficients still were modest. Possible explanations for this include the multiple factors which influence adaptation to chronic headache, of which locus of control beliefs are only one. Additionally, the sample used in this study was a relatively young sample of headache sufferers rather than a clinical sample. A lack of crystallized beliefs about the locus of control of headaches and also a more restricted range of symptoms in the study sample therefore may have also contributed to the smaller coefficient values.

In conclusion, the Headache-Specific Locus of Control Scale appears to have adequate reliability and construct validity as a measure of headache sufferers' beliefs regarding the control of their headache disorder. The beliefs assessed by this instrument were related to several potentially important aspects of the individuals' adaptation to their headache disorder. Therefore, the assessment of the individuals' beliefs about their headache disorder may add significantly to information obtained in more typical medical diagnostic evaluations.

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