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Clinical Pain Catastrophizing in Women with Migraine and Obesity

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Abstract

Objective/Background—Obesity is related to migraine. Maladaptive pain coping strategies (e.g., pain catastrophizing), may provide insight into this relationship. In women with migraine and obesity, we cross-sectionally assessed: 1) prevalence of clinical catastrophizing; 2) characteristics of those with and without clinical catastrophizing; and 3) associations of catastrophizing with headache features.

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STATEMENT OF AUTHORSHIP

All authors contributed to conception and design of the study.

DSB, RBL, JGT, LR, JR, and RRW assisted in acquisition of data.

DSB, DCB, RBL, and JGT contributed to analysis and interpretation of the data.

DSB and DCB drafted the manuscript.

All authors contributed to revising the manuscript for intellectual content and provided final approval of the completed manuscript.

Conflicts of Interest

Dale S. Bond, PhD – received travel support from The American Headache Society.

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Richard B. Lipton, MD – received research support from the NIH [PO1 AG03949 (Program Director), PO1AG027734 (Project Leader), RO1AG025119 (Investigator), RO1AG022374-06A2 (Investigator), RO1AG034119 (Investigator), RO1AG12101 (Investigator), the National Headache Foundation, and the Migraine Research Fund; serves on the editorial board of Neurology and as senior advisor to Headache, has reviewed for the NIA and NINDS, holds stock options in eNeura Therapeutics; serves as consultant, advisory board member, or has received honoraria from: Allergan, American Headache Society, Autonomic Technologies, Boston Scientific, Colucid, Eli Lilly, Endo, eNeura Therapeutics, Novartis, and Teva.

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Methods—Obese women migraineurs seeking weight loss treatment (n=105) recorded daily migraine activity for 1-month via smartphone and completed the Pain Catastrophizing Scale (PCS). Clinical catastrophizing was defined as total PCS score ≥ 30 . The Headache Impact Test (HIT-6), Allodynia Symptom Checklist (ASC-12), Headache Management Self-Efficacy Scale (HMSE), and assessments for depression (CES-D) and anxiety (GAD-7) were also administered. Using PCS scores and Body Mass Index (BMI) as predictors in linear regression, we modeled a series of headache features (i.e., headache days, HIT-6, etc.) as outcomes.

Results—One-quarter (25.7%; 95% CI=17.2%–34.1%) of participants met criteria for clinical catastrophizing: they had higher BMI (37.9 ± 7.5 vs. 34.4 ± 5.7 kg/m², $p=0.035$), longer migraine attack duration (160.8 ± 145.0 vs. 97.5 ± 75.2 hours/month, $p=0.038$), higher HIT-6 scores (68.7 ± 4.6 vs. 64.5 ± 3.9 , $p<0.001$), more allodynia (7.0 ± 4.1 vs. 4.5 ± 3.5 , $p<0.003$), depression (25.4 ± 12.4 vs. 13.3 ± 9.2 , $p<0.001$), and anxiety (11.0 ± 5.2 vs. 5.6 ± 4.1 , $p<0.001$), and lower self-efficacy (80.1 ± 25.6 vs. 104.7 ± 18.9 , $p<0.001$) compared to participants without clinical catastrophizing. The odds of chronic migraine were nearly 4-fold greater in those with (n=8/29.6%) versus without (n=8/10.3%) clinical catastrophizing (OR=3.68; 95% CI=1.22–11.10, $p=0.021$). In all participants, higher PCS scores were related to more migraine days ($\beta=0.331$, $p=0.001$), longer attack duration ($\beta=0.390$, $p<0.001$), higher HIT-6 scores ($\beta=0.425$, $p<0.001$), and lower HMSE scores ($\beta=-0.437$, $p<0.001$). Higher BMI, but not higher PCS scores, was related to more frequent attacks ($\beta=-0.203$, $p=0.044$).

Conclusions—One-quarter of participants with migraine and obesity reported clinical catastrophizing. These individuals had more frequent attacks/chronicity, longer attack duration, higher pain sensitivity, greater headache impact, and lower headache management self-efficacy. In all participants, PCS scores were related to several migraine characteristics, above and beyond the effects of obesity. Prospective studies are needed to determine sequence and mechanisms of relationships between catastrophizing, obesity, and migraine.

Keywords

migraine; obesity; pain catastrophizing; allodynia; women; smartphone

INTRODUCTION

An ever expanding body of evidence supports a comorbid relationship between obesity and migraine.¹ Research demonstrating that obesity increases the risk for both having migraine (particularly in those of reproductive age)^{2–8} and experiencing more frequent and severe attacks^{9–14} has prompted growing interest in factors to help elucidate this relationship.^{15–18} Along with theories regarding common physiologic processes (e.g., inflammation)^{15–18} and overlapping risk behaviors (e.g., low physical activity)^{16, 19}, it is hypothesized that shared psychological factors may be important in the connection between obesity and migraine.^{16, 20} Specifically, higher levels of pain catastrophizing have been associated with both obesity and increased pain in persons with osteoarthritis pain.²¹ Catastrophizing may also play an important role in the migraine obesity relationship.

Pain catastrophizing is a negative cognitive and affective set activated in response to anticipated or actual pain.^{22–24} Individuals who catastrophize experience difficulty

inhibiting thoughts about their pain (rumination), exaggerate and worry about the negative consequences of pain (magnification), and believe there is nothing they can do to alleviate the pain (helplessness).²⁵ Across a variety of pain and other chronic medical disorders, catastrophizing is consistently associated with increased pain experience and reporting, associated disability and impaired health-related quality of life, increased pain behavior, greater use of healthcare services, and longer hospital stays.^{26–31} Among individuals with migraine, catastrophizing is associated with more frequent migraine attacks/chronicity, poorer treatment response, increased medical consultation, impaired functioning and reduced health-related quality of life.^{32–35}

While pain catastrophizing appears to be adversely associated with severity, impairment, and treatment outcomes in migraine and obesity, catastrophizing has not been examined in individuals with both obesity and migraine. Thus, the current study aimed to conduct exploratory analysis of the relationship of catastrophizing with obesity and migraine in women with both conditions. Specifically, we sought to: 1) identify the percentage of participants who have clinically relevant levels of catastrophizing; 2) compare demographic (age, race/ethnicity, education level), anthropometric (body mass index [BMI]), migraine (attack frequency, duration, and pain severity, headache impact, cutaneous allodynia, headache management self-efficacy) and psychological (depression, anxiety) characteristics in participants with and without clinical levels of catastrophizing; and 3) evaluate associations of catastrophizing with migraine characteristics in all participants, controlling for the effects of weight status.

METHODS

Participants and procedures

This cross-sectional study included 105 women, aged 18–50 years old, who were overweight or obese (BMI ≥ 25 kg/m²), had a neurologist-confirmed diagnosis of migraine with or without aura according to International Classification for Headache Disorders third edition beta (ICHD-III-beta) criteria³⁶, and were seeking behavioral treatment to lose weight and reduce their migraine attacks as part of the Women's Health and Migraine (WHAM) trial.³⁷ Participants were recruited between November 2012 and December 2014 from local neurological medicine clinics via physician referral and the community via Internet sites, social media outlets, and direct mailings. Individuals who expressed interest in participating were asked to contact the research center by calling a provided telephone number or visiting a Web site. Of 499 women who called, 269 were declared ineligible after telephone screening. The most common reasons for ineligibility included not meeting study criteria for migraine (n=82) or weight status (n=62), and unwillingness to commit to research protocol (n=62). Individuals deemed initially eligible after telephone screening (n=230) were invited to a study orientation. Of these 230, 123 attended the study orientation and provided informed consent, had their height and weight measured, and completed questionnaires assessing pain catastrophizing and other psychological, migraine, and demographic characteristics. At this same visit, participants were evaluated by the study neurologist to confirm migraine diagnosis and then provided with a smartphone-based headache diary to complete for the next 28 consecutive days. A total of 105 participants who completed all

baseline measures including the smartphone-based headache diary were analyzed. All measures were completed prior to randomization and initiation of treatment. The study protocol was approved by the Rhode Island Hospital Institutional Review Board, Providence, RI, USA. All authors had full access to study data throughout data collection, analysis, and manuscript preparation. The primary author (DSB) assumes full responsibility for the integrity of the data.

Measures

Pain catastrophizing—The Pain Catastrophizing Scale (PCS) was used to assess catastrophic thinking related to pain.²⁵ This measure asks participants to recall past pain experiences and to indicate the extent to which they experienced each of 13 thoughts or feelings when experiencing pain, on 5-point scales ranging from (0) *not at all* to (4) *all the time*. The PCS produces a total score (range: 0–52) and three subscale scores assessing rumination (e.g., “I can’t seem to get it out of my mind”), magnification (e.g., “It’s awful and I feel that it overwhelms me”) and helplessness (“There’s nothing I can do to reduce the intensity of the pain”). A total score of 30 is the validated cut score for clinically significant levels of catastrophizing.²⁵ The PCS has demonstrated good reliability and construct validity²⁵ and has previously been used to assess pain catastrophizing in samples with migraine.^{32, 38} Reliability in the present sample was high (Cronbach’s alpha = 0.891).

Migraine characteristics

Daily migraine activity monitoring: Participants reported their migraine activity at the end of each day for 28 consecutive days using a smartphone configured with a Web-based headache diary application.³⁷ Participants’ ratings of migraine attack occurrence (yes/no), maximum headache pain severity [0 (*no pain*) to 10 (*pain as bad as you can imagine*)], and duration (hours) were automatically transmitted to the research team, who checked the data and followed up with participants in the event that any responses were missing or unclear. By using an electronic diary, participants’ migraine headache activity was time stamped and recorded each day and in real time. This maximized compliance with the assessment protocol and decreased the potential for bias associated with traditional means of data collection such as paper-and-pencil diaries, which are often completed retrospectively.^{37, 39} Participant data were summarized as monthly migraine attack frequency, average maximum pain severity, and total monthly attack duration.

Headache impact: The 6-item Headache Impact Test-6 (HIT-6) is a validated self-administered questionnaire that measures headache impact on “usually daily activities” including work, school, or social activities, pain severity, fatigue and desire to lie down, frustration, and difficulty with concentration.⁴⁰ Higher HIT-6 scores indicate greater impact on normal everyday life and ability to function, with scores 49, 50–55, 56–59, and 60 indicating little to no impact, some impact, substantial impact, and very severe impact, respectively. The HIT-6 is shown to discriminate between different levels of migraine severity and to have good internal and temporal consistency.^{40, 41}

Cutaneous allodynia: The 12 item Allodynia Symptom Checklist (ASC-12) is a validated self-administered questionnaire designed to measure presence and severity of cutaneous

allodynia symptoms during migraine attacks.⁴² Scores of 0–2, 3–5, 6–8, and 9 indicate none, mild, moderate, and severe allodynia. Previous research has shown that higher scores on the ASC-12 are associated with higher migraine attack frequency and BMI in individuals with migraine.⁴³

Headache management self-efficacy: The Headache Management Self-Efficacy Scale (HMSE) is a self-administered questionnaire containing 25 items that assess level of confidence in ability to manage headache pain and prevent headache episodes.⁴⁴ Higher HMSE scores are associated with greater use of positive psychological coping strategies to prevent and to manage headaches. The HMSE has high internal consistency and construct validity as evidenced by negative associations with measures of headache severity and disability.⁴⁴

Psychological characteristics

Depression: The Center for Epidemiologic Studies-Depression Scale (CES-D) assesses frequency of depressive mood and symptoms during the past week.⁴⁵ Higher CES-D scores indicate greater symptomatology and a cut-off score of 16 indicates clinically significant symptoms of depression. The CES-D has excellent internal consistency, test-retest reliability, and correlated well with other depression measures.⁴⁵

Anxiety: The 7 item Generalized Anxiety Disorder Scale (GAD-7) assesses severity of anxiety symptoms over the past 2 weeks.⁴⁶ Higher GAD-7 scores indicate greater anxiety symptomatology with scores of 5, 10, and 15 taken as thresholds for mild, moderate, and severe anxiety. The GAD-7 is shown to be a reliable and valid measure of anxiety in primary care settings and the general population^{46, 47}, and has previously been used in studies involving migraine patients with obesity.²⁰

Anthropometric characteristics—Height was measured in millimeters using a wall-mounted Harpenden stadiometer. Weight was measured in light street clothing, without shoes, and to the nearest 0.1 kg using a calibrated digital scale (Tanita BWB 800). BMI was calculated from these measures using the formula: $BMI (kg/m^2) = weight (kg)/(height (m))^2$.

Demographic characteristics—Age, race, ethnicity, and level of education were assessed via questionnaire.

Statistical analysis

Descriptive statistics (mean and SD) were calculated for all continuous variables. Categorical variables were represented using counts and proportions (%). *T*-test and chi-square were used to compare demographic, anthropometric, migraine, and psychological characteristics between participants with and without clinical levels of pain catastrophizing. Bivariate logistic regression was used to compare the odds of having chronic migraine in participants with and without clinical levels of catastrophizing. Linear regression models were initially conducted to examine PCS total scores, BMI, and their interaction as predictors of migraine characteristics [i.e. number of migraine attacks and days, total attack duration, and average maximum pain severity, headache impact (HIT-6 scores), cutaneous

allodynia (ASC-12 scores), and headache management self-efficacy (HMSE scores)] in all participants. Given that the models including the interaction term were a uniformly poor fit as evidenced by non-significant interaction terms and non-significant improvements in the model fit, we report the regression models with only PCS total score and BMI as predictors. All analyses were performed using SPSS statistics for Windows (version 20.0; IBM Corp, Armonk NY). Given that this study involved exploratory analysis intended to be hypothesis generating, tolerance for Type I error was set at $\alpha < 0.05$ for all analyses. This was a secondary analysis of baseline data collected as part of an ongoing randomized controlled trial. For the randomized controlled trial, a sample size of 140 was selected to provide adequate power to compare changes in monthly migraine frequency across behavioral weight loss intervention and migraine education control arms.³⁷

RESULTS

Characteristics of participants overall and by level of pain catastrophizing

Table 1 shows demographic, anthropometric, migraine, and psychological characteristics of participants ($n=105$) overall and by level of pain catastrophizing. On average, participants were 38 years of age and severely obese. Approximately one-quarter (23.9%) of participants identified as non-White and 17% were Hispanic. The majority (58%) of participants had at least a 4-year college degree. On average, participants reported having 6 migraine attacks over 11 days with moderate pain intensity. Additionally, participants on average reported HIT-6 scores indicating very severe headache-related impact on normal daily life and ability to function, experiencing mild cutaneous allodynia, low headache management self-efficacy, clinically relevant symptoms of depression, and mild anxiety.

One-quarter (25.7%; 95% CI=17.2%–34.1%) of participants reported clinical levels of pain catastrophizing.²⁵ Compared to individuals without clinical levels of catastrophizing, these individuals on average had higher BMI, longer total migraine attack duration, greater headache-related impact, higher levels of cutaneous allodynia, lower headache management self-efficacy, and greater depression and anxiety symptomology. Additionally, the odds of having chronic migraine was nearly 4-fold greater in participants with clinical levels of catastrophizing compared to participants without clinical levels of catastrophizing (OR=3.68; 95% CI=1.22–11.10, $p=0.02$).

Associations of pain catastrophizing with migraine characteristics

Table 2 presents results of linear regression models conducted in all participants predicting migraine characteristics from PCS total scores, controlling for BMI. Higher PCS total scores were independently associated with more migraine days ($\beta=0.331$, $p=0.001$), longer attack duration ($\beta=0.390$, $p<0.001$), higher HIT-6 scores ($\beta=0.425$, $p<0.001$), and lower HMSE scores ($\beta=-0.437$, $p<0.001$). Higher BMI, but not higher PCS scores, was related to more frequent attacks ($\beta=-0.203$, $p=0.044$).

DISCUSSION

Despite growing evidence to support a link between obesity and migraine¹, efforts to directly study factors that might help to explain this link have been few. The present

investigation is the first to examine whether a clinically significant level of pain catastrophizing is associated with features of the migraine attack, obesity severity, and psychological symptoms in women with obesity. To assess pain catastrophizing we used the PCS and applied a previously validated cut-off score of 30 to define clinically significant pain catastrophizing.²⁵

An important and novel aim of this study was to identify the proportion of obese women with migraine that had clinically significant levels of pain catastrophizing. We found that one-quarter of our sample engaged in clinical catastrophizing: these participants had attacks that lasted longer and occurred on more days compared to those who did not have clinical levels of catastrophizing. Additionally, there was a 4-fold increase in the relative odds of chronic migraine among participants with clinical levels of catastrophizing. Thus, it is possible that pain catastrophizing may be an exacerbating factor for both migraine and obesity, or conversely in persons with more severe migraine and obesity, they may be more likely to catastrophize.

Though clinical catastrophizing was associated with more frequent and impactful headaches, more cutaneous allodynia, higher BMI, lower levels of self-efficacy for headache management as well as more depression and anxiety, the mechanisms linking these characteristics are uncertain. In patients with other pain disorders, the relationship of catastrophizing to pain-related outcomes is mediated by pain management self-efficacy.^{48, 49} Thus, clinical catastrophizing in individuals with migraine and obesity might lead to increases in attack frequency and obesity severity via lower self-efficacy related to both effective headache and weight management.

Cutaneous allodynia is a clinical marker of sensitization in central trigeminovascular neurons^{50, 51}, a process that figures prominently in theories of migraine progression and related resistance to treatment.^{43, 51–54} Cutaneous allodynia is more common in migraineurs with obesity⁴³, and the relationship of cutaneous allodynia with pain symptoms is influenced by pain catastrophizing in adults with chronic non-migraine pain.⁵⁵ Thus, higher degree of obesity and attack frequency might contribute to clinical levels of catastrophizing via development of cutaneous allodynia. Finally, given that catastrophizing is associated with greater depression and anxiety²⁴, depression and anxiety are risk factors for chronic migraine and allodynia^{13, 56, 57}, and the relationship between obesity and migraine frequency and disability is modified by anxiety and depression²⁰, clinical catastrophizing could exacerbate migraine and obesity via depression and anxiety. Alternatively, clinical catastrophizing could mediate associations of depression and anxiety with migraine.³⁸

In addition to evaluating differences in participant characteristics by level of catastrophizing, we also explored catastrophizing as a continuous predictor of migraine features and related parameters. Among all participants, higher levels of catastrophizing were associated with having attacks of higher frequency, duration, and impact along with lower confidence in ability to effectively manage and prevent attacks. Importantly, these associations occurred above and beyond the effects of obesity. Thus, while individuals with clinical catastrophizing appear to be heavier and have worse migraine attacks, regression analyses suggest that the link between catastrophizing and migraine characteristics is not stronger for

heavier individuals across a range of catastrophizing levels. It is unclear whether the same pattern would be observed in a sample including migraine patients without obesity.

This study has several strengths that advance previous studies of the relationship between pain catastrophizing and migraine. It is the first study to: 1) identify prevalence of clinically-relevant levels of catastrophizing in a sample of migraineurs and within the context of obesity; 2) evaluate relationships between catastrophizing and migraine attack features using a smartphone diary that prompted participants to record their migraine activity each day and in real time; and 3) explore relationships of catastrophizing with other important migraine-related parameters and psychological characteristics using validated measures.

This study is also not without limitations. As stated above, this study employed a cross-sectional design which did not allow us to address direction of causality or mediational relationships. Given that this study was conducted in a sample of migraine patients who all had obesity, future research that examines differences in rates of clinical catastrophizing among migraine patients by weight status is needed to obtain stronger evidence on catastrophizing as a link between obesity and migraine. Moreover, research is also needed to explore the possibility that a third unmeasured pain-causing mechanism accounts for simultaneous elevations in pain severity, reductions in pain tolerance and/or pain catastrophizing in individuals with migraine and obesity. Unlike a previous study³², we used the original and validated version of the PCS and did not modify items to be specific to migraine. Thus, it is possible that participants' responses reflected other physical sources of pain beyond migraine. While study eligibility criteria included English fluency to limit language barriers, questionnaires used in this study were not designed specifically for use with Hispanic populations and thus might not have captured any potential cultural differences in perception of pain and related variables. Finally, our sample was limited to women of reproductive ages who were overweight and obese. Consequently, findings may not be generalizable to migraineurs who are male, women in or beyond menopause, and those who are normal weight.

This work is of substantial potential significance but studies to determine temporal ordering and the influence of varying degrees of weight status are needed. Addressing obesity, catastrophizing, and mood disorders have the potential to improve headaches. Longitudinal observational studies and randomized intervention trials are warranted.

CONCLUSIONS

This study showed that pain catastrophizing is related to obesity and migraine in women with both conditions. Specifically, one-quarter of participants had clinically significant levels of catastrophizing. These individuals had greater obesity severity and experienced migraine attacks of greater frequency, length, and impact, higher levels of cutaneous allodynia, greater depression and anxiety symptomology, and lower self-efficacy in their ability to manage and prevent attacks. Among all participants, catastrophizing was associated with migraine attack features and related characteristics above and beyond the effects of obesity. Future studies are needed to: determine whether catastrophizing levels differ in migraineurs with and without obesity; explore sequencing of relationships between

catastrophizing, obesity and migraine, establish underlying mechanisms; and examine whether interventions that directly or indirectly target pain catastrophizing can improve migraine.

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Abbreviations

PCS	Pain Catastrophizing Scale
HIT-6	Headache Impact Test
ASC-12	Allodynia Symptom Checklist
HMSE	Headache Management Self-Efficacy Scale
CES-D	Centers for Epidemiologic Studies Depression Scale
GAD-7	Generalized Anxiety Disorder 7-item
BMI	Body Mass Index

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Table 1

Characteristics of participants with and without clinical levels of pain catastrophizing (PC).

	Full sample (n=105)	With clinical PC (n=27)	Without clinical PC (n=78)	P*
Demographic and anthropometric characteristics				
Age, mean ($\pm$ SD), yrs	38.1 (8.0)	37.5 (8.1)	38.8 (7.8)	0.448
Race, n (%)				
African American	11 (10.5)	5 (18.5)	6 (7.7)	0.427
White	80 (76.1)	18 (66.7)	62 (79.5)	
Other	11 (10.5)	3 (11.1)	8 (10.3)	
Mixed	3 (2.9)	1 (3.7)	2 (2.5)	
Ethnicity, n (%)				0.393
Non-Hispanic	87 (82.9)	24 (82.9)	63 (80.8)	
Hispanic	18 (17.1)	3 (11.1)	15 (19.2)	
Education, n (%)				0.191
< 4 year college/university degree	47 (44.8)	15 (55.6)	32 (41.0)	
4 year college degree	58 (55.2)	12 (44.4)	46 (59.0)	
Body mass index, mean ($\pm$ SD), kg/m ²	35.3 (6.4)	37.9 (7.5)	34.4 (5.7)	0.035
Migraine characteristics				
Migraine attacks/mo., mean ($\pm$ SD), number	5.6 (3.7)	6.2 (5.5)	5.4 (2.9)	0.376
Migraine days/mo., mean ($\pm$ SD), number	8.7 (5.5)	10.6 (7.2)	8.0 (4.6)	0.088
Chronic migraine, n (%)	16 (15.2)	8 (29.6)	8 (10.3)	0.021
Max. pain severity, mean ($\pm$ SD), 0–10 scale	5.9 (1.4)	6.3 (1.5)	5.8 (1.4)	0.113
Total migraine duration/mo., mean ($\pm$ SD), hr	113.8 (101.1)	160.8 (145.0)	97.5 (75.2)	0.038
Headache impact, M ($\pm$ SD)	65.6 (4.5)	68.7 (4.6)	64.5 (3.9)	<0.001
Cutaneous allodynia, M ($\pm$ SD)	5.2 (3.8)	7.0 (4.1)	4.5 (3.5)	0.003
Headache management self-efficacy, M ($\pm$ SD)	98.4 (23.4)	80.1 (25.6)	104.7 (18.9)	<0.001
Psychological characteristics				
Pain catastrophizing (Total), mean ($\pm$ SD)	22.7 (10.8)	37.6 (4.9)	17.5 (6.7)	–
Depression, mean ($\pm$ SD)	16.6 (11.4)	25.4 (12.4)	13.3 (9.2)	<0.001
Anxiety, mean ($\pm$ SD)	7.0 (5.0)	11.0 (5.2)	5.6 (4.1)	<0.001

Note.

* For comparison of with clinical PC vs. without clinical PC. Migraine features (i.e. migraine attacks, days, intensity, and duration) measured using smartphone-based diary over 28-day period. Headache impact measured by HIT-6. Allodynia measured by ASC-12. Headache management self-efficacy measured by HMSE. Pain catastrophizing measured by PCS. Depression measured by CES-D. Anxiety measured by GAD-7.

Associations of pain catastrophizing scale (PCS) total scores with migraine characteristics, controlling for the effects of weight status

Table 2

Predictor	Model 1 R ² = .055 p = .056			Model 2 R ² = .106 p = .003			Model 3 R ² = .146 p < .001			Model 4 R ² = .036 p = .152			Model 5 R ² = .172 p < .001			Model 6 R ² = .056 p = .054			Model 7 R ² = .181 p < .001		
	Migraine attacks			Migraine days			Total attack Duration			Maximum pain severity			HIT-6 Score			ASC Score			HMSE Score		
	β	SE	p	β	SE	p	β	SE	p	β	SE	p	β	SE	p	β	SE	p	β	SE	p
PCS Score	.178	.034	.076	.331	.049	.001	.390	.885	<.001	.021	.013	.123	.425	.039	<.001	.185	.035	.065	-.437	.200	<.001
BMI	-.203	.058	.044	-.134	.083	.167	-.147	1.49	.123	.018	.023	.436	-.062	.065	.506	.108	.059	.278	.152	.338	.104

Note. HIT-6 = Headache Impact Test-6, ASC = Allodynia Symptom Checklist, HMSE = Headache Management Self-Efficacy Scale Score, SE = standard error, BMI = Body Mass Index