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The three dimensions of headache impact: pain, disability and affective distress

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Abstract

It is increasingly recognized that pain measures alone provide incomplete information about the impact of pain on functioning or quality-of-life. A wide range of measures that promise to provide additional information about the impact of pain on people's lives are thus coming into use. In order to clarify the construct of headache impact, we attempted to identify the dimensions assessed by a set of 22 headache-impact measures and to identify the specific measures that best assessed each of these headache-impact dimensions. Adults ($n = 329$) with frequent benign headache disorders completed a comprehensive assessment battery that included 22 headache-impact measures. Factor analysis was then used to identify dimensions underlying the headache-impact measures. Three factors labeled Affective Distress, Pain Density and Disability best accounted for correlations among headache-impact measures. Interfactor correlations ranged between 0.37 and 0.20, suggesting three correlated but separable impact dimensions. These results suggest the construct of headache impact needs to be broadened beyond pain and disability to include affective distress. An adequate assessment of the impact of recurrent headache disorders in clinical trials and other research may require measures from all three of the headache-impact dimensions identified here.

Keywords

Headache; Impact; Pain; Disability; Affective distress

1. Introduction

A variety of measures that assess the severity of headache problems and gauge the impact headaches have on a person's life have become available in recent years (Dahloöf, 1993; Von Korff et al., 1994; Hartmaier et al., 1995; Lipton and Stewart, 1995; Santanello et al., 1995; Solomon, 1997; Stewart et al., 1999). The frequency and duration of headache episodes and ratings of pain severity obtained from patient reports or, preferably, from daily headache recordings remain the most frequently used measures. Until recently it had been assumed that these headache measures provided relatively complete information about the severity of recurrent headache problems. It is increasingly recognized, however, that headache measures alone provide incomplete information about the impact of headaches on functioning or quality-of-life (Stewart et al., 1988, 1999; Lipton et al., 1994). Consequently, a wide range of other measures that promise to provide additional information about the impact of recurrent headache disorders on people's lives have come into use. These include measures that explicitly inquire about the impact of headaches on work, recreational and social functioning (Von Korff et al., 1992; Smith et al., 1997; Stewart et al., 1999), generic measures designed to broadly assess the

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impact of any chronic illness on multiple dimensions of functioning and well being (Solomon et al., 1993, 1994; Osterhaus et al., 1994; Essink-Bot et al., 1995; Langeveld et al., 1996, 1997), and diary recordings of headache impact (Holroyd et al., 1994; Von Korff et al., 1998). Several recently developed measures also attempt to assess headache-related affective distress as well as headache-related impairments in functioning (Holroyd et al., 1994; Jacobson et al., 1994; Cavallini et al., 1995; Passchier et al., 1996), because affective distress related to headaches is frequently described as a burden by recurrent headache sufferers and may impair functioning and compound problems created by headaches themselves.

Headache-impact measures more clearly characterize the effect of recurrent headache disorders on people's lives and the outcomes of therapy than would be possible with headache measures alone (Solomon, 1997). Headache-impact measures also may help clinicians to match patients with appropriate treatment options (Lipton et al., 1994) by enabling clinicians to identify the more disabled patients or patients more affectively distressed by their headaches and to tailor treatment accordingly. However, the construct of headache impact remains vague. It is unclear, for example, how many different constructs or dimensions are assessed by currently available headache-impact measures. It is also unclear if two measures that propose to assess some aspect of headache impact are, in fact, assessing the same construct.

In this study we attempted to determine the number of constructs or dimensions that are assessed by a set of 22 headache-impact measures and to identify the individual measures that best assessed each of the identified headache-impact dimensions. Our expectation was that three separable constructs—pain, disability and affective distress—would capture much of the information in these 22 headache-impact measures. This is because headache-impact measures have generally been designed to assess one or more of these three constructs, and generic illness impact measures have attempted to assess similar constructs. Pain, disability and affective distress also are the hallmark features of chronic pain (Fordyce, 1976, 1978; Romano and Turner, 1985) and thus are likely to be relevant in the assessment of chronic headache disorders. However, we expected that individual headache-impact measures would vary widely in their ability to assess these three constructs, so that not all headache-impact measures could be assumed to provide equivalent information.

2. Materials and methods

2.1. Patients

A total of 329 patients (77% female) seeking treatment for frequent tension-type 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. Twenty-nine percent of patients received a migraine diagnosis in addition to their tension-type headache diagnosis. Patients were predominantly White (94%), but included Black (3%), Native American (2%) and Asian (1%) participants. The average age was 36.6 years (range 17–65, SD 11.75). The median annual family income was between \$30 000 and \$45 000.

Patients reported problem headaches for an average of 12.4 years (range 0.5–54, median 10.9). 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 h when the headache was treated (SD 6.2, median 5.0) and 12.1 h when the headache was untreated (SD 5.2, median 16.0). During the 6 months preceding our assessment 51% of patients had received treatment for their headaches from a health professional. Among the patients who had

received treatment 64% had been treated by their family physician and 67% had been treated by another health care professional.

Patients taking antidepressant medication or other prophylactic headache medications, or using anti-anxiety medication on a daily basis 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 co-morbid pain disorder 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.

2.2. Measures

2.2.1. Structured diagnostic interview—Medical history/evaluation, headache history and a detailed description of headache symptoms was collected in a 1–1.5 h structured diagnostic evaluation; a headache diagnosis was then made on the basis of International Headache Society diagnostic criteria (Olesen, 1988). Patient descriptions ($n = 325$ – 326)¹ of the typical frequency (days/week), intensity (1–Slightly painful: I only notice my pain when I focus my attention on it to 10–Extremely painful: I can't do anything when I have such pain) and duration (in hours with a maximum of 16 h for unremitting headaches) of headache episodes obtained in this interview provided basic descriptive information about the patients' headaches.

2.2.2. Pain severity questionnaire—Six questions ($n = 327$ – 329) designed by Von Korff et al. (1994) to assess various aspects of headache severity were included on a questionnaire completed by patients. Number of headache-related disability days was assessed by the following question: How many days in the last 6 months have you been kept from your usual activities (work, school, or housework) because of headaches? Headache-related impairments in work and social/recreational activities were assessed by the following three questions rated on a 0–10 scale where 0 was 'no interference' and 10 was 'unable to carry out any activities': (1) In the past 6 months, how much have your headaches interfered with your daily activities?; (2) In the past 6 months, how much have your headaches interfered with your ability to take part in recreational, social and family activities?; and (3) In the past 6 months, how much have your headaches interfered with your ability to work (including housework)? Two additional questions inquire about the severity of the patient's typical headache and the patient's worst headache in the last 6 months and were rated on a 0–10 scale, where 0 was 'no pain' and 10 was 'pain as bad as it could be'. A final question assessing current pain intensity was judged not relevant and not included in analyses.

2.2.3. Headache recordings—Patients ($n = 263$) also recorded headache activity four times a day for 1 month in a daily headache diary using a 10-point rating scale with five anchors that ranged from 'no pain' to 'extremely painful—I can't do anything when I have a headache' (e.g. Holroyd et al., 1991). The Headache Index (average of the 28 ratings taken each week, including 0s), the number of headache days (pain rating > 1.5), the number of days of at least moderate pain (pain rating ≥ 5) and the peak headache intensity (peak pain ratings for each week averaged across weeks) provided daily diary measures of headache activity.

2.2.4. Psychological functioning—Two standardized psychological symptom inventories and a standardized procedure for obtaining psychiatric diagnosis were used to assess psychological functioning.

¹The n differs across measures as not all patients completed every measure; thus n is provided for each set of measures.

2.2.4.1. Beck Depression Inventory ($n = 329$; BDI; Beck et al., 1988) The BDI is a 21-item self-report measure that assesses symptoms of depression. The BDI has been widely used in the assessment of individuals with recurrent headache disorders (Penzien et al., 1993).

2.2.4.2. State-Trait Anxiety Inventory ($n = 329$; STAI: Form X-1; Spielberger et al., 1970) The Trait subscale of the STAI (STAI-T) 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 (Penzien et al., 1993).

2.2.4.3. Primary Care Evaluation of Mental Disorders ($n = 323$; Prime MD; Spitzer et al., 1990) The Prime MD assessment system is designed to facilitate the diagnosis of commonly occurring psychiatric disorders in medical settings. It includes a patient-completed questionnaire of key symptoms and a clinician-administered structured interview that yields a subset of diagnoses included in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychiatric Association, 1994). Diagnoses of the most commonly encountered mood (Major Depressive Disorder, Dysthymia and Minor Depressive Disorder) and anxiety disorders (Panic Disorder, Generalized Anxiety Disorder and Anxiety Disorder Not Otherwise Specified) were made using the Prime MD Mood and Anxiety Modules. The two subclinical diagnoses (minor depression and anxiety disorder NOS) have slightly more liberal diagnostic criteria in the Prime MD than in DSM IV. Essentially the Prime MD codes these two subclinical diagnoses when symptoms of depression or anxiety are of significant magnitude to warrant clinical attention but do not satisfy criteria for one of the clinical diagnostic categories included in the Prime MD. For factor analysis we coded whether each patient did or did not receive a Prime MD anxiety disorder diagnosis and a Prime MD mood disorder diagnosis.

2.2.5. Medical Outcomes Study Short-Form General Health Survey—The Medical Outcomes Study Short-Form General Health Survey (MOS-SF20; Stewart et al., 1988) is an abbreviated form of the MOS-36 Health Survey designed to assess the impact of chronic disease on quality-of-life (Ware and Sherbourne, 1992; McHorney et al., 1993, 1994). The MOS-SF20 consists of 20 items designed to assess the impact of health problems in six areas. Of interest in assessing headache impact were three subscales designed to assess the impact of health problems on functional status: physical functioning (tasks of daily living), role functioning (work/school/home) and social functioning (social/recreational). In addition, a mental health subscale provides a measure of psychological symptoms (anxiety/depression), and the pain subscale provides a global pain measure assessing limitations associated with bodily pain. Subscales are scaled so that higher scores indicate less impairment, with a score of 100 indicating the absence of impairment. Detailed psychometric information has been reported on this instrument as part of the Medical Outcomes Study (Stewart et al., 1988).

2.2.6. Headache Disability Inventory—The Headache Disability Inventory (HDI; Jacobson et al., 1994) was designed to assess ‘the burden of chronic headaches’ using 25 items that inquire about the perceived impact of headaches on emotional functioning (e.g. ‘I feel desperate because of my headaches’) and daily activities (e.g. ‘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 month, $r = 0.76-0.83$) stability, and patient reports on the HDI appear to be reasonably congruent with spouse reports (Jacobson et al., 1994, 1995). Although the authors rationally 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 the analysis.

3. Results

3.1. Factor structure

The 22 measures described above were hypothesized to measure three major dimensions of headache impact: disability, pain and affective distress. The Kaiser-Meyer-Olkin measure of sampling adequacy for the 22 variables was 0.833, indicating that common factors account for correlations among variables and factor analysis was appropriate. Exploratory factor analysis was conducted separately on pairwise Pearson and Spearman correlation matrices. Because the same factor structure with nearly identical loadings was obtained in both cases, the Pearson correlation matrix was used in subsequent analyses. Unweighted least squares was selected as the factor extraction procedure because it is relatively insensitive to violations of multivariate normality. Oblique rotation was chosen because the hypothesized constructs were believed to correlate at least moderately.

Examination of the scree plot revealed an optimal three-factor solution accounting for 46.6% of the variance among measures. The three-factor solution provided a reasonable fit to our data leaving only 26% of the residuals for the reproduced correlation matrix greater than 0.05. Further analyses examined the factor structure obtained with different factor extraction procedures (generalized least squares and maximum likelihood) and the factor structure obtained from a correlation matrix with cases deleted listwise ($n = 218$) rather than pairwise. In all cases the same three-factor solution was identified.

The pattern matrix for the three-factor solution is displayed in Table 1. It can be seen that the first factor emerged as the Affective Distress factor, with five variables loading highly. The STAI-T, MOS-SF mental health subscale, and BDI were marker variables for this factor with loadings of 0.91, -0.90, and 0.88, respectively. The HDI also loaded primarily on the affective distress factor at 0.52, reflecting the fact that many HDI items inquire about affective distress associated with headaches. Unexpectedly, MOS-SF physical functioning subscale exhibited a low but significant loading on the affective distress factor as well but did not load significantly on any other factor.

Factor 2 emerged as the Pain Density factor, with five of the ten pain variables loading significantly. The Headache Index was a marker variable for the factor, loading at 0.95; the number of days of at least moderately severe pain (pain rating ≥ 5) and the number of headache days also exhibited relatively high loadings at 0.84 and 0.78, respectively. The MOS-SF pain subscale failed to load on any factor, calling into question the ability of this brief pain-related disability measure to assess headache pain or headache-related disability in the same manner as instruments designed specifically for use with recurrent headache disorders.

The third factor was the Disability Factor, with six of the eight disability measures loading significantly, and a seventh, the HDI, exhibiting significant secondary loading. Interference in daily activities, work, and social activities were marker variables for this factor with loadings of 0.85, 0.81, and 0.80, respectively. Three pain measures (average headache pain, worst headache pain, and reported headache intensity) also loaded on this factor. The anchors for these pain intensity ratings refer to the disability or impairment produced by the pain—that is, they are essentially measures of pain-related disability. The MOS-SF physical functioning subscale failed to load on the Disability factor, which calls into question the value of this subscale as a measure of physical impairment in this sample.

Although the three identified factors are related, they appear to represent separable constructs. The largest correlation among the three identified factors was a moderate positive correlation of 0.37 between the Affective Distress and Disability factors. Even so, these two factors shared less than 15% of variance, suggesting that affective distress and disability can be reasonably

regarded as distinct constructs. The correlations between the Pain Density factor and the Disability ($r = 0.22$) and Affective Distress ($r = 0.20$) factors were significantly smaller than the correlation between the Affective Distress and Disability factors ($Z = 2.42$, $P = 0.016$, and $Z = 2.73$, $P = 0.006$, respectively).

The three highest loading variables on each factor provided a good measure of the associated factor. The three highest loading variables (BDI, STAI-T, and MOS-SF mental health) accounted for 93% of the variance in the Affective Distress factor score. Similarly, the three highest loading variables (Headache Index, number of headache days, and number of days with at least moderate pain) accounted for 98% of the variance in the Pain Density factor score. Finally, the three highest loading variables (ratings of interference with daily activities, with social, recreational and family activities, and with work caused by headaches) accounted for 89% of the variance in the disability factor score.

3.2. Three-factor vs. Alternate Factor solutions

The three-factor solution we identified accounted for a larger share of the variance among measures than comparable one or two factor solutions. A single-factor solution was unable to adequately reproduce the original correlation matrix, accounting for only 24.9% of the variance among measures and leaving two thirds of the residuals for the reproduced correlation matrix greater than 0.05. The two-factor solution also provided a relatively poor fit to our data, accounting for 36.6% of the variance among headache-impact measures and almost half (44%) of the residuals greater than 0.05. Interestingly, the factors identified in the two-factor solution did not appear to represent pain and disability as might be expected. Instead, the first factor (eigenvalue = 5.62) combined the measures of pain and disability and the second factor (eigenvalue = 2.20) emerged as an affective distress factor. A four-factor solution only increased the variance accounted for by 4.6% and merely served to split the disability factor into two disability factors. These findings confirm that the three-factor solution provides the most parsimonious factor solution.

The variance among the 22 measures accounted for by the three-factor solution was limited by the fact that a number of measures included in the factor analysis; for example several MOS subscales, did not provide a good measures of any of three factors that were identified. Thus, a factor analysis of a reduced set of measures that included the three best measures of each factor accounted for 79% of the variance among measures. Of course measurement error also cannot be explained by factor analysis. However, the three-factor solution appeared to provide the best explanation of variance in headache impact measures.

4. Discussion

Information from 22 headache-impact measures was best explained by three factors that we labeled Affective Distress, Pain Density and Disability. The Pain Density factor was best defined by headache measures obtained from daily headache recordings, although patient reports of the frequency and duration of headaches obtained during the diagnostic evaluation also loaded on this factor. This factor appeared to reflect headache activity or density of headache pain and to represent the dimension of headache impact that is most frequently assessed in clinical trials. However, not all pain measures loaded on this factor. The pain subscale of the widely used MOS-SF failed to load significantly on any of the three factors identified here, but had its highest loading on the Affective Distress factor. The MOS-SF pain subscale thus did not appear to provide the same information as either headache parameters or disability measures. This casts doubt on the usefulness of the MOS-SF pain subscale for assessing the impact of headache pain.

The Disability factor was best defined by headache-specific disability measures that inquired specifically about impairments in work, social and other activities caused by headaches, but most other disability measures loaded on this factor as well. Ratings of pain intensity anchored to disability, that is, ratings that gauge the severity of pain by the disability the pain produces, loaded on this Disability factor, as did the number of headache-related disability days in the last 6 months. The MOS-SF role and social functioning subscales which are designed to assess impairments in social and role performance produced by any chronic medical disorder also loaded on this factor, suggesting that these generic subscales assess the same disability dimension as do headache-specific disability measures. On the other hand, the MOS-SF physical functioning subscale failed to load on the Disability factor, probably because it is designed to assess limitations in physical capabilities that are not relevant to recurrent headache disorders; in fact, this subscale loaded on the Affective Distress factor suggesting that, in this population, scores on this subscale may be more influenced by affective distress than by physical functioning. Pain and disability appeared to be best considered as separate constructs, as the Disability factor and the Pain Density factor were not highly correlated ($r = 0.2$).

Psychological symptom measures including standardized measures of anxiety and depression, the MOS-SF mental health subscale, psychiatric diagnosis of anxiety or mood disorders, and the Headache Disability Inventory all loaded on the Affective Distress factor. This factor appears to assess both headache-specific affective distress and psychological symptoms or psychopathology that may or may not be related to headaches. The Headache Disability Inventory, which was explicitly designed to assess headache-related affective distress as well as impairments in functioning, also exhibited a secondary loading on the Disability factor, suggesting this measure is also sensitive to disability, although to a lesser extent than affective distress.

To the extent that the impairments exhibited by individuals with recurrent headache disorders vary along all three of the dimensions of headache impact that were identified in this study, an adequate assessment of headache impact will require the explicit assessment of all three impact dimensions. Efforts to assess headache impact that limit themselves to measures from a single impact dimension may miss important aspects of headache impairment. For example, judgements about the efficacy of therapies typically are made primarily on the basis of headache measures from the Pain Density factor, though these measures are sometimes combined with pain intensity measures that do provide some information about pain-related disability. However, pain and disability are separable dimensions of headache impact that may be altered in different ways by different therapies. If our assessment procedures fail to distinguish headache activity and headache-related disability, not only will we miss possible differential effects of various therapies on pain and disability, but we also may be tempted to incorrectly assume that reductions in headache activity are necessarily accompanied by equivalent reductions in disability.

Affective distress is less likely to be recognized as a separable dimension of headache impact than is either pain or disability. It is generally recognized, however, that not only pain but affective responses to pain influence the impact pain will have on the individual (Melzack and Wall, 1983; Fernandez and Turk, 1992). In fact, affective responses to headaches can be a better predictor of disability than headache pain itself (Passchier et al., 1985). In part, this occurs because headaches that elicit anxiety, helplessness or resignation are likely to be associated with greater disability than are headaches of the same severity that are accompanied by less affective distress (Passchier et al., 1985). Fear that a headache will disrupt planned activities also leads some people to curtail or avoid work, social and family activities, even in periods when they are headache-free, so anticipatory anxiety begins to impair functioning even outside headache episodes (Philips and Hunter, 1981; Philips, 1983; La Croix and Barbaree, 1990; Hursey and Jacks, 1992). Nonetheless, current efforts to assess headache impact

generally do not reflect the fact that headaches can impose an emotional burden that is not adequately captured by measures of headache activity or disability.

A problem with the affective distress construct is that headache-related affective distress and affective distress related to a co-morbid psychiatric disorder or to other stresses in the patient's life probably cannot be readily distinguished by currently available measures. However, the disability construct poses a similar methodological problem in that 'headache-related' disability also may be 'related' or influenced not just by headaches, but also by other co-morbid conditions, other demands in the individual's life, local norms regarding disability, and even by environmental reinforcements for disability or continued performance. Nonetheless it remains useful to assess the disability associated with headaches. In a similar manner it is likely to be useful to assess affective distress in assessing headache impact. Instruments that inquire specifically about headache-related affective distress may reduce this confounding somewhat, but are unlikely to completely eliminate it (Jacobson et al., 1994; Cavallini et al., 1995). For example, The Headache Disability Inventory appears to be a convenient instrument for the assessment of headache-related affective distress, though our results suggest that affective distress and disability are somewhat confounded in this measure. It may be possible to develop a pure measure of headache-related affective distress, or to modify HDI items to yield such a measure. However, we expect that headache-related affective distress is likely to be influenced by, and not completely separable from, affective distress that arises from other sources.

On the other hand, if we ignore affective distress as a dimension of headache impact because of methodological concerns, we risk ignoring an important component of the burden that is imposed by recurrent headache (Holroyd et al., in press). Also, we will be unlikely to explore the hypotheses suggested by this three-dimensional model of headache impact. For example, it would be unlikely that we would investigate the possibility that the burden of recurrent headache disorders is best reduced when therapy addresses not only pain and disability, but also headache-related affective distress. Studies evaluating behavioral treatments such as relaxation, biofeedback training and cognitive-behavior therapy for recurrent headache disorders suggest that these therapies reduce affective distress, even in individuals who might fail to show improvements in headache activity (Blanchard et al., 1991; Penzien et al., 1993). Less information is currently available about the impact of drug therapies on headache-related affective distress because this variable has rarely been assessed in drug trials. However, the benefits that sedatives such as butalbital provide in compound analgesics may result primarily from their ability to reduce headache-related affective distress; antidepressant medication may similarly reduce the burden of headaches not only by reducing headache activity but also by reducing associated affective distress. If measures of all three dimensions of headache impact were included in future clinical trials, it would help us better determine if various drug and non-drug therapies produce different patterns of outcomes and, if so, help us to rationally combine therapies in a manner that better reduces the burden of recurrent headache disorders.

Not all headache-impact measures appeared equally useful in assessing the three identified dimensions of headache impact. In particular the subscales from the widely used MOS-SF20 (Ware et al., 1992) showed considerable variability in their assessment abilities. Three subscales of the MOS-SF appeared to provide reasonable measures of the Disability and Affective Distress factors, but the MOS-SF failed to adequately assess the Pain Density factor. Other subscales such as the physical functioning subscale appeared less appropriate for use with recurrent headache disorders than with individuals with other chronic medical disorders. This suggests that if the MOS-SF is used to assess the impact of recurrent headache disorders, the various subscales need to be used selectively. The gold standard of a daily diary or at least an interview assessment may be necessary to accurately assess pain density.

There are at least two limitations to this factor analysis. Firstly, the dimensions of headache impact identified by factor analysis are influenced by the set of measures that are included in the factor analysis. Although a wide variety of measures that might be used to assess the impact of recurrent headache disorders on functioning and well being were included in this analysis, not all possible measures were included (Philips and Hunter, 1981; Philips, 1983; Hursey and Jacks, 1992; Cavallini et al., 1995; Passchier et al., 1996; Stewart et al., 1999). It is thus possible that the factor structure that we identified would look somewhat different if additional measures were included in the analysis. Secondly, the identified factor structure might vary somewhat in different samples of individuals with recurrent headache disorders. For example, our sample included only a small number of African-Americans and Asian-Americans, so it is possible that this factor structure would look somewhat different in samples of these or other ethnic minorities. The robustness of this factor structure therefore should be examined in factor analyses of data from a different but overlapping set of measures administered to different populations of recurrent headache sufferers.

In conclusion, information provided by 22 headache-impact measures appeared to be best explained by three constructs: Affective Distress, Pain Density and Disability. This suggests that our ideas about headache impact may need to be broadened beyond pain and, recently, disability to include the construct of affective distress. An adequate assessment of the impact of recurrent headache disorders in clinical trials and other research then would include measures from all three of the headache-impact dimensions identified here.

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Table 1

Pattern matrix

Variable	Affect	Pain	Disability
<i>Affective distress</i>			
STAI Trait Anxiety Subscale	0.91		
MOS-SF Mental Health Subscale	− 0.90		
Beck Depression Inventory	0.88		
Mood Disorder diagnosis	0.64		
Headache Disability Inventory	0.52		0.35
Anxiety Disorder Diagnosis	0.51		
MOS-SF Physical Functioning	− 0.40		
MOS-SF Pain Subscale	−		
<i>Pain density</i>			
Headache Index, Diary		0.95	
Headache days at least moderate pain		0.84	
Headache days		0.78	
Frequency of headaches, interview		0.58	
Duration of headaches, interview		0.31	
<i>Disability</i>			
Interference with daily activities			0.85
Interference with work			0.81
Interference with social activities			0.80
Pain Intensity, interview			0.59
Average pain, questionnaire			0.55
Worst pain intensity, questionnaire			0.49
Number of disability days			0.48
MOS-SF Social Functioning Subscale			− 0.33
MOS-SF Role Functioning Subscale			− 0.32