Trajectories of Headache Disability Treatment Response: Psychosocial and Clinical Correlates

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This thesis titled
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ABSTRACT

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Using a naturalistic, longitudinal study design, 219 patients receiving treatment for headache disorders completed psychosocial assessments and 30-day daily diaries that assessed headache frequency, severity, and disability at pre-treatment and provided data on headache-related disability at pre-treatment and 1-, 2-, and 6-month follow-up. Latent-class trajectory analysis of the headache disability measure identified three treatment trajectory groups: (1) a high-disability non-responder group; (2) a high-disability responder group; and (3) a low-disability responder group.

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INTRODUCTION

In the United States, one-year prevalence estimates of chronic tension-type headache (CTTH; 9 to 14%) and migraine headache (20 to 30%) have been documented (Jensen & Stovner, 2008; Stovner et al., 2007). These disorders pose serious public health problems, including high rates of physical impairment, employment absenteeism, reduced work productivity, and diminished quality of life (Lipton, et al., 2007; Silberstein, et al., 2007; Steiner et al., 2003; Stewart, Lipton, & Simon, 1996; Stewart et al., 1992). Given the significant impact of headache disorders on one’s physical, social and emotional well-being, it is important to understand how patients respond to contemporary headache pharmacotherapies to prevent and/or manage headaches.

Numerous preventive pharmacological treatments have been indicated for headache disorders. Prophylactic (i.e., preventive) pharmacotherapies have repeatedly been shown to reduce the frequency and severity of a variety of chronic headache conditions (Diener et al., 2007; Silberstein et al., 2004; Bettucci, 2006; Holroyd et al., 2001). Propranolol, a beta-blocker, is the most frequently studied prophylactic migraine treatment while amitriptyline, a tricyclic antidepressant, is the most frequently studied treatment for CTTH (Speciali, Eckeli, & Dach, 2008; Castells, Delgado, & Escoda, 2008; Ramadan, 2007; Loj & Solomon, 2006; Fumal & Schoenen, 2008; Lampl et al., 2006).

While several pharmacotherapies efficaciously treat headache disorders, a significant proportion of patients (≈30%) do not respond successfully to these treatments (Holroyd, 2002; Adelman, 2000; Diener et al., 2008). Little is known about this latter group of patients. There are several potential outcome trajectories that patients may
evince over the course of pharmacotherapy. For example, some patients report rapid improvements, some report more gradual changes, and others report no changes in their headache activity after initiating new acute and prophylactic treatments (Heckman et al., 2008; Holroyd et al., 2001).

Growth curve modeling provides an opportunity to identify statistically and potentially clinically meaningful differences in longitudinal treatment outcome trajectories in headache patients. Growth curve modeling has been utilized most extensively in studies of learning, depression, and substance use, areas in which subgroups of treatment outcomes are common (Gildengers et al., 2005; Murphy et al., 2008; Amtmann, Abbott, & Berninger, 2008). For example, several 10-year longitudinal studies of symptom severity in schizophrenic patients found symptom reductions in approximately 75% of patients, symptom increases in 25% of patients, and symptom stability in just a few patients (Levine & Rabinowitz, 2008; Rabinowitz et al., 2008; Rabinowitz et al., 2007). A distinct subset of children does not respond, or responds slowly, to early reading interventions (Amtmann, Abbott, & Berninger, 2008). Finally, anxiety declines in most female patients following an acute cardiac event but persists in a significant subset of patients (≈30%; Murphy et al., 2008). The utilization of growth curve modeling in these areas has enabled researchers to characterize heterogeneous response patterns and identify factors predictive of treatment resistant depression (Levine & Rabinowitz, 2008), long-term substance use behavior patterns (Xie, McHugo, & Drake, 2009), and children in need of more comprehensive early reading interventions (Amtmann, Abott, & Berninger, 2008).
The prophylactic medication treatment of headache disorders has been studied extensively but suffers from a lack of diversity in treatment outcome measures. Most research of this type relies on headache frequency and severity as outcome measures. While these measures enable practitioners to evaluate treatment efficacy vis-à-vis symptom improvement, they yield less information about one’s physical or functioning well-being (Andrasik et al., 2005). It has long been posited that the experience of pain includes not only the sensory experience of pain but also the emotional and functional sequelae of sensory-related pain (Andrasik et al., 2005; Turk & Okifuji, 2002).

Headache disability may be an ideal outcome measure by which to assess treatment outcomes because headache disability measures correlate positively and significantly with headache frequency and severity (Jacobson et al., 1994) and capture functional-, emotional-, and role-related activity overlooked by headache frequency and severity measures (Magnusson, Riess, and Becker, 2004; Holroyd, 1999; Holroyd, Labus, & Carlson, 2009). Increasingly, patients—and those who pay for medical treatments—seek medical interventions that improve headache-related symptoms and improve one’s physical, emotional and functional welfare.

The current study sought to characterize statistically and clinically meaningful headache treatment response trajectory categories using the treatment outcome measure of headache disability and to identify headache characteristics and psychosocial variables assessed prior to the initiation of new preventive pharmacotherapies that predicted treatment trajectory group membership. The selection of psychosocial factors associated with treatment trajectory group membership was guided by Social Cognitive Theory
(SCT; Bandura, 1986). Using growth curve modeling, the current study characterized treatment trajectory group membership and identified demographic (race, socioeconomic status), headache-related (diagnosis, headache days, headache severity), and psychosocial characteristics (headache specific self efficacy, locus of control, social support, psychiatric comorbidity) associated with membership in treatment response trajectory groups. Findings from the current study may enable headache treatment practitioners to identify patients who are likely, or unlikely, to respond favorably to contemporary prophylactic pharmacotherapies administered to patients in headache treatment clinics.

METHOD AND PARTICIPANTS

Characteristics of Participants

Data analyzed in the current study were collected from 219 patients who presented at outpatient medical settings for treatment of episodic migraine, chronic migraine, episodic tension-type headache, or chronic tension-type headache. Patients were recruited from four outpatient headache treatment clinics in Cincinnati, Cleveland, Columbus, and Toledo, OH.

Procedures

The study used a naturalistic longitudinal design and assessed participants using pre-treatment, 1-, 2-, and 6-month follow-up visits that occurred during the course of the participant’s routine care (Please see Figure 1). It is important to note that the follow-up time periods used in this study were selected because they coincided with participants’ normally scheduled follow-up visits to these clinics. Patients were recruited by their neurologist at the initial clinic visit. To recruit study patients, brochures and posters that
described the study were distributed to participating treatment clinics for display and distribution to potential participants. Eligible patients who expressed interest in the study provided written informed consent in the treatment clinic.

Patients were initially assessed at pre-treatment and were again assessed at 1, 2, and 6 month follow-up. This particular treatment schedule represents the natural course of treatment recommended by patients’ physicians. Abortive medication was given to patients at the initial visit if they were not already receiving acute treatment. Furthermore, physicians made modifications to abortive regimens for patients already in receipt of such treatment. At this visit, patients were diagnosed by their physicians using HIS criteria. Patients were re-assessed during their second visit, which occurred 1-month after the initial visit, to determine their need for preventive pharmacotherapy based on their headache activity during the previous 30 days. At this juncture, preventive medication was prescribed as clinically indicated. Finally, patients made follow-up visits at two and six months after their initial visit.

**Study Inclusion Criteria**

The study employed the following inclusion criteria: (1) 18 years of age or older; (2) self-identifying as African American or Caucasian; (3) satisfying IHS criteria for either episodic migraine, chronic migraine, episodic tension-type headache, or chronic tension-type headache; (4) the patient’s physician believed that he or she should begin a new preventive pharmacotherapy; (5) proficiency in the English language; (6) the patient was willing to postpone preventive treatment for one month (to assess headache activity prior to the initiation of the new preventive pharmacotherapy; and (7) the patient
completed the Headache Disability Inventory (HDI) at least once during the course of treatment.

Assessment Measures

*Demographic Characteristics.* Patients provided data on their age, gender, race, education, employment status, insurance status, and annual income through a self-report questionnaire completed at the pre-treatment visit. To obtain a more comprehensive estimate of each patient’s socioeconomic status, a principal components analysis (PCA) created a composite SES score based on each patient’s “Number of Years of Education Completed” and “Annual Income.”

*Headache Diagnosis.* During the initial patient-physician interaction, the physician diagnosed the patient’s current headache disorder(s) using International Headache Society (2003) criteria.

*Headache Characteristics.* Measures of headache activity were obtained via participants’ self-report diary data completed from the pre-treatment visit to the 1 month follow-up visit, and either mailed in to the research cite or returned to the physician. Headache characteristics were determined by (a) the number of headache days during the past month (frequency) and (b) average intensity of headaches over the month (severity).

*Primary Care Evaluation for Mental Disorders (PRIME MD; Spitzer et al., 1994).* Patients’ psychiatric disorders were diagnosed using the PRIME-MD. The PRIME-MD was administered to patients by trained research staff during a telephone interview conducted within two days of the pre-treatment visit. The PRIME-MD yields a subset of diagnoses included in the Diagnostic and Statistical Manual of Mental
Disorders (DSM IV; Spitzer et al., 1994), including mood and anxiety disorders, as well as alcohol (abuse/ dependence), eating disorders, and somatoform disorders. Previous studies have found the PRIME-MD to be comparable to trained diagnostic interviews (Spitzer et al., 1994; Please see appendix B). For the purposes of this study, psychiatric comorbidity was assessed as: (1) anxiety diagnosis (i.e., “yes”/ “no”) and depression diagnosis (“yes”/ “no”).

*Headache Specific Locus of Control Scale (HSLC; Martin, Holroyd, & Penzien, 1990; VandeCreek & O'Donnell, 1992).* The 33-item HSLC scale measured patients’ beliefs regarding factors that control their headaches. The HSLC scale contained three locus of control (LOC) subscales that assessed the extent to which individuals believed their headaches were controlled by their own efforts (Internal LOC subscale), chance circumstances (Chance LOC subscale), and health care professionals (Health Care Professional LOC subscale). Respondents rated the extent to which they agreed with each LOC item using a five-point rating scale (1= “Strongly disagree” to 5=“Strongly agree”). In the current study, coefficient alpha for each LOC subscale ranged from 0.82 to 0.85 and the test-retest reliabilities of the HSLC subscales over a three-week interval ranged from 0.72 to 0.75. (Martin, Holroyd, & Penzien, 1990; Please see appendix B).

*Headache Management Self-Efficacy Scale (HMSE; French et al., 2000).* The 25-item HMSE scale assessed a patient’s perceived ability to prevent and manage their headache activity. Patients rated the extent to which they agreed with each item using a seven-point rating scale (1=“Strongly disagree” to 7=“Strongly agree”). In the current
study, the HMSE scale demonstrated excellent internal consistency ($\alpha=0.90$; Please see appendix B).

*Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988).* The 12-item MSPSS scale measured patients’ perceived social support from three sources: family; friends; and significant other(s). Each MSPSS item used a seven-point Likert scale (1=“Very strongly disagree” to 7=“Very strongly agree”). Higher scores indicate higher perceptions of social support. The MSPSS scale demonstrated excellent psychometric characteristics in the current study ($\alpha=0.91$, test-rest reliability=0.93).

*Headache Disability Inventory (HDI; Jacobson et al., 1994).* The 25-item HDI assessed the burden of chronic headaches on one’s emotional well-being and daily functioning and served as the primary outcome measure in growth curve modeling analyses. The HDI demonstrated excellent psychometric properties in the current study ($\alpha=0.92$).

**Data Analyses**

*Intent to Treat Analysis.* An intent to treat (ITT) analysis was used in the current study because it provides the most accurate representation of the population of interest, unlike a completers-only approach that would, in all likelihood, yield a sample that is biased on one or more variables. The ITT approach used data provided by participants who received preventative medication, self-identified as being Caucasian or African American, and who completed the HDI at any of the assessment time points during the
study (n=219). Data on treatment completers versus non-completers is published elsewhere (Heckman et al., 2008).

**Mixed Modeling.** The current analysis identified subgroups of patients with similar courses of treatment response as measured by the HDI. To derive homogeneous, empirically-based subgroups, mixed model latent regression modeling was conducted. This analysis empirically clustered similar trajectories over time based on both the initial disability score (intercept) and change in disability score over time (slope). The number of groups and, therefore, the number of separate trajectories for which parameters estimated was achieved by including a categorical latent variable in the model. Both statistical and pragmatic criteria were used to determine the optimal shape and number of groups. Following Muthen’s (2003) guidelines, the statistical criteria for determining the model included the Bayesian Information Criteria (BIC), posterior probability, and entropy. BIC, a goodness-of-fit measure, was used to assess the fit of a model with multiple classes that accounted for the number of parameters estimated in the analysis. Model fit was indicated by lower BIC values. Estimated conditional class probabilities were utilized to compute entropy. Entropy measured how statistically distinguishable the proposed classes were, with higher entropy values indicative of more distinguishable classes. Additionally, the study team examined the pragmatic criteria of number of groups, the meaningfulness and interpretability of the model, and the number of participants in each group (Muthen, 2003, Lubke & Muthen, 2005). Data analyses for mixed modeling were conducted using Mplus version 3.11 (Muthen & Muthen, 2004).
Predictive Characteristics. Three multinomial logistic regressions were carried out to explore factors that predicted and differentiated the trajectories. Demographic factors included race/ethnicity (African-American or Caucasian-American) and socioeconomic status (SES). Clinical factors included migraine or tension-type headache diagnosis, chronic or episodic diagnosis, headache days, and headache severity at baseline. Psychosocial variables included headache self-efficacy, locus of control, social support, and psychiatric comorbidity.

RESULTS

Sample Characteristics

As shown in Table 1, the typical patient was Caucasian (67%), female (88%), and 36.7 years of age. Eighty percent of participants were diagnosed with migraine headache and 20% were diagnosed with tension-type headache as their primary diagnosis. Forty-seven percent of participants had an “episodic” headache diagnosis (i.e., episodic tension-type headache, episodic migraine headache with and without aura) and 53% had a chronic diagnosis (i.e., chronic tension-type headache, chronic migraine with and without aura, chronic daily headache). On average, patients experienced headaches on 17.4 days over a 30-day period.

Latent Growth Curve Analysis

Results from mixed modeling latent class analyses indicated that the best fitting model was a linear, 3–class model. Table 2 shows fit indices and entropy of the growth mixture models for linear and quadratic models with 1, 2, 3, and 4 classes. While the BICs of the three best-fitting models were not significantly different from each other, the
lowest BIC (which is preferable when evaluating model fit) was determined to be a linear, 3-class model. The linear, 3-class model had an entropy value of 0.628, indicating that the classes in the model were modestly distinguishable from each other. The average class posterior probabilities ranged from .742-.874, indicating that the model accurately predicted patients’ group classification 74 to 87% of the time.

Figure 2 illustrates the proposed and actual disability trajectories for each of the three groups identified by the latent class analysis. Group 1 patients (n=74; 34%) reported relatively high HDI scores at pre-treatment (mean=59.17) and evinced a non-significant worsening of headache-related disability (i.e. HDI scores increased an average of 0.645 points; Cohen’s d= -.11). Group 2 patients (n=24; 11%) reported the highest pre-treatment HDI scores (mean=61.5) and evidenced the fastest decline in headache disability over the 6 month follow-up period at a rate of 3.28 per follow-up period (a total average decrease of 9.84; Cohen’s d=2.4). Group 3 patients (n=121; 55%) reported the lowest pre-treatment HDI scores (mean=42.75) and exhibited gradually decreasing HDI values over the 6 month follow-up period, with a total average decrease of 2.08 (Cohen’s d =.52). Based on these findings, the three groups that emerged from the treatment outcome analysis were classified as: (1) High-Disability, Nonresponders (i.e. Group 1, which initiated treatment with an elevated level of disability and did not respond to treatment); (2) High-Disability, Responders (i.e. Group 2, which initiated treatment with a high level of disability but responded promptly to treatment); and (3) Low Disability, Responders (i.e. Group 3, which started treatment with lower disability levels and showed gradual responses to treatment (see Table 1, Figure 2, Table 3, and Table 4).
ANOVA and Chi-square Analyses

Univariate ANOVAs and chi-square analyses tested for differences in demographic, headache characteristic, and psychosocial variables between the disability trajectory groups (See Table 1). The disability trajectory groups did not differ in age, gender, ethnicity, having chronic vs. episodic headache diagnoses, having migraine vs. tension-type diagnoses, or internal headache-specific locus of control (all ps > .10).

At pre-treatment, the three groups did differ in SES composite scores, $F(2,202)=3.02, p=.051$, headache frequency, $F(2,216)=4.38, p=.01$, headache severity, $F(2,218)=5, p<.01$, headache management self-efficacy, $F(2,207)=12.07, p<.001$, health care professional locus of control, $F(2,208)=8.87, p<.001$, chance locus of control, $F(2,205)=23.53, p<.001$, social support, $F(2,209)=3.23, p=.04$, having an anxiety comorbidity, $\chi^2(2)=22.27, p<.001$, and having a depression comorbidity, $\chi^2(2)=21.85, p<.001$.

Bonferroni corrected post-hoc comparisons found several differences between the Low Disability-Responders Group and the High Disability-Non-Responders Group. Specifically, compared to High Initial Disability, Non-Responders, Low Initial Disability-Responders reported significantly higher SES composite scores (p < .05), fewer headache days per month (p < .05), decreased headache severity (p < .05), less health care professional locus of control, (p < .05), less chance locus of control (p < .05), greater headache management self-efficacy (p < .05), and were less likely to have comorbid anxiety or depressive disorder diagnoses (both ps < .05).
Significant differences were also observed between Low Disability, Responders and High Disability Responders. Compared to High Initial Disability Responders, Low Initial Disability Responders reported less health care provider locus of control (p < .05), decreased chance locus of control (p < .05), greater headache management self-efficacy (p < .05), and were less likely to have comorbid anxiety and depression diagnoses (both ps < .05).

*Multinomial Logistic Regressions*

Correlational analyses were conducted in order to assess for multicollinearity between the independent variables (see Table 5). While significant correlations were found between several of the independent variables, VIF and tolerance values indicated that there was no multicollinearity among the independent variables (see Table 5). Additionally, no predictors were correlated with one another at r > .80, further reducing the possibility of multicollinearity (Tabachnik & Fidell, 2001).

As previously mentioned, ANOVA and chi-square analyses were conducted to determine which predictor variables to include in the multinomial logistic regressions (MLRs). Predictors that were correlated with the disability trajectory groups with Pearson correlation significance levels below 0.20 were included in the MLR (Tabachnik & Fidell, 2001). Race, chronic diagnosis or episodic diagnosis, migraine or tension-type diagnosis, and internal headache specific locus of control were correlated with the disability trajectory groups with Pearson significance levels above 0.20, and these variables were excluded from the subsequent analyses (see Table 1). All other variables were correlated with the trajectory groups at baseline at significance levels below .2 and
were included in the MLRs. Three MLRs were conducted, one including demographic characteristics (socioeconomic status), one including headache-related characteristics (frequency and severity), and one including psychosocial characteristics (self-efficacy, health care provider locus of control, chance locus of control, social support, anxiety comorbidity, and depression comorbidity) were conducted to see which factors predicted disability trajectory group membership. The demographic characteristic ($\chi^2(2)=6.16; p=.05$), headache-related characteristic ($\chi^2(4)=15.94; p<.01$), and psychosocial characteristic ($\chi^2(12)=77.66; p<.001$) MLRs were significant, indicating that as a group, each set of factors included in the three regressions significantly predicted disability trajectory group membership. No factors included in the analysis predicted membership in the high-disability responders group over the high-disability nonresponders group.

Predictors of the High-High versus Low-Poor Disability Trajectory Groups

High-disability responder trajectory group membership was predicted over low-disability responder trajectory group membership by higher health care provider locus of control (OR=1.08; $p<.05$), higher chance locus of control (OR=1.1; $p<.001$), and the presence of an anxiety comorbidity (OR=3.08; $p<.05$). Headache severity marginally predicted high-disability responders trajectory group membership over low-disability responders group membership (OR=1.07; $p=.051$; Please see Tables 6 and 7).

Predictors of the High-Non versus Low-Poor Disability Trajectory Groups

High-disability nonresponder trajectory group membership was predicted over low-disability responder group membership by lower SES (OR=.66; $p<.05$), higher headache frequency (OR=1.05, $p=.05$), higher headache severity (OR=3.47, $p=.01$),
lower headache specific self efficacy (OR=.97, p<.01), higher health care provider locus of control (OR=1.06, p<.05), higher chance locus of control (OR=1.07, p<.01), having an anxiety disorder (OR=2.48, p<.05), and having comorbid depression (OR=2.32, p<.05; Please see Tables 6 and 7).

**DISCUSSION**

Using mixture growth modeling techniques, the current study found: (1) three distinct patterns of response to prophylactic headache treatments that were categorized as high-disability nonresponders, high-disability responders, and low-disability responders; (2) that demographic, headache, and psychosocial variables distinguished participants in the two groups with high initial disability scores from those participants with low initial disability scores; and (3) that none of the variables assessed in the current study (i.e. demographic, headache-related, and psychosocial variables) distinguished participants with high initial levels of disability who improved from those with high initial levels of disability who did not improve.

Using criteria suggested by Muthen (2002) and Muthen and Muthen (2003), our study identified two groups (high-disability nonresponders and high-disability responders) who started treatment with a comparable level of increased disability and a third group of participants (low-disability responders group) that had significantly lower levels of impairment at the onset of treatment. This is not altogether inconsistent with previous research, which, when utilizing other statistical techniques, frequently suggests the presence of a subset of patients that does not respond to treatment (≈30%), while most other patients evince statistically and clinically meaningful reductions in headache
symptoms (Holroyd, 2002; Adelman, 2000; Diener et al., 2008). Additionally, the level of disability displayed in the two high disability groups when compared to the levels of disability found in most national clinical research samples, suggests that these patients are likely being missed in randomized clinical headache outcome studies (French, 2000; Holroyd, Labus, & Carlson, 2009). For example, in treatment outcome studies on patients with CTTH, the average baseline HDI score at treatment initiation was 38.42 and 39.42, respectively (Holroyd, Labus, & Carlson, 2009 & French, 2000, respectively). These scores are much lower than the current study’s average of 51.83. It may be that strict inclusion/exclusion criteria often used in clinical trials exclude headache patients with high disability, who, for reasons such as psychiatric comorbidity, are not eligible for the study. Future researchers should carefully consider the exclusionary criteria utilized, as there appears to be a significantly impaired and poorly understood cluster of patients who are not being examined (Tietjen et al., 2007).

When the demographic, headache-related, and psychosocial predictors of disability trajectory group membership were examined, the three trajectory groups appeared to collapse into two groups, a high disability and a low disability group. As could be expected, the two high disability groups were predicted over the low disability group by higher levels of headache frequency and severity and psychiatric comorbidity (Cassidy et al., 2003; Von Korf et al., 1992; Terwindt et al., 2000; Lipton et al., 2001; Jacobson et al., 1994; Heckman et al., 2008; Nicholson et al., 2007; Holroyd et al., 2000; Lanteri-Minet et al., 2005; Breuner, Smith, & Womack, 2004; Tschennen et al., 1992; Stewart & Lipton, 2002; Marcus, 2000). Additionally, a psychosocial profile including a
high level of chance and health-care-provider locus of control, a low level of internal locus of control, and a low level of self-efficacy predicted membership in the high-disability groups. These findings are consistent with the extant literature (e.g. French et al., 2000; Martin, Holroyd, & Penzien, 1990), and suggest that there may be two very different clinical profiles of patients who enter treatment, a high initial disability and a low initial disability group. Patients who entered treatment with high levels of disability had heterogenous responses to treatment. While the majority of these patients did not respond treatment, as might be expected based on previous research (Holroyd, 2002; Adelman, 2000; Diener et al., 2008), a subset of this group responded quite well, and attained a comparable although slightly higher disability level when compared to the low disability group. Most of those patients who stayed in treatment showed significant treatment response, while those who did not stay in treatment did not reduce their headache-related disability. This result could be taken as a hopeful signal to headache clinicians that patients with a challenging profile of clinical and psychosocial characteristics have the potential to respond to treatment with dramatic reductions in the impact of headache disorders on their functioning. However, as these patients were also at a high risk for nonresponse to treatment, they may be good candidates for more intense interventions, such as the combination of behavioral management and pharmacotherapy (Rothrock, 2009). The psychosocial characteristics of these patients, such as high levels of psychiatric comorbidity and low self-efficacy, may also make them potentially good candidates for psychotherapy (Andrasik, Buse, & Grazzi, 2009). Psychotherapeutic interventions may help to remediate the distress caused by anxiety and depression, which
may have a relationship to headache disability (Andrasik, Buse, & Grazzi, 2009). Additionally, as self-efficacy has been emerging in the literature as an important mediator of headache disorder treatment outcome, behavioral management training should target self-efficacy (Holroyd, Labus, & Carlson, 2009).

It is also important to note that the majority of patients initiated treatment with a (relatively) lower level of disability, and while they improved at a statistically significant level, the decreases in disability were fairly small. This is consistent with the limited clinically representative research that has used headache disability as a measure of headache treatment response (Heckman et al., 2009). Given the limited improvement most patients experience in treatment, continued resources need to be directed towards developing more effective headache treatments.

While no clinical or psychosocial characteristic included in the analysis predicted group membership between the two high-disability groups, a subsequent analysis indicated that the high disability responders group had significantly (p<.05) lower rates of dropping from the study (25% vs. 51%). This can be interpreted in multiple ways. It is understandable that patients who enter treatment with high levels of disability and improve rapidly would be more likely to maintain treatment adherence than those who did not improve, or who improved gradually. However, participants who adhere to treatment are also more likely to respond to treatment (Boes & Capobianco, 2005; Rains, Lipchik, & Penzien, 2006), and may have been more likely to be in the high-disability responders group. Alternatively, this may simply have been an artifact of the intent to treat analysis, as the last HDI score received for the participants was carried forward,
while patients’ actual treatment response may have been different. Future studies might consider a brief follow-up with those patients who drop from treatment to assess treatment outcomes.

While the current study did not find a statistical difference between the two high initial disability groups on race, age, or SES, previous research conducted with this sample found that patients who prematurely dropped from treatment were more likely to be younger, African-American, and have lower levels of SES in Caucasian-Americans (Heckman et al., 2008). Future studies might consider continuing to explore the relationship between treatment adherence, premature treatment termination, and treatment response. Additionally, treatment adherence appears to be an important potential area for intervention in clinical settings.

The current study had several limitations. First, this is a secondary analysis of a dataset that was collected for another purpose. Moreover, because all participating headache treatment clinics were located in urban areas in Ohio, study results may not generalize to other geographic locations. All data collected in the study, with the exception of headache diagnoses, were self-report in nature and potentially subject to problems related to social desirability, demand characteristics, and recall bias. Many of the measures utilized in the study were not specific to preventive pharmacological treatment, and were instead geared toward non-pharmacological headache self-management. As a result, the findings in the current study may not be an accurate reflection of the relationship between, for example, headache self-efficacy and preventive
pharmacological treatment. In order to more accurately assess this relationship, measures are needed to assess, for example, medication regimen self-efficacy.

While this study employed the pragmatic criteria outlined by Muthen (2003) to select the model (i.e. number of groups, the meaningfulness and interpretability of the model, and the number of participants in each group), there were multiple models that fit the data. Therefore, justification could be made for alternative interpretations of the data. Additionally, the current study utilized an intent-to-treat analysis in order to capture the most representative sample of participants. However, utilization of a completers sample would have most likely produced a different grouping of the participants that could provide information about what predicts treatment response in a sample of patients who tend to stay in treatment. While the study included a wide range of factors that have been found to be important in the health and headache literatures, the list of potential predictors was by no means exhaustive. Other factors such as co-occurring symptoms, medication side-effects, and adherence to treatment regimens which were not measured in the current study may have differentiated participants in the disability trajectory groups.

In spite of the above limitations, the current study is the first to examine headache treatment response patterns using latent growth curve methodology. This paper has overcome some of the limitations of previous research, including its use of a prospective design, a comprehensive outcome measure, and a clinically-representative sample. This research identified the clinical profile (demographic, headache characteristic, and psychosocial) of three groups of patients, each with similar disability trajectories. Two of
these groups had a similar level of disability, headache days, headache severity, headache management self-efficacy, chance and healthcare-professional locus of control, and rates of psychiatric comorbidity, but strikingly different responses to treatment. These two groups, the high-disability responders and high-disability nonresponders groups, differed on most variables from the third group, the low-disability responders. However, the only variable that distinguished the high-disability responders and high-disability nonresponders groups was treatment adherence (as measured by dropping from the current study). The results of the current study suggest that clinicians should pay particular attention to those patients with high levels of disability at their initial visits, as those patients are at a high risk for non-response to treatment. These patients are also potentially good candidates for behavioral interventions, as they had a clinical profile including high levels of psychiatric comorbidity, low levels of self-efficacy, and high levels of health-care-provider and chance locus of control. Additionally, patients with high levels of disability had high treatment dropout rates, suggesting that clinicians target adherence interventions to participants with similar clinical profiles. These results also imply that RCT’s may be missing those participants who enter treatment with high levels of disability, who, due to high rates of psychiatric comorbidity, may be excluded. Furthermore, research is needed to determine what factors may predict the difference between those patients who start treatment with high levels of disability, stay in treatment, and improve, and those who drop from treatment and do not improve.
REFERENCES


Bettucci, D., Testa, L., Calzoni, S., Mantegazza, P., Viana, M., & Monaco, F. (2006). Combination of tizanidine and amitriptyline in the prophylaxis of chronic tension-


Table 1: Levels of Disability and All Potential Demographic, Headache Characteristic and Psychosocial Predictor Variables.

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th></th>
<th>High-disability Nonresponders</th>
<th>Low –disability Responders</th>
<th>High-disability Responders</th>
</tr>
</thead>
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<td></td>
<td>M</td>
<td>SD</td>
<td>N</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Base HDI</td>
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<td>11.3</td>
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</tr>
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<td>1 MFU</td>
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<td>11.8</td>
<td>125</td>
<td>60.72</td>
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</tr>
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<td>2 MFU</td>
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<td>98</td>
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</tr>
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<td>6 MFU</td>
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<td>Freq</td>
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<td>180</td>
<td>19.11</td>
<td>7.9</td>
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<tr>
<td>Severity</td>
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<td>.39</td>
<td>180</td>
<td>1.8</td>
<td>.45</td>
</tr>
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<td>18.67</td>
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<td>1.77</td>
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<td>205</td>
<td>.22</td>
<td>.93</td>
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<td>Race (AA)</td>
<td>37%</td>
<td>81</td>
<td>219</td>
<td>45%</td>
<td>33</td>
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<tr>
<td>Chronic</td>
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<td>93</td>
<td>218</td>
<td>46%</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>72%</td>
<td>157</td>
<td>218</td>
<td>66%</td>
<td>49</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Migraine</td>
<td>46%</td>
<td>99</td>
<td>214</td>
<td>64%</td>
<td>47</td>
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<td>Anx Com</td>
<td>54%</td>
<td>115</td>
<td>214</td>
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<td>53</td>
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<td>Dep Com</td>
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<td>208</td>
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<td>10.4</td>
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<td>Gender (F)</td>
<td>88%</td>
<td>190</td>
<td>215</td>
<td>84%</td>
<td>62</td>
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</table>
Table 2: HDI Latent Growth Curve Analysis Results: Model Fit Indices and Group Descriptions.

<table>
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<tr>
<th>Model</th>
<th>Entropy</th>
<th>BIC</th>
<th>Par.</th>
<th>Log Likelihood</th>
<th>Group Ns</th>
<th>Percentage</th>
<th>Group Intercept</th>
<th>Group Slope</th>
<th>Group Quad. Func.</th>
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<td>-0.8</td>
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<td></td>
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<td>4675.42</td>
<td>11</td>
<td>-2308.07</td>
<td>153</td>
<td>70</td>
<td>46.3</td>
<td>-1.2</td>
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<td>Linear 3 groups</td>
<td>.628</td>
<td>4670.484*</td>
<td>14</td>
<td>-2297.519</td>
<td>74</td>
<td>34</td>
<td>59.2</td>
<td>.2</td>
<td></td>
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<tr>
<td>Linear 4 groups</td>
<td>.65</td>
<td>4674.719</td>
<td>17</td>
<td>-2291.552</td>
<td>52</td>
<td>24</td>
<td>61.5</td>
<td>.6</td>
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<tr>
<td>Quadratic 1 group</td>
<td></td>
<td>4670.774</td>
<td>12</td>
<td>-2303.053</td>
<td>219</td>
<td>52</td>
<td>-2.7</td>
<td>.3</td>
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<td>Quadratic 2 groups</td>
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<td>4672.586</td>
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<td>155</td>
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<td>47.8</td>
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<td>Quadratic 3 groups</td>
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<td>Quadratic 4 groups</td>
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<td>-2274.608</td>
<td>91</td>
<td>42</td>
<td>41.6</td>
<td>-2.2</td>
<td>.2</td>
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</table>

*Significant at p < 0.05.
Table 3: Intent to Treat Values of the HDI by Trajectory Group for all Follow-up Periods.

<table>
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<tr>
<th></th>
<th>Total Sample</th>
<th>High-disability Nonresponders</th>
<th>Low-disability Responders</th>
<th>High-disability Responders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>N</td>
<td>M</td>
</tr>
<tr>
<td>Baseline HDI</td>
<td>51.74</td>
<td>11.8</td>
<td>219</td>
<td>61.55</td>
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<tr>
<td>HDI 1 MFU</td>
<td>50.09</td>
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<td>61.53</td>
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<td>HDI 2 MFU</td>
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<td>12.2</td>
<td>219</td>
<td>60.99</td>
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<td>HDI 6 MFU</td>
<td>47.81</td>
<td>12.7</td>
<td>219</td>
<td>62.32</td>
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</table>
Table 4: Results of T-Tests Comparing the Intent to Treat Values of the Three Disability Trajectory Groups at Baseline and 6MFU.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th></th>
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<th>6 MFU</th>
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<tbody>
<tr>
<td></td>
<td>T</td>
<td>Df</td>
<td>Sig</td>
<td>T</td>
<td>Df</td>
<td>sig</td>
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<tr>
<td>High-disability</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Responders vs. Low-</td>
<td>15.85</td>
<td>193</td>
<td>&lt;.001</td>
<td>21.87</td>
<td>193</td>
<td>&lt;.001</td>
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<td>disability Responders</td>
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<tr>
<td>Low-disability</td>
<td>-11.04</td>
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<td>-2.43</td>
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<td>.016</td>
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<tr>
<td>Responders vs. High-</td>
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</tr>
<tr>
<td>disability Nonresponders</td>
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<td>High-disability</td>
<td>-.45</td>
<td>96</td>
<td>.653</td>
<td>11.31</td>
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<td>&lt;.001</td>
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<tr>
<td>Responders vs. High-</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>disability Nonresponders</td>
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Table 5: Zero-Order Pearson Correlation of All Potential Predictor Variables.

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<th>11</th>
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<tr>
<td>1. Race</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2. SES</td>
<td>-.16*</td>
<td>-</td>
<td></td>
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<td></td>
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<td>3. Chronic</td>
<td>.05</td>
<td>-.09</td>
<td>-</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Migraine</td>
<td>-</td>
<td>.23**</td>
<td>-24**</td>
<td>-</td>
<td></td>
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</tr>
<tr>
<td>5. Frequency</td>
<td>.16*</td>
<td>-24**</td>
<td>.27**</td>
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<tr>
<td>6. Severity</td>
<td>.2*</td>
<td>-.19*</td>
<td>.03</td>
<td>-.05</td>
<td>.21**</td>
<td>-</td>
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<td>7. Anxiety</td>
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<td>.03</td>
<td>-.12</td>
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<td>-.2**</td>
<td>-.12</td>
<td>.33**</td>
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<td>9. HSE</td>
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<td>.09</td>
<td>.17*</td>
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<td>10. LOC Internal</td>
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<td>-.05</td>
<td>.05</td>
<td>.10</td>
<td>-.04</td>
<td>-.25**</td>
<td>-.12</td>
<td>.39**</td>
<td>-</td>
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<td></td>
</tr>
<tr>
<td>11. LOC HCP</td>
<td>-.05</td>
<td>-.07</td>
<td>.03</td>
<td>.05</td>
<td>-.04</td>
<td>-.00</td>
<td>-.21**</td>
<td>-.02</td>
<td>-.02</td>
<td>.22**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Chance</td>
<td>.05</td>
<td>-.25**</td>
<td>.04</td>
<td>-.08</td>
<td>.11</td>
<td>.10</td>
<td>-.31**</td>
<td>-.21**</td>
<td>-.42**</td>
<td>.04</td>
<td>.23**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>13. Soc. Sup.</td>
<td>-.13</td>
<td>.21**</td>
<td>-.16*</td>
<td>-.04</td>
<td>-.22**</td>
<td>.03</td>
<td>.07</td>
<td>.17*</td>
<td>.1</td>
<td>-.11</td>
<td>.004</td>
<td>-.18*</td>
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Table 6: Results of the Three Multinomial Logistic Regression Analyses Conducted for Demographic, Headache Characteristic and Psychosocial Predictors.

<table>
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<tr>
<td>Severity</td>
<td>7.52</td>
<td>2</td>
<td>.023</td>
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<tr>
<td>Clinical Characteristics (M)</td>
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<td>Frequency (M)</td>
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<td>Severity (M)</td>
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<tr>
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<td>Anxiety Dx</td>
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<td>Depression Dx</td>
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<td>LOC-HCP</td>
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<td>Social Support</td>
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Table 7: Odds Ratios and Test Statistics of all Individual Predictors Included in the Multinomial Logistic Regression Analyses.

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<th>High-disability Nonresponders vs. High-disability Responders</th>
<th>Low-disability Responders vs. High-disability Responders</th>
<th>Low-disability Responders vs. High-disability Nonresponders</th>
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<tr>
<td></td>
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<td>Wald</td>
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<td><strong>Clinical Characteristics (imputed mean)</strong></td>
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<tr>
<td>Frequency</td>
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<td>Severity</td>
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<td>.66</td>
<td>.57</td>
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<td>HSE</td>
<td>.99</td>
<td>.95</td>
<td>.33</td>
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<tr>
<td>LOC-Chance</td>
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<tr>
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<tr>
<td>Social Support</td>
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<td><strong>Demographics</strong></td>
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<td><strong>Clinical Characteristics</strong></td>
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<td>Frequency</td>
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Table 8: Means and Standard Deviations Obtained for all Measures in the Current Study Compared with Previous Studies.

<table>
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<tr>
<th>Measures</th>
<th>Mean</th>
<th>SD</th>
<th>Prior Studies</th>
<th>Sample</th>
<th>M</th>
<th>SD</th>
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<td>51.83</td>
<td>11.8</td>
<td>French et al., 2000</td>
<td>329 Patients seeking treatment for headache disorders</td>
<td>39.42</td>
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<td></td>
<td></td>
<td></td>
<td>Holroyd, Labus, &amp; Carlson, 2009</td>
<td>169 patients seeking treatment with CTTH</td>
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<td>HDI-Outcome</td>
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<td>11.9</td>
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<td>HMSE</td>
<td>92.14</td>
<td>22.9</td>
<td>French et al., 2000</td>
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<td>110.29</td>
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<td>LOC-Internal</td>
<td>33</td>
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<td>Martin, Holroyd, &amp; Penzien, 1990</td>
<td>College student headache sufferers</td>
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<td></td>
<td></td>
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<td>French et al., 2000</td>
<td>329 Patients seeking treatment for headache disorders</td>
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<td>8.00</td>
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<td>LOC-Chance</td>
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<td>College student headache sufferers</td>
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<td>MSPSS</td>
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<td>Zimet, Dahlem, Zimet, &amp; Farley, 1988</td>
<td>275 college students</td>
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Figure 1. Prospective design: participants were assessed at baseline, 1-, 2-, and 6-month follow-up visits that occur during the course of each participant’s care at four collaborating clinic sites.
Figure 2. Average headache disability inventory scores as proposed by the growth curve model and as reported by participants at all four assessment points for the three disability trajectory groups.
Figure 3. Conceptual models of the disablement process and contributions to quality of life outcomes. Adapted from Stuifbergen, Brown, and Phillips (2009) and Verbrugge and Jette (1994).
Figure 4. Model of quality of life, reproduced from Phillips and Stuifbergen (2009).
APPENDIX A: SUPPLEMENTAL TEXT
Disability

The theory of disability has evolved over time from a biomedical model to a biopsychosocial model. In the biomedical model of disability, the disability is a distinct, objective condition (Smart & Smart, 2006). This model separates the medical condition from the person and the environment, and can increase the stigmatization of persons with disabilities by identifying and categorizing them by their disability. The biomedical model also leads to the “try harder” syndrome, in which the responsibility for the degree of “success” in adapting to the disability lies in the individual (Smart & Smart, 2006).

Later models of disability recognized the importance of the environment (both social and physical) and aspects of the individual aside from the disability (Nagi, 1976). These models recognized that individuals fulfill various functions in their environment, and acknowledge that aspects of the environment, including prejudice and stigma, can exacerbate or create disability (Smart & Smart, 2006; Nicholson et al., 2007).

Currently, the most commonly utilized model of disability is the World Health Organization’s International Classification of Functioning, Disability, and Health (ICF; Masala & Petretto, 2008). This model can be summarized as the interaction between the person, the health condition, and the environment (Masala & Petretto, 2008). When this interaction is positive, it is considered functioning, and when it is negative, it is considered disablement (Masala & Petretto, 2008; Andrasik, 2005). This model is consistent with the movement in behavioral medicine towards the biopsychosocial model of illness, which acknowledges the importance of personal and environmental factors (Nicolson, Houle, Rhudy, & Norton, 2007).
Most research has focused on how individual characteristics relate to disability. For example, Phillips and Stuifbergen (2009) used structural equation modeling (SEM) to evaluate predictors of disability in patients with fibromyalgia or multiple sclerosis. The authors used a biosocial model of disability and examined the relationship between age, education, duration of illness, depressive symptoms, social support, economic adequacy, functional limitations, and disability (see Figure 3). The authors found a similar fit for both the participants with Fibromyalgia and Multiple Sclerosis, and that both intra-individual and extra individual factors partially mediated the role of functional limitations on disability. A comprehensive model of disability in headache disorders has not been created.

*Health Related Quality of Life*

Health related quality of life (HRQL) has been examined in many chronic illnesses such as pulmonary arterial hypertension (Shafazand, et al., 2004), human immunodeficiency virus (Swindells et al., 1999) and chronic pain (Blyth et al., 2001; Boardman et al., 2003; Jensen et al., 2007). From these studies, it can be concluded that the more a patient’s illness restricts him/her physically and emotionally, the more likely he/she is to report being dissatisfied with his/her HRQL.

There are a variety of factors that have been related to quality of life in patients with chronic illnesses. For example, research that looked at the quality of life of patients living with HIV found that social support and problem-focused coping were significantly associated with better HRLQ (Swindells et al., 1999). This suggests that in addition to the direct physical and emotional impact of an illness, there are psychosocial factors that may
moderate patients’ perception of their quality of life. Therefore, it is not only important to consider the physical impact that a disease has on the patient’s life, but also thorough consideration should be given to psychosocial factors such as support network and coping strategies in tailoring treatment for a particular patient.

Health-related quality of life may also be affected by socioeconomic factors. In their study that looked at the HRQL in hypertensive patients exposed to a pharmacy intervention, Cote and colleagues (2005) found that compared to those not given the intervention, participants in the treatment group and who had higher socioeconomic status (SES) reported improvement in the HRQL, whereas low SES participants in the treatment group did not report such benefits. The authors concluded that pharmacists’ interventions can have both a negative and a positive impact on the HRQL of individuals treated with antihypertensive medication, depending on income level.

Several attempts have been made to create more comprehensive models of the factors related to quality of life for specific chronic illnesses. In one specific example, Stuifbergen, Brown, and Phillips (2009) examined predictors of quality of life and disability using a comprehensive model of quality of life for people with multiple sclerosis (see figure 4). The conceptual model included contextual factors, resources, barriers, and health promoting behaviors as explanatory variables, while pathology, impairment, functional limitations, and disability represented the disablement process. The model had a significant fit, and barriers, social support, health promoting behaviors, and functional limitations were significant predictors of quality of life.
**Headache and QoL.** Dahlof and Solomon (1998) conceptualized HRQL as representing the net effects of an illness and its therapy on a patient’s perception of his or her ability to have a useful and fulfilling life. The key components of this conceptualization are the patients’ perception of the direct effects of the illness and his/her perception of the effects of the intervention used to remedy the illness. The patients’ perception of his/her quality of life is dependent on the degree to which the two domains restrict his/her ability to function normally. For headache sufferers, the debilitating effects of both the illnesses and therapy are costly.

Studies have reported that headache sufferers have a lower health-related quality of life than individuals with other chronic illnesses such as hypertension and diabetes (Osterhaus, Townsend, Gandek, & Ware, 1994). Most studies that have examined the impact of headache on HRQL have been conducted with clinical populations. These samples tend to consist of patients with more frequent and severe headaches. Few studies have looked at the impact of migraine on HRQL in a community sample (Lipton et al., 2000). One study conducted in the Netherlands showed that subjects with migraine in the community had significantly lower scores on measures of HRQL than matched control groups (Terwindt et al., 2000). Lipton (1998) also reported a negative correlation between headache disability in migraineurs and HRQL. As disability from headache increased, migraineurs reported lower HRQL. These findings reflect the detrimental impact of headaches on an individual’s ability to function as a contributing member of society.
Social Cognitive Theory

Bandura’s social cognitive theory (SCT) built on social learning theory (Miller & Dollard, 1941), and integrated cognitive factors. The theory asserts that social and environmental factors influence individuals through cognitive and psychological mechanisms (Bandura, 1986). The unique contribution of social learning theory to understanding and explaining behavior is the “continuous reciprocal interaction between cognitive, behavioral, and environmental determinants” (Bandura, 1977, p. vii). It was influential in promoting the notion that people are both the products and the producers of their environment (Bandura, 1989).

Among the important personal (or cognitive) factors outlined by Bandura that have been frequently studied in the health literature is self-efficacy (Bandura, 1994; Rosenstock, Strecher, & Becker, 1988; Baranowski et al., 2002). Self-efficacy is defined as an individual’s belief in their ability to take specific actions to accomplish a certain goal (Bandura, 1994; Rosenstock, Strecher, & Becker, 1988).

Perceived self-efficacy has been studied in relation to long-term health behaviors and has been predictive of behaviors and outcomes in chronic illnesses such as asthma, arthritis, chronic obstructive pulmonary disease, and diabetes (Allen, Becker, & Swank, 1991; Bandura, 1977). Research examining the relationship between health-promoting and health-impairing behaviors and self-efficacy beliefs have found a negative relationship between perceived self-efficacy and health-related behaviors such as frequenting bathhouses and bars and engaging and in risky sexual practices, and a positive relationship between perceived self efficacy and condom use in adolescents and
adults (McKusick et al., 1985; DiClemente et al., 1992; Jemmott, Jemmott, & Fong, 1992; Bandura, 1994).
APPENDIX B: STUDY MEASURES
Demographics.

(1) What is your gender?
   - Male
   - Female
   What is your DOB__/__/__ Age___

(2) What ethnic background or race do you consider yourself?
   - White/Non-Hispanic
   - Hispanic/Latino
   - African American/Non-Hispanic
   - African American-Hispanic
   - Asian or Pacific Islander
   - Native American
   - Other__________(Specify)

(3) What is the highest grade or year of school that you have completed?
   - Elementary
   - High School
   - Trade/College
   - Graduate School

(4) What is your current employment status? (Mark all that apply)
   - Working full-time ( 35 or more hours per week)
   - Working part-time ( fewer than 35 hours per week)
   - Unemployed
   - Student (either full or part-time)
   - Social Security Disability
   - Applying for Social Security
   - Other (Please explain:____________________________)

(5) What figure is closest to your current annual income?
   - $0-$20,000
   - $20,001-$40,000
   - $40,001-$60,000
   - $60,001-$80,000
   - $80,001-$100,000
   - Over $100,000

(6) Do you have insurance? (Please select all that apply)
   - HMO
   - PPO
   - Private
   - SSI/SSD
   - Out of pocket
Headache Management Self-Efficacy Scale

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.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Moderately Disagree</th>
<th>Slightly Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Slightly Agree</th>
<th>Moderately Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

(1) I can keep even a bad headache from disrupting my day
   By changing the way I respond to the pain.........................1 2 3 4 5 6 7

(2) When I’m in some situations, nothing I do will
   Prevent headaches.................................................................1 2 3 4 5 6 7

(3) I can reduce the intensity of a headache by relaxing.............1 2 3 4 5 6 7

(4) There are things I can do to reduce headache pain.................1 2 3 4 5 6 7

(5) I can prevent headaches by recognizing headache triggers........1 2 3 4 5 6 7

(6) Once I have a headache, there is nothing I can do to control it...1 2 3 4 5 6 7

(7) When I’m tense, I can prevent headaches by controlling
   my tension.............................................................................1 2 3 4 5 6 7

(8) Nothing I do reduces the pain of a headache.......................1 2 3 4 5 6 7

(9) If I do certain things every day, I can reduce the number of
   headaches I will have...............................................................1 2 3 4 5 6 7

(10) If I can catch a headache before it begins, I can stop it.........1 2 3 4 5 6 7

(11) Nothing I do will keep a mild headache from turning
    into a bad headache...............................................................1 2 3 4 5 6 7

(12) I can prevent headaches by changing how I respond to stress...1 2 3 4 5 6 7

(13) I can do things to control how much my headaches
    interferes with my life..............................................................1 2 3 4 5 6 7

(14) I cannot control the tension that causes my headaches............1 2 3 4 5 6 7

(15) I can do things that will control how long a headache lasts.......1 2 3 4 5 6 7

(16) Nothing I do will keep a bad headache from disrupting my day....1 2 3 4 5 6 7

(17) When I’m not under a lot of stress, I can prevent many headaches...1 2 3 4 5 6 7

(18) When I sense a headache is coming, there is nothing
    I can do to stop it......................................................................1 2 3 4 5 6 7

(19) I can keep a mild headache from disrupting my day by
    changing the way I respond to the pain.....................................1 2 3 4 5 6 7

(20) If I am under a lot of stress, there is nothing I can do to
    prevent headaches......................................................................1 2 3 4 5 6 7

(21) I can do things that make a headache seem not so bad............1 2 3 4 5 6 7
(22) There are things I can do to prevent headaches....................1 2 3 4 5 6 7
(23) If I am upset, there is nothing I can do to control
the pain of a headache..........................................................1 2 3 4 5 6 7
(24) I can control the intensity of headache pain.......................1 2 3 4 5 6 7
(25) I can do things to cope with my headaches.......................1 2 3 4 5 6 7
Headache Specific Locus of Control

The HSLC is a 33 item questionnaire that has responses ranging from 1 (strongly disagree) to 5 (strongly agree). The HSLC consists of 3 subscales: Health Care Professionals Locus of Control, Internal Locus of Control, and Chance Locus of Control.

Note that to create a total I/E score items on either the Internal subscale or on the two External subscales (Health Care Professionals & Chance) need to be reverse scored. In previous reports using this scales items on the Internal subscale have been reverse scored so that higher scores indicate a more external LOC.

1. Scoring the Health Care Professionals subscale: calculate the sum for items 6, 8, 10, 12, 14, 15, 16, 22, 24, 27, 30.

2. Scoring the Internal subscale: calculate the sum for items 2, 4, 5, 7, 11, 17, 19, 21, 26, 28, 32.


Instructions: This is a questionnaire designed to determine the way in which people view certain important headache-related issues. Each item is a belief statement with which you may agree or disagree. Beside each statement are numbers which correspond to a scale on which you may rate the extent to which you agree or disagree with each item. The values range from "Strongly Disagree" = 1 to "Strongly Agree" = 5. Circle the number that represents the extent to which you disagree or agree with the statement. Please make sure that you answer every item and that you circle only one number per item. This is a measure of your personal beliefs; there is no right or wrong answers.

1 = Strongly Disagree
2 = Moderately Disagree
3 = Neutral
4 = Moderately Agree
5 = Strongly Agree

1. When I have a headache, there is nothing I can do to affect its course ........................................................................................................1 2 3 4 5

2. I can prevent some of my headaches by avoiding certain stressful situations ......................................................................................1 2 3 4 5

3. I am completely at the mercy of my headaches .........................................1 2 3 4 5
4. I can prevent some of my headaches by not getting emotionally upset  ............................................................... 1 2 3 4 5
5. If I remember to relax, I can avoid some of my headaches .............. 1 2 3 4 5
6. Only my doctor can give me ways to prevent my headaches ............. 1 2 3 4 5
7. My headaches are sometimes worse because I am overactive ............ 1 2 3 4 5
8. My headaches can be less severe if medical professionals (doctors, nurses, etc.) take proper care of me ......................... 1 2 3 4 5
9. My headaches are beyond all control .............................................. 1 2 3 4 5
10. My doctor's treatment can help my headaches ............................... 1 2 3 4 5
11. When I worry or ruminate about things, I am more likely to get headaches .................................................................. 1 2 3 4 5
12. Just seeing my doctor helps my headaches ...................................... 1 2 3 4 5
13. No matter what I do, if I am going to get a headache, I will get a headache ................................................................ 1 2 3 4 5
14. Having regular contact with my physician is the best way for me to control my headaches ................................................. 1 2 3 4 5
15. When I have headaches, I should consult a medically trained professional ........................................................................ 1 2 3 4 5
16. Following the doctor's medication regimen is the best way for me not to be laid-up with a headache ...................................... 1 2 3 4 5
17. When I drive myself too hard, I get headaches ................................. 1 2 3 4 5
18. Luck plays a big part in determining how soon I will recover from a headache ................................................................. 1 2 3 4 5
19. By not becoming agitated or overactive, I can prevent many headaches ............................................................................. 1 2 3 4 5
20. My not getting headaches is largely a matter of good fortune ............ 1 2 3 4 5
21. My actions influence whether I have headaches ............................. 1 2 3 4 5
22. I usually recover from a headache when I get proper medical help .................................................................................. 1 2 3 4 5
23. I'm likely to get headaches no matter what I do .................................. 1 2 3 4 5
24. If I don't have the right medication, my headaches will be a problem .......................................................... 1 2 3 4 5
25. Often I feel that no matter what I do, I will still have headaches ....... 1 2 3 4 5
26. I am directly responsible for getting some of my headaches .......... 1 2 3 4 5
27. When my doctor makes a mistake, I am the one to suffer with headaches ................................................................. 1 2 3 4 5
28. My headaches are worse when I'm coping with stress ............... 1 2 3 4 5
29. When I get headaches, I just have to let nature run its course ........ 1 2 3 4 5
30. Health professionals keep me from getting headaches ............... 1 2 3 4 5
31. I'm just plain lucky for a month when I don't get headaches .......... 1 2 3 4 5
32. When I have not been taking proper care of myself, I am likely to experience headaches ................................................ 1 2 3 4 5
33. It's a matter of fate whether I have a headache .............................. 1 2 3 4 5
Multidimensional Scale of Perceived Social Support

**Instructions:** Read each statement carefully. Indicate how you feel about each statement by circling the appropriate number using the following scale:

1 = Very strongly disagree
2 = Strongly disagree
3 = Mildly disagree
4 = Neutral
5 = Mildly agree
6 = Strongly agree
7 = Very strongly agree

1. There is a special person who is around when I am in need.
2. There is a special person with whom I can share joys and sorrows.
3. My family really tries to help me.
4. I get the emotional help and support I need from my family.
5. I have a special person who is a real source of comfort to me.
6. My friends really try to help me.
7. I can count on my friends when things go wrong.
8. I can talk about my problems with my family.
9. I have friends with whom I can share my joys and sorrows.
10. There is a special person in my life who cares about my feelings.
11. My family is willing to help me make decisions.
12. I can talk about my problems with my friends.
*Prime MD*

*Instructions*

1. Within each module, proceed sequentially from question to question unless instructed either to skip to another question or to EXIT from the module. Remember: Always proceed to the next question unless you are instructed to go elsewhere.

2. Diagnoses are boxed.

3. EXIT means to exit from the module you are in. Then proceed either to the next module that needs to be evaluated or to the Summary Sheet on the last page.

*INTRODUCTION TO PATIENT:*

Now, I’ll be asking you some questions to help me understand any other symptoms you might be having. I’ll be making some notes as we go along.

*PSYCHIATRIC HISTORY:*

A. Have you ever seen your doctor about difficulty with nerves, tensions, or depression?
   - □ If yes, what, when, how long, treatment?
     __________________________
     __________________________
   - □ No

B. Do you currently have any difficulties with nerves, tension, or depression?
   - □ Yes, what? ________________ (ask below questions 1, 2, and 3)
   - □ No

If participant responded yes to question B, query for the following:

1. Has your doctor ever prescribed you tablets for this difficulty?
   - □ Yes, what __________________  □ No

If answer yes to question 1, ask following question. If not, go to question 3.

2. Are you still currently taking medication for this problem?
   - □ Yes, what ____________________  □ No

3. Are you currently seeing a counselor/therapist for this difficulty?
   - □ Yes  □ No
For the last 2 weeks, have you had any of the following problems nearly every day?

1. Trouble falling or staying asleep, or sleeping too much?   Yes  No
2. Feeling tired or having little energy?    Yes  No
3. Poor appetite or overeating?     Yes  No
4. Little interest or pleasure in doing things?    Yes  No
5. Feeling down, depressed, or hopeless?    Yes  No
6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down?    Yes  No
7. Trouble concentrating on things, such as reading the newspaper or watching television?    Yes  No
8. Being so fidgety or restless that you were moving around a lot more than usual?   
   \textit{If no}: What about the opposite – moving or speaking so slowly that other people could have noticed?   
   \textit{Count as Yes if Yes to either question, or if psychomotor agitation or retardation observed during the interview.} Yes  No
9. In the last 2 weeks, have you had thoughts that you would be better off dead or of hurting yourself in some way? \textit{If yes}: Tell me about it.    Yes  No
10. Are answers to five or more of #1 to #9 Yes (one of which is #4 or #5)?    Yes-  No

MOOD MODULE cont.

11. Have you ever had a time when you were either much more down or depressed, or had even less interest or pleasure in doing things?   
    \textit{If yes}: At that time, did you have many of the problems that I just asked you about, like trouble sleeping, concentrating, feeling tired, poor appetite, little interest in things?    Yes-  No
    \textit{Count as Yes only if, in the past, patient probably had Five of symptoms #1 to #9 and acknowledges some Current depressed mood or little interest or pleasure.}

12. Over the last 2 years, have you often felt down or depressed, or had little interest or pleasure in doing things?   
    \textit{Count Yes only if Yes to}: Was that on more than half the days over the last 2 years?    Yes  No-

13. In the last 2 years, has that often made it hard for you to do your work, take care of things at home, or get along with other people?    Yes-  No

14. \textit{Was major depression (including partial remission) Diagnosed at #10 or #11?}    Yes-  No

15. \textit{Are answers to two or more of #1 to #9 Yes (one of}
16. Did a doctor ever say you were manic-depressive or give you Lithium or Depakote?  
*If yes:* When was that? Do you know why?  
Yes-  No-

17. Are current depressed symptoms probably due to the biological effects of a physical disorder, medication, or other drug? 
Yes-  No-

---

**ANXIETY MODULE**

18. During the PAST MONTH have you had an anxiety attack (suddenly feeling fear or panic)?  
Yes  No-

19. You indicated that you had an anxiety attack this month. Has this ever happened before?  
Yes-  No-

20. Does the attack sometimes come suddenly out of the blue?  
*If unclear:* In situations where you don’t expect to be nervous or uncomfortable?  
Yes-  No-

21. Have you worried a lot about having another attack or worried that there was something wrong with you?  
*Count as Yes if ever present.*  
Yes-  No-

Think about your last really bad attack.

Go to #33 as soon as you have checked four symptoms that occurred during the patient’s last bad attack.

22. *Were you short of breath?*  
23. *Did your heart race, flashes or chills?*  
24. *Did you have chest pain or pressure?*  
25. *Did you sweat?*

26. *Did you feel as if you were choking?*  
27. *Did you have hot flashes or chills?*  
28. *Did you have nausea, or an upset stomach, or the feeling that you were going to have diarrhea?*  
29. *Did you feel dizzy, unsteady, or faint?*  
30. *Did you pound, or skip?*  
31. *Did you tremble or shake?*  
32. *Were you afraid you were dying?*

33. *Are four or more of #22 to #32 checked?*  
Yes-  No-
ANXIETY MODULE cont.

34a. Have you felt nervous, anxious, or on edge on more than half the days in the last month?  
Yes  No

34b. Have you been worrying about a lot of different things on more than half the days in the last month?  
Yes-  No-

In the last month, have you often been bothered by any of these problems?

35. † Feeling restless so that it is hard to sit still?  
37. † Muscle tension, aches, or soreness?  
39. † Trouble concentrating on things, such as reading or watching TV?

36. † Getting tired very easily?  
38. † Trouble falling asleep or staying asleep?  
40. † Becoming easily annoyed or irritated?

41. Are three or more of #35 to #40 checked?  
Yes  No-

42. In the last month, have these problems made it hard for you to do your work, take care of things at home, or get along with other people?

43. In the last 6 months, have you been worrying a great deal about different things? Count as Yes only if also Yes to: Has this been on more than half the days in the last 6 months?  
Yes  No-

44. When you are worrying this way, do you find that you can’t stop?  
Yes-  No-

45. Has Panic Disorder or Anxiety Disorder NOS been Diagnosed?  
Yes  No-

46. Are current anxiety symptoms probably due to biological effects of a physical disorder, medication, or other drug?  
Yes-  No-

[Alcohol Module]

47. Do you drink alcohol?  
Yes  No-

During the PAST MONTH…

48. Have you thought you should cut down on your drinking of alcohol?  
Yes  No

49. Has anyone complained about your drinking?  
Yes  No

50. Have you felt guilty or upset about your drinking?  
Yes  No

51. Was there ever a single day in which you had more drinks of beer, wine or liquor?  
Yes  No

52. Has a doctor ever suggested that you stop drinking
because of a problem with your health? Yes No

**Count as Yes if has continued to drink in the last 6 months after doctor suggested stopping.**

Have any of the following happened to you more than one time in the last 6 months?

53. Were you drinking, high from alcohol, or hung over while you were working, going to school, or taking care of other responsibilities? Yes No

54. What about missing or being late for work, school, or other responsibilities because you were drinking or hung over? Yes No

55. What about having a problem getting along with other people while you were drinking? Yes No

56. What about driving a car after having several drinks or after drinking too much? Yes No

57. *Is at least one of #48 to #52 Yes- OR- do responses for questions #53 to #56 indicate patient has probably had a significant problem with alcohol within the past 6 months?* Yes No

**Eating Disorder Module**

58. During the PAST MONTH, have you been bothered by your eating being out of control? Yes No

59. Did you often eat, within any 2-hour period, what most people would regard as an unusually large amount of food? Yes No

60. When you eat this way, do you often feel that you can’t control what or how much you eat? Yes No

61. Has this been as often, on average, as twice a week for the last 3 months? Yes No

62. Do you often make yourself vomit, or take more than twice the recommended dosage of laxatives, to avoid gaining weight after eating this way? Yes No

63. Has this been as often, on average, as twice a week for the last 3 months? Yes No

64. Do you often fast- no eat anything at all for at least 24 hours- or exercise for more than an hour specifically in order to avoid gaining weight after eating this way? Yes No

65. Has this been as often, on average, as twice a week for the last 3 months? Yes No

**Summary Sheet**

**Patient ID#**

**Summary Diagnosis**
Check all the diagnoses made in the modules.

- No diagnosis made in any modules

**Mood**

- Major Depressive Disorder (296.20)
- Partial Remission of Major Depressive Disorder (296.25)
- Dysthymia (300.4)
- Minor Depressive Disorder (311)
- R/O Bipolar Disorder (if confirmed: 296.50)
- R/O Depressive Disorder Due to Physical Disorder, Medication, or Other Drug
  - (If confirmed and due to physical disorder: 293.83)
  - (If confirmed and due to medication or other drug: 295.84)

**Anxiety**

- Panic Disorder (300.01)
- Generalized Anxiety Disorder (300.02)
- Anxiety Disorder NOS (300.00)
- R/O Anxiety Disorder Due to Physical Disorder, Medication, or Other Drug
  - (If confirmed and due to physical disorder: 293.89)
  - (If confirmed and due to medication or other drug: 292.89)

**Alcohol**

- Probable Alcohol Abuse/Dependence
  - (If confirmed Alcohol Abuse: 305.00)
  - (If confirmed Alcohol Dependence: 303.9)

**Eating Disorder**

- Binge Eating Disorder (307.50)
- Bulimia Nervosa, Purging Type (307.51)
- Bulimia Nervosa, Nonpurging Type (307.51)
Project Insight: Headache Diary

Day 1  (mo/dy/yr)

<table>
<thead>
<tr>
<th>Headache severity is: (Check one □)</th>
<th>Ability to perform activities: (Check one □)</th>
<th>Associated symptoms: (Check all that apply □)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No headache............................</td>
<td>Normal.........................................</td>
<td>Sensitivity to light................................</td>
</tr>
<tr>
<td>Mild pain..................□</td>
<td>Mildly impaired................................</td>
<td>Sensitivity to sound................................</td>
</tr>
<tr>
<td>Moderate pain..............□</td>
<td>Severely impaired.............................</td>
<td>Nausea...............................................</td>
</tr>
<tr>
<td>Severe pain.................□</td>
<td>Unable to do activities, requires bed rest...</td>
<td>Vomiting.............................................</td>
</tr>
</tbody>
</table>

Did you take your preventive medication today?  □ yes □ no □ not part of my TX regimen

Day 2  (mo/dy/yr)

<table>
<thead>
<tr>
<th>Headache severity is: (Check one □)</th>
<th>Ability to perform activities: (Check one □)</th>
<th>Associated symptoms: (Check all that apply □)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No headache............................</td>
<td>Normal.........................................</td>
<td>Sensitivity to light................................</td>
</tr>
<tr>
<td>Mild pain..................□</td>
<td>Mildly impaired................................</td>
<td>Sensitivity to sound................................</td>
</tr>
<tr>
<td>Moderate pain..............□</td>
<td>Severely impaired.............................</td>
<td>Nausea...............................................</td>
</tr>
<tr>
<td>Severe pain.................□</td>
<td>Unable to do activities, requires bed rest...</td>
<td>Vomiting.............................................</td>
</tr>
</tbody>
</table>

Did you take your preventive medication today?  □ yes □ no □ not part of my TX regimen

Day 3  (mo/dy/yr)

<table>
<thead>
<tr>
<th>Headache severity is: (Check one □)</th>
<th>Ability to perform activities: (Check one □)</th>
<th>Associated symptoms: (Check all that apply □)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No headache............................</td>
<td>Normal.........................................</td>
<td>Sensitivity to light................................</td>
</tr>
<tr>
<td>Mild pain..................□</td>
<td>Mildly impaired................................</td>
<td>Sensitivity to sound................................</td>
</tr>
<tr>
<td>Moderate pain..............□</td>
<td>Severely impaired.............................</td>
<td>Nausea...............................................</td>
</tr>
<tr>
<td>Severe pain.................□</td>
<td>Unable to do activities, requires bed rest...</td>
<td>Vomiting.............................................</td>
</tr>
</tbody>
</table>

Did you take your preventive medication today?  □ yes □ no □ not part of my TX regimen

Day 4  (mo/dy/yr)

<table>
<thead>
<tr>
<th>Headache severity is: (Check one □)</th>
<th>Ability to perform activities: (Check one □)</th>
<th>Associated symptoms: (Check all that apply □)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No headache............................</td>
<td>Normal.........................................</td>
<td>Sensitivity to light................................</td>
</tr>
<tr>
<td>Mild pain..................□</td>
<td>Mildly impaired................................</td>
<td>Sensitivity to sound................................</td>
</tr>
<tr>
<td>Moderate pain..............□</td>
<td>Severely impaired.............................</td>
<td>Nausea...............................................</td>
</tr>
<tr>
<td>Severe pain.................□</td>
<td>Unable to do activities, requires bed rest...</td>
<td>Vomiting.............................................</td>
</tr>
</tbody>
</table>

Did you take your preventive medication today?  □ yes □ no □ not part of my TX regimen
Modified Migraine Specific Quality of Life

The purpose of this scale is to identify difficulties that you may be experiencing because of your headaches. Please circle **yes**, **sometimes**, or **no** to each item. Answer each item as it pertains to your headache only.

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
<th>No</th>
<th>Sometimes</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Because of my headaches, I feel handicapped</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>2.</td>
<td>Because of my headaches, I feel restricted in performing my routine daily activities</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>3.</td>
<td>No one understands the effect that my headaches have on my life</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>4.</td>
<td>I restrict my recreational activities (e.g., sports, hobbies) because of my headaches</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>5.</td>
<td>My headaches make me angry</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>6.</td>
<td>Sometimes I feel that I am going to lose control because of my headaches</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>7.</td>
<td>Because of my headaches, I am less likely to socialize</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>8.</td>
<td>My spouse (significant other), or family and friends, have no idea what I am going through because of my headaches</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>9.</td>
<td>My headaches are so bad that I feel I am going to go insane</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>10.</td>
<td>My outlook on the world is affected by my headaches</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>11.</td>
<td>I am afraid to go outside when I feel that a headache is starting</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>12.</td>
<td>I feel desperate because of my headaches</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>13.</td>
<td>I am concerned that I am paying penalties at work or at home because of my headaches</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>14.</td>
<td>My headaches place stress on my relationships with family or friends</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>15.</td>
<td>I avoid being around people when I have a headache</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td>16.</td>
<td>I believe my headaches are making it difficult</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. I am unable to think clearly because of my headaches.</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>18. I get tense (e.g. muscle tension) because of my headaches.</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>19. I do not enjoy social gatherings because of my headaches.</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>20. I feel irritable because of my headaches.</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>21. I avoid traveling because of my headaches.</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>22. My headaches make me feel confused.</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>23. My headaches make me feel frustrated.</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>24. I find it difficult to read because of my headaches.</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>25. I find it difficult to focus my attention away from my headaches and on other things.</td>
<td>No</td>
<td>Sometimes</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
Headache Disability Inventory

Instructions: The purpose of this scale is to identify difficulties you may be experiencing because of your headaches. Please circle yes, sometimes, or not to each item. Answer each item as it pertains to your headache only.

(1) Because of my headaches, I feel handicapped……..No Sometimes Yes
(2) Because of my headaches, I feel restricted in 
   Performing my routine daily activities...................... No Sometimes Yes
(3) No one understands the effect that my headaches 
   have on my life.............................................. No Sometimes Yes
(4) I restrict my recreational activities (e.g., sports, hobbies) 
   Because of my headaches................................. No Sometimes Yes
(5) My headaches make me angry..............................No Sometimes Yes
(6) Sometimes I feel that I am going to lose control 
   Because of my headaches................................. No Sometimes Yes
(7) Because of my headaches, I am 
   less Likely to socialize............................................... No Sometimes Yes
(8) My spouse (significant other), or family and friends, have 
   No idea what I am going through because 
   of my headaches........................................... No Sometimes Yes
9. My headaches are so bad that I feel am going 
   to go insane......................................................No Sometimes Yes
10. My outlook on the world is 
    affected by my headaches.....................................No Sometimes Yes
(11) I am afraid to go outside when I feel that a headache 
    Is starting......................................................... No Sometimes Yes
(12) I feel desperate because of my headaches............No Sometimes Yes
(13) I am concerned that I am paying penalties at work 
    Or at home because of my headaches.......................... No Sometimes Yes
(14) My headaches place stress on my relationship with 
    Family or friends.................................................. No Sometimes Yes
(15) I avoid being around people when I 
    have a headache.................................................. No Sometimes Yes
(16) I believe my headaches are making it difficult 
    For me to achieve my goals in life............................. No Sometimes Yes
(17) I am unable to think clearly because of 
    Headaches.......................................................... No Sometimes Yes
(18) I get tense (e.g. muscle tension) because of 
    My headaches...................................................... No Sometimes Yes
(19) I do no enjoy social gathering because of my 
    Headaches.......................................................... No Sometimes Yes
(20) I feel irritable because of my headaches............ No Sometimes Yes
(21) I avoid traveling because of my headaches........ No Sometimes Yes
(22) My headaches make me feel confused............... No Sometimes Yes
(23) My headaches make me feel frustrated............. No Sometimes Yes
(24) I find it difficult to read because 
    of my headaches.................................................. No Sometimes Yes
(25) I find it difficult to focus my attention away 
    From my headaches and on other things.................. No Sometimes Yes
APPENDIX C: SUPPLEMENTAL ANALYSES
Table C-1. Levels of the HSQ and All Potential Demographic, Headache Characteristic, and Psychosocial Predictors.

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th></th>
<th></th>
<th></th>
<th>Group 2</th>
<th></th>
<th></th>
<th></th>
<th>Group 3</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>N</td>
<td>M</td>
<td>SD</td>
<td>N</td>
<td>M</td>
<td>SD</td>
<td>N</td>
<td>M</td>
<td>SD</td>
<td>N</td>
</tr>
<tr>
<td>Base HSQ</td>
<td>46.32</td>
<td>15.06</td>
<td>214</td>
<td>38.45</td>
<td>10.47</td>
<td>138</td>
<td>55.95</td>
<td>10.76</td>
<td>43</td>
<td>66.7</td>
<td>8.27</td>
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<td>1 MFU</td>
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<td>185</td>
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<tr>
<td>Severity</td>
<td>1.68</td>
<td>.39</td>
<td>180</td>
<td>1.6</td>
<td>.36</td>
<td>118</td>
<td>1.9</td>
<td>.42</td>
<td>37</td>
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<td>.27</td>
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<td>20.65</td>
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<tr>
<td>Severity (M)</td>
<td>1.68</td>
<td>.35</td>
<td>221</td>
<td>1.61</td>
<td>1.12</td>
<td>140</td>
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<td>.38</td>
<td>47</td>
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<td>11.9</td>
<td>43</td>
<td>35.03</td>
<td>6.7</td>
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<tr>
<td>LOC Chance</td>
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Table C-2. Results of LCGA: Model Fit Indices and Descriptions for all Headache Specific Quality of Life Trajectory Groups.

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Table C-3: Results of Multinomial Logistic Regressions Predicting HSQ Responder Group Membership

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Table C-4. Results of Multinomial Logistic Regressions: Unique Predictors

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Figure C-1. Actual and proposed mean values of quality of life at baseline, 1 month follow-up, 2 month follow-up, and 6 month follow-up.