

Ecological Momentary Assessment of Headache Pain Intensity and Pain Interference in Women with Migraine and Obesity

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Background -1-

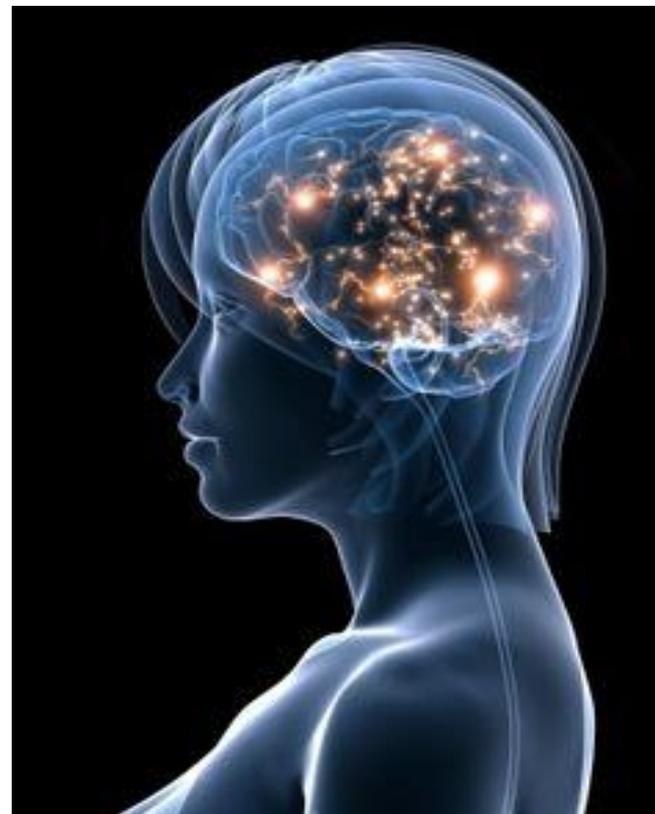
■ What is Migraine?

- **Neurological disease affecting 36 million Americans (1 billion people worldwide)**
- **Women are disproportionately affected**
- **Repeated headache attacks**
 - Moderate or severe intensity
 - Unilateral location
 - Pulsating or throbbing quality
- **Occurs with symptoms such as nausea, vomiting, photophobia and phonophobia**



Background -2-

- **Migraine headache attacks and associated symptoms interfere with daily functioning.**
- **The degree of interference and extent to which QOL is impacted is variable.**
- **Pain intensity is shown to account for more variance in pain interference than other headache features.**



Background -3-

- **Past studies demonstrate a robust pain intensity-interference relationship, but are limited by certain measurement aspects:**
 - Use of retrospective questionnaires
 - imperfect recall
 - Administration of measures in clinical settings
 - poor ecological validity
 - Use of headache diaries without verification of compliance
 - questionable accuracy of headache patterns
 - Limited measurement of predictors and moderators
 - Little understanding of factors that independently predict pain interference or affect strength of pain intensity-interference relationship

Study Aims

- **In women with migraine and obesity, we used Ecological Momentary Assessment (EMA) via a smartphone 28-day headache diary, to conduct exploratory analysis of:**
 1. Association between pain intensity and pain interference across different domains of functioning on days that migraine headaches occurred in real time and in participants' natural environment
 2. Extent to which pain interference within each of the different domains was predicted by different demographic, anthropometric, headache and psychosocial characteristics either independently or in an interaction with pain intensity

Methods -1-

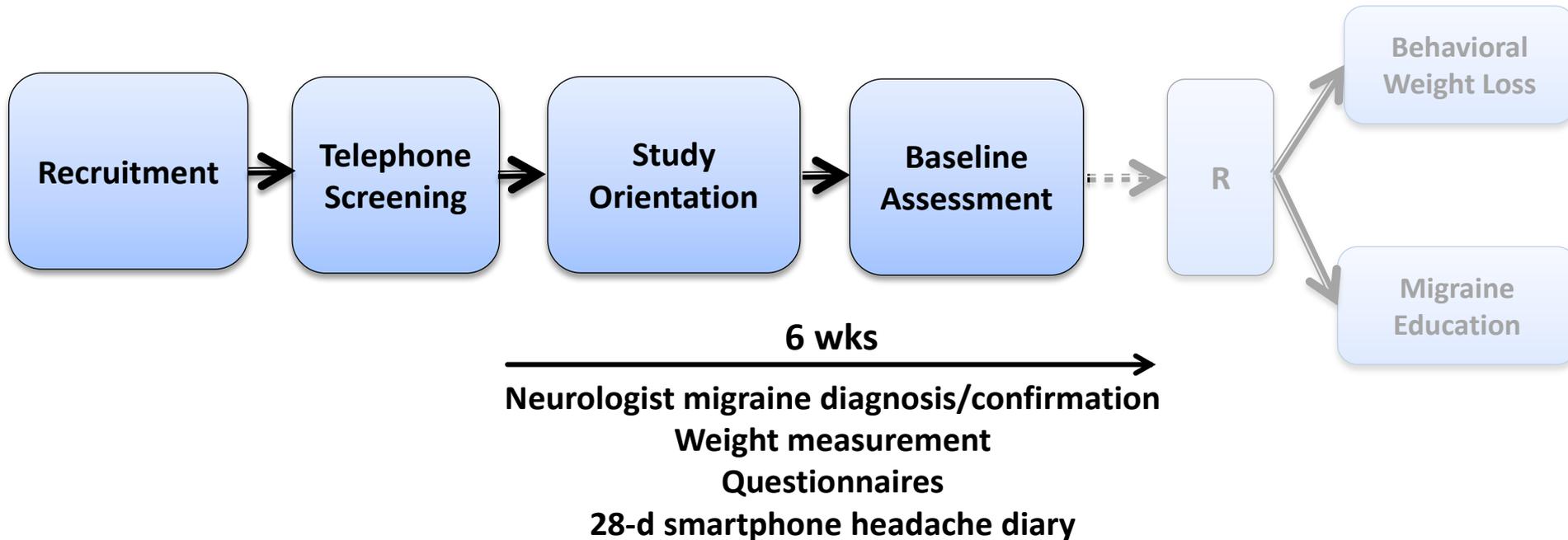
■ Participants

- 116 women
- 18-50 years old
- Overweight/obese (BMI \geq 25 kg/m²)
- Neurologist-confirmed diagnosis of migraine with or without aura according to ICHD-III Beta criteria
- Seeking behavioral treatment to lose weight and reduce migraine attacks as part of the Women's Health and Migraine (WHAM) Trial



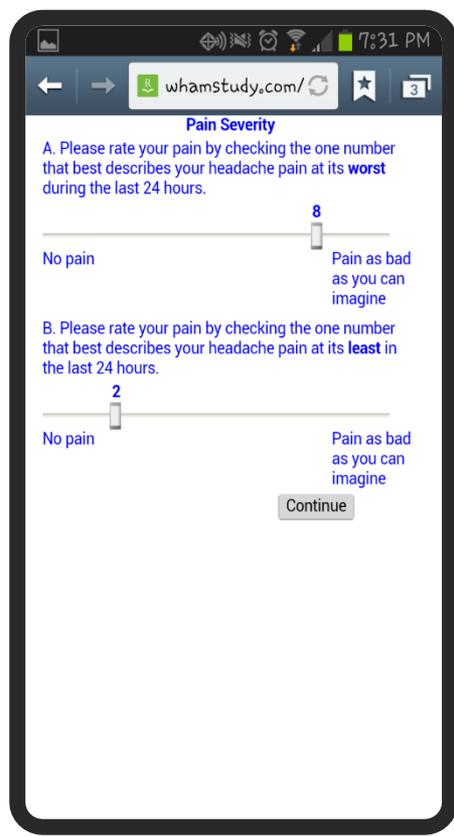
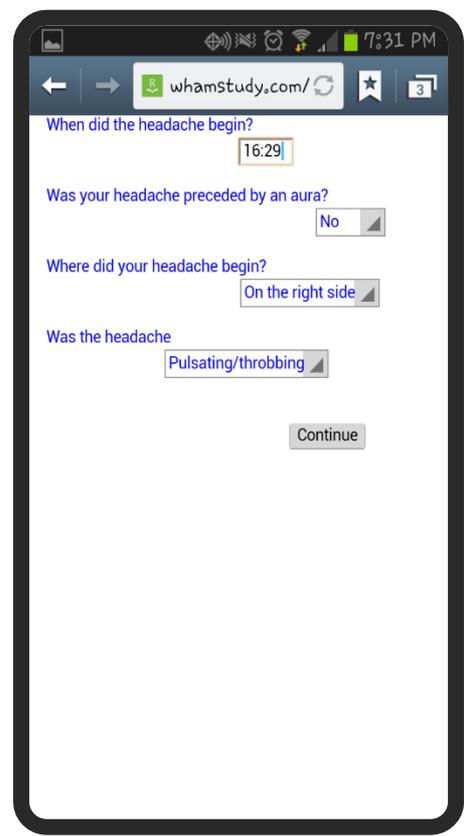
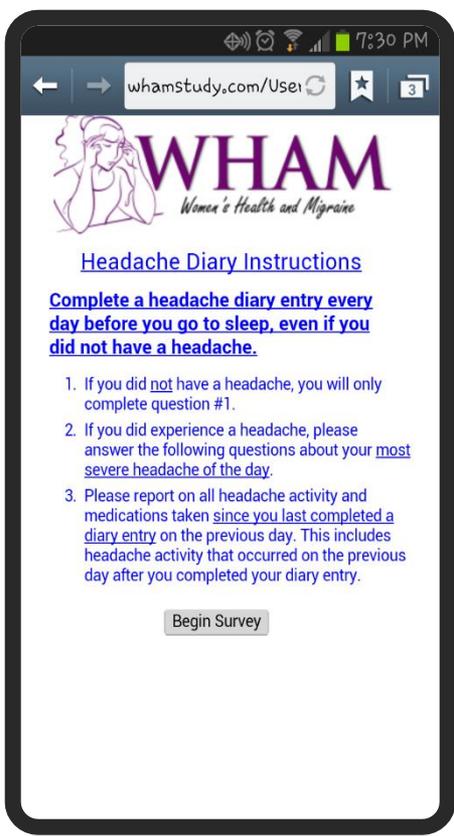
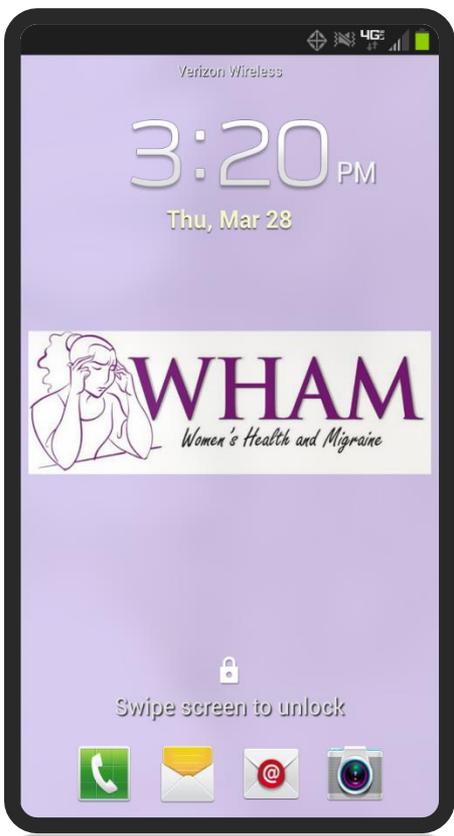
Methods -2-

■ Procedures



Methods -3-

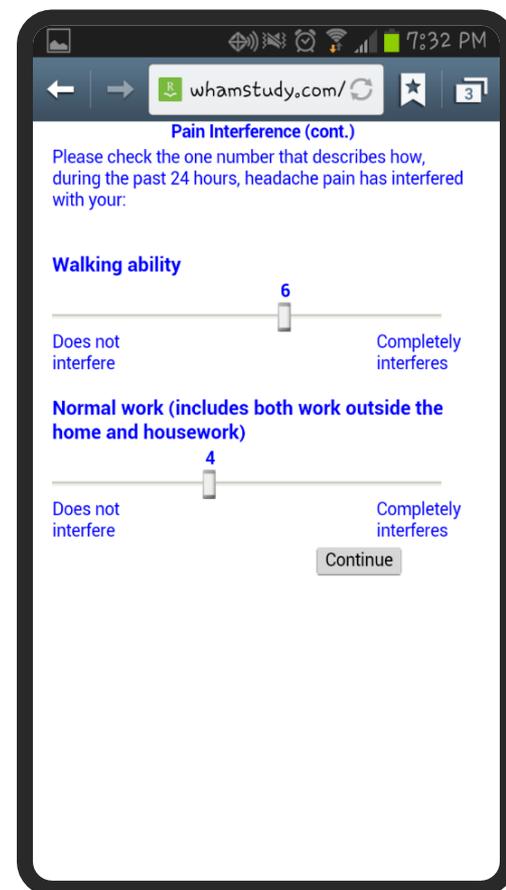
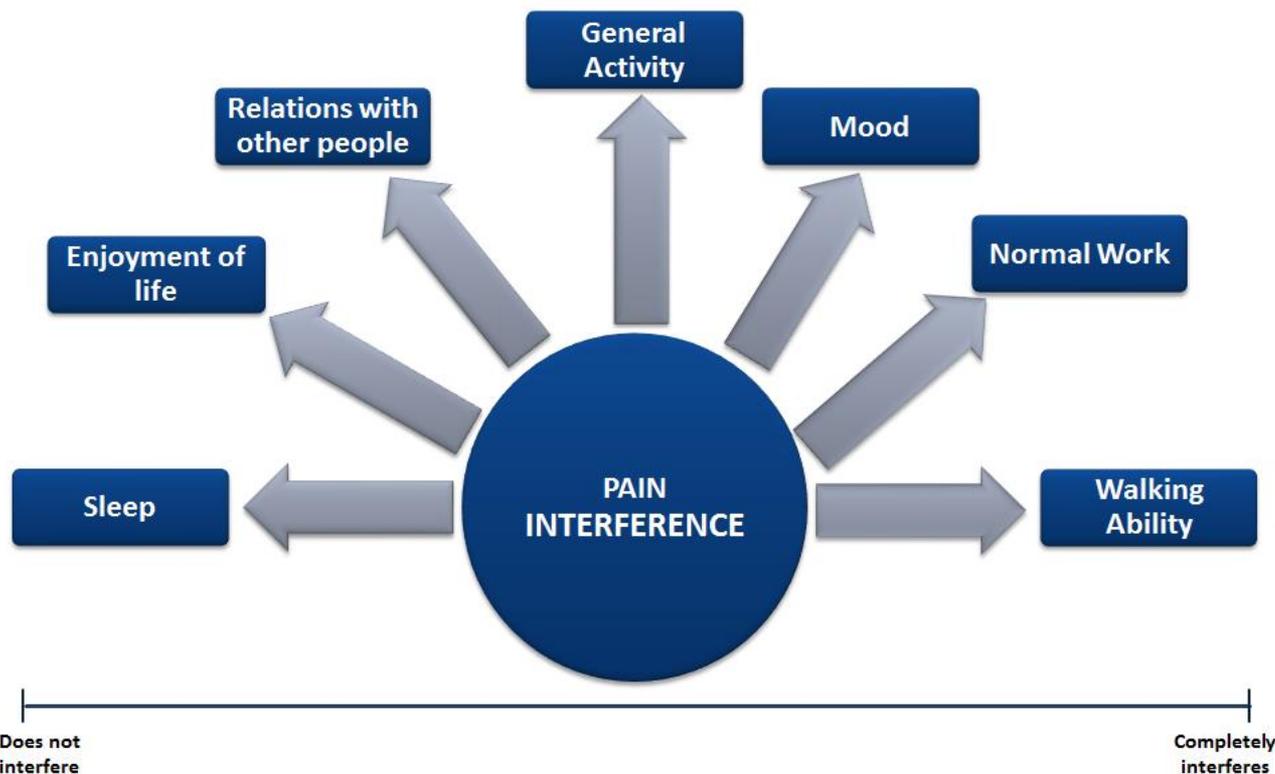
Measures: Daily Smartphone Headache Diary



Methods -4-

■ Measures: Daily Smartphone Headache Diary (cont.)

BRIEF PAIN INVENTORY PAIN INTERFERENCE SUBSCALE



Methods -6-

■ Measures: Paper-and-pencil measures (headache)

Variable	Measure
Cutaneous allodynia	Allodynia Symptom Checklist-12 -Assesses occurrence & severity of allodynia in response to innocuous stimuli applied to skin or scalp during headache -Scores of 0-2, 3-5, 6-8, and ≥ 9 = none, mild, moderate and severe allodynia



Methods -6-

■ Measures: Paper-and-pencil measures (psychosocial)

Variable	Measure
Pain Catastrophizing	Pain Catastrophizing Scale (PCS) -Rating of 13 thoughts and feelings reflecting pain-related rumination, magnification, and helplessness about pain -Total score range: 0-52, ≥ 30 = clinically relevant levels of PC
Headache Management Self-Efficacy	Headache Management Self-Efficacy Scale (HMSE) -Assesses confidence in ability to manage and prevent headache pain -Total score range: 25-175 -Higher scores = more frequent use of positive coping strategies
Depression	Center for Epidemiologic Studies Depression Scale (CES-D) -Assesses frequency of depressive symptoms during past week -Total score range: 0-60, higher scores = greater depressive symptoms - ≥ 16 = clinically significant depressive symptoms

■ Other Measures: Demographic and BMI

Methods -7-

■ **Statistical Analysis**

- Linear mixed-effects models with random effect of subject to accommodate multiple responses from each participant were used to examine predictors of pain interference
 1. Each domain of pain interference and the pain interference total score were modeled using maximum pain intensity as the only predictor.
 2. Additional demographic/anthropometric, headache, and psychosocial predictors and their interaction with pain intensity were added to the model
 3. Backward elimination procedure used to produce final models with only those predictors that were $p < .05$

Results -1-

Participant Characteristics (n=116)

Demographic and Anthropometric Characteristics

Age , mean (\pm SD), years	38.2 (8.1)
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Race, n (%)

African American	11 (9.5%)
White	90 (77.6%)
Other	12 (10.3%)
Mixed	3 (2.6%)

Ethnicity, n (%)

Hispanic	19 (16.4%)
Non-Hispanic	97 (83.6%)

Education, n (%)

< 4 year college/university degree	53 (46.7%)
\geq 4 year college/university degree	63 (53.3%)

BMI , mean (\pm SD), kg/m ²	35.0 (6.4)
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Results -2-

Participant Characteristics (cont.)

Headache Characteristics

Migraine headache days/mo. , mean (\pm SD), number	8.8 (5.5)
Total migraine headache duration/mo. , mean (\pm SD), hours	113.4 (100.1)
Maximum pain intensity , mean (\pm SE), 0-10 scale	6.0 (0.1)
Cutaneous allodynia , mean (\pm SD)	5.1 (3.9)
Pain interference , mean (\pm SE), 0-10 scale	
Total interference	3.5 (0.2)
General activity	4.0 (0.2)
Mood	4.6 (0.2)
Walking ability	1.9 (0.2)
Normal work	3.6 (0.2)
Relations with other people	3.4 (0.2)
Sleep	2.9 (0.2)
Enjoyment of life	4.3 (0.2)

Results -3-

Participant Characteristics (cont.)

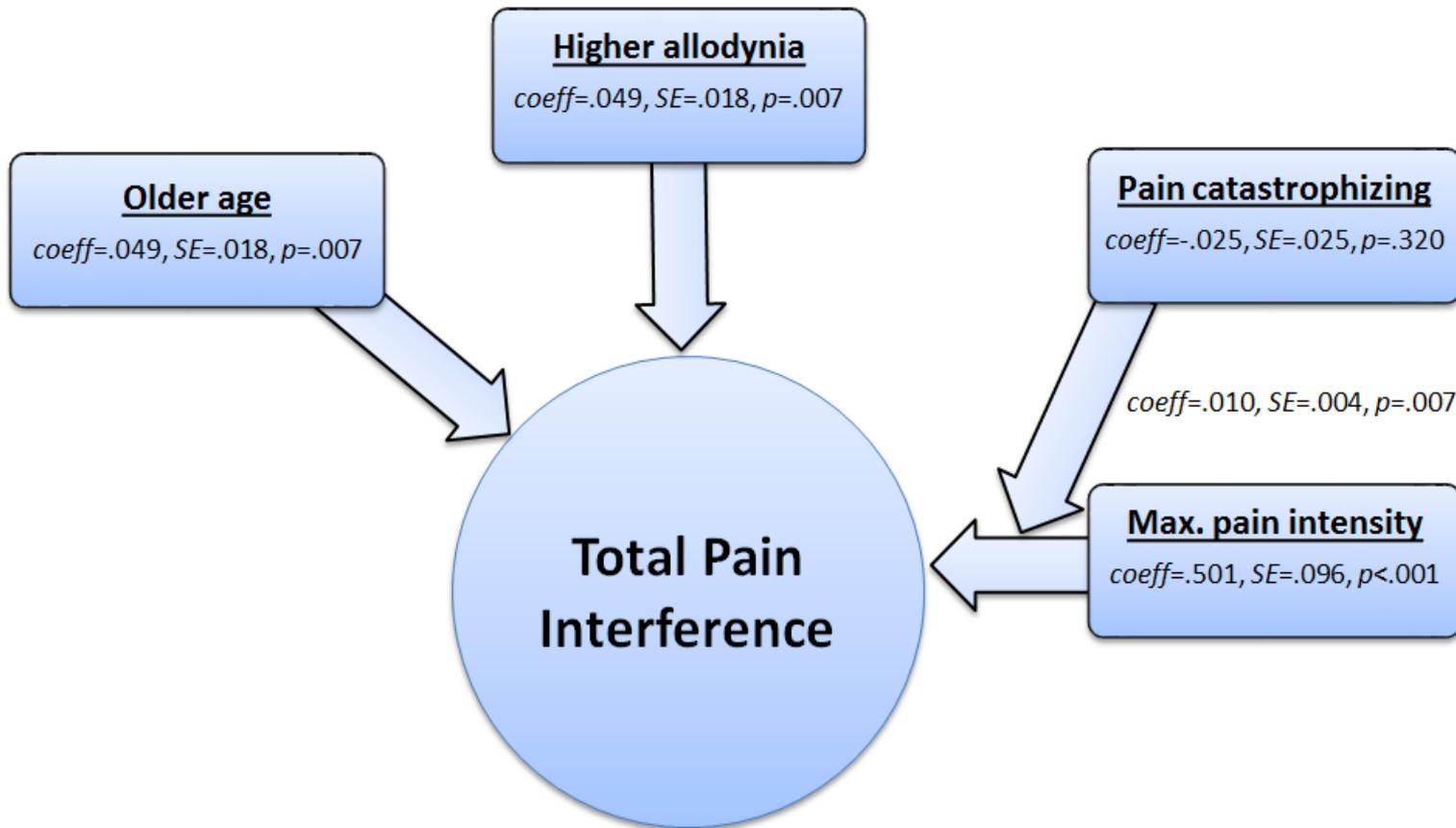
Psychosocial Characteristics

Pain catastrophizing , mean (\pm SD), 0-52 scale	22.4 (10.8)
Depressive symptoms , mean (\pm SD), 0-60 scale	16.2 (11.3)
Headache management self-efficacy , mean (\pm SE), 25-175 scale	98.3 (22.9)



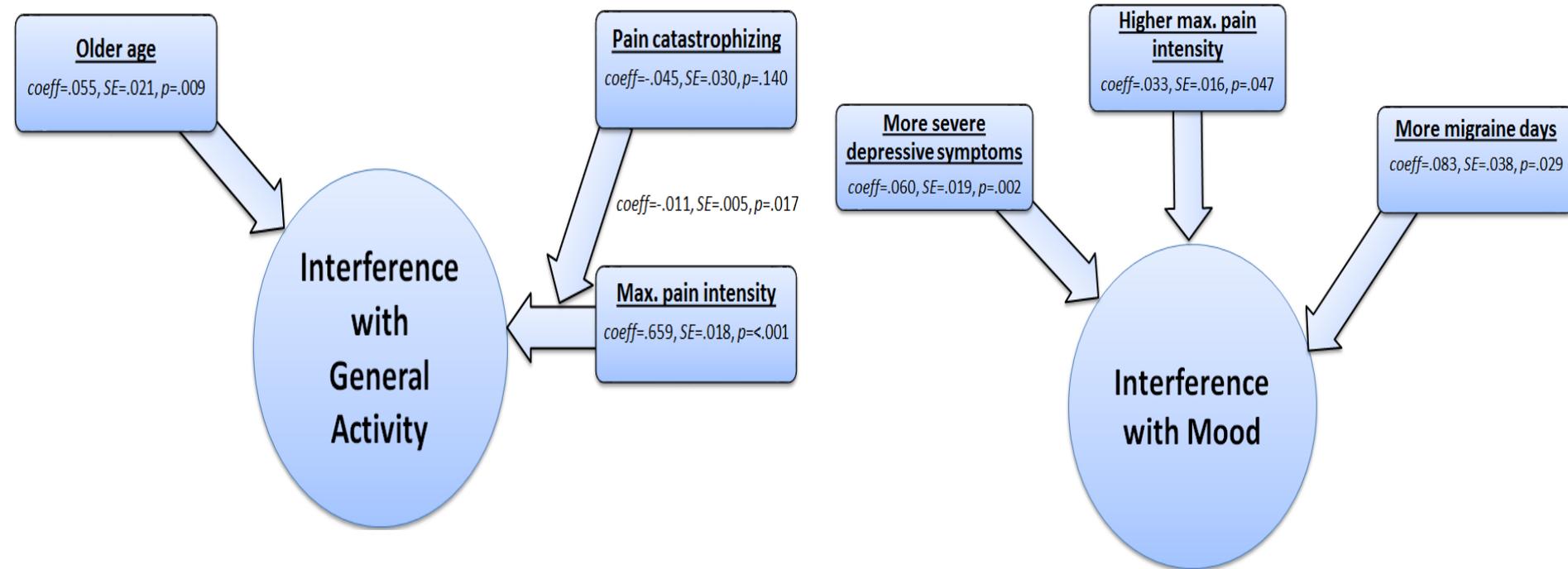
Results -4-

Predictors of Total Pain Interference



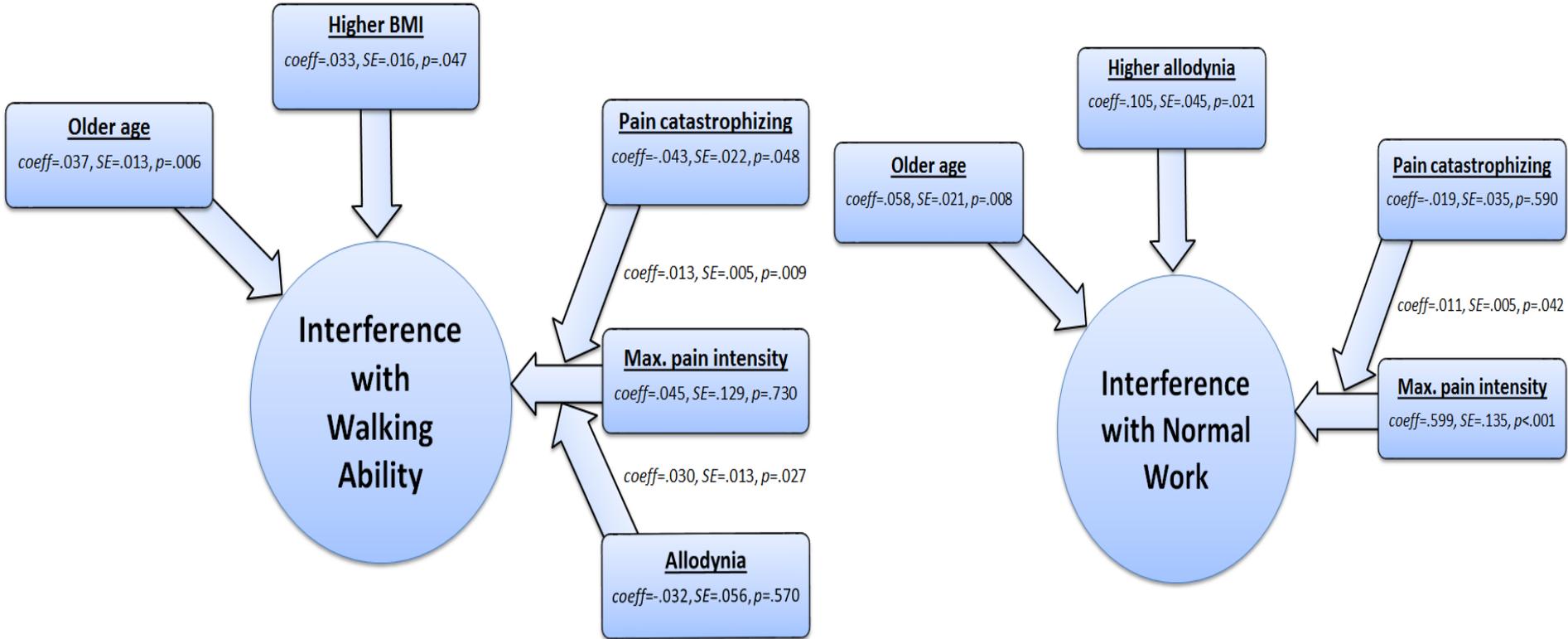
Results -5-

Predictors of Individual Domains of Pain Interference



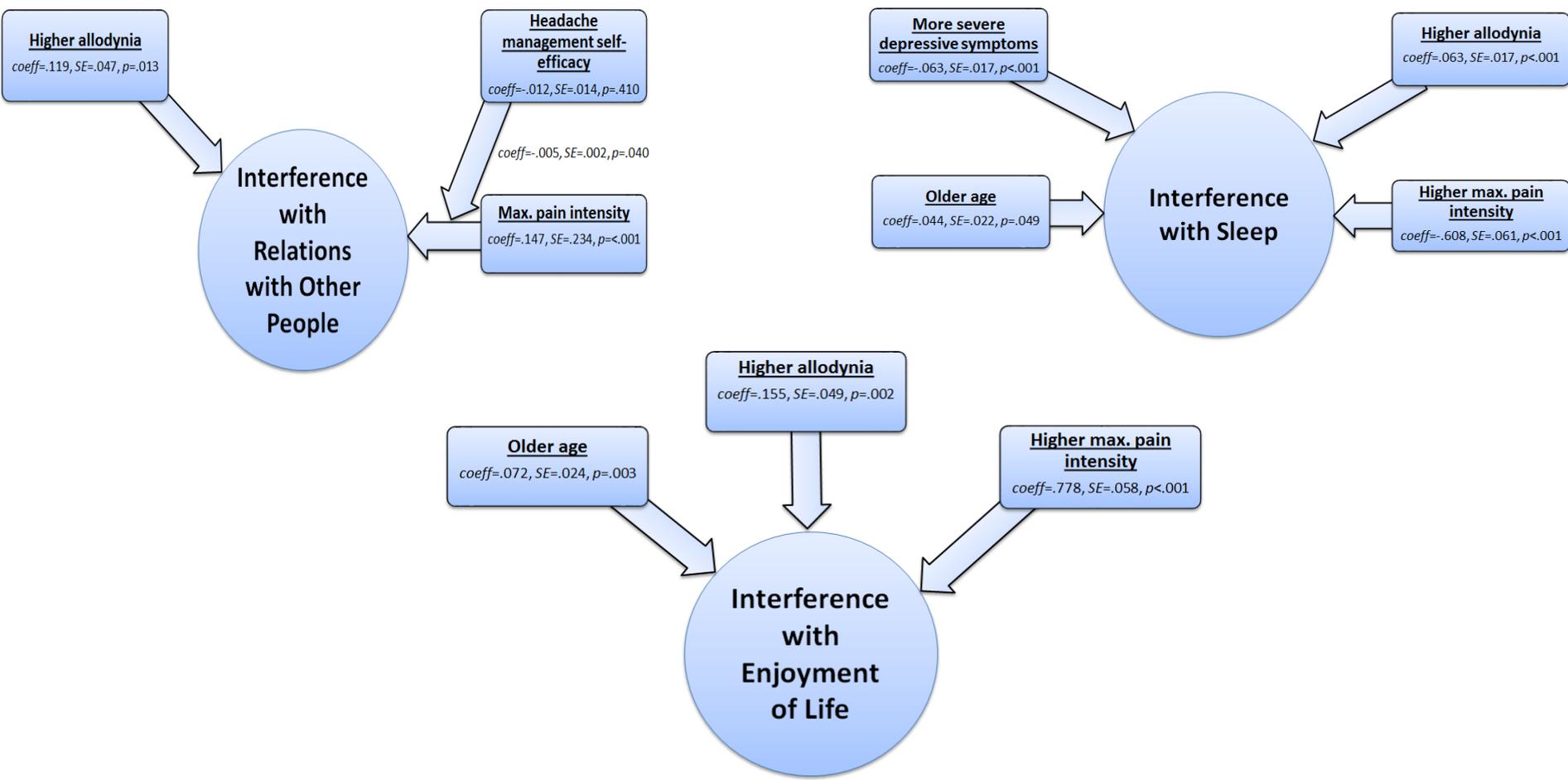
Results -6-

Predictors of Individual Domains of Pain Interference (cont.)



Results -7-

Predictors of Individual Domains of Pain Interference (cont.)



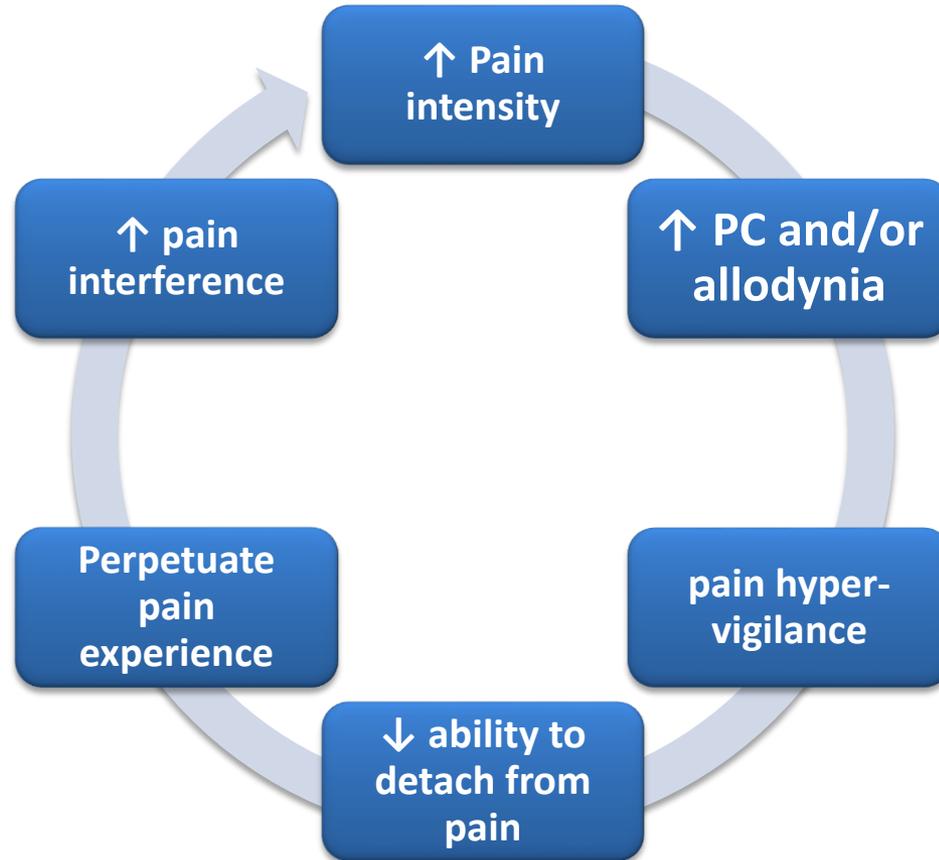
Discussion -1-

■ Major Findings

1. Pain intensity was a consistent predictor of pain interference across multiple domains of interference on migraine days
2. Only variables most proximally associated with pain (i.e. pain catastrophizing, allodynia) and headache management self-efficacy interacted with pain intensity to predict greater interference
3. Older age and more severe allodynia consistently predicted higher levels of pain interference, regardless of levels of pain intensity.

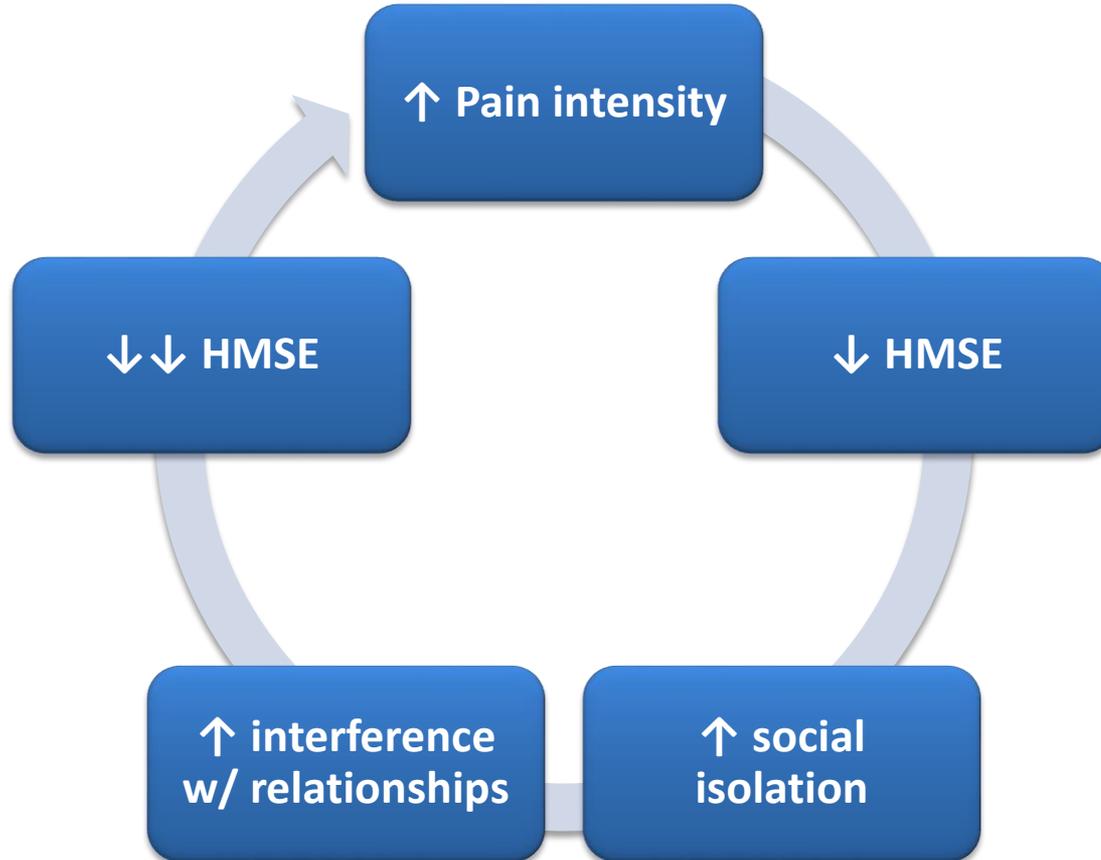
Discussion -2-

Potential Reasons for Interactions of Pain Catastrophizing (PC) and Allodynia with Pain Intensity to Predict Pain Interference



Discussion -3-

Potential Reasons for Interaction of Headache Management Self-Efficacy (HMSE) with Pain Intensity to Predict Pain Interference



Discussion -4-

■ Strengths

- First study to examine dynamic patterns of pain intensity and pain interference on a per-headache basis in individuals with migraine in the natural environment via smartphone-based EMA
- Provides novel information regarding headache-related and psychosocial factors that modify the migraine pain intensity-interference relationship

■ Limitations

- Sample restricted to reproductive-aged women with overweight/obesity
 - may explain why BMI was not a more consistent predictor
 - unclear whether findings generalize to women who are older and men
- Ratings of pain interference not available on days that migraine attacks did not occur
 - unable to test for association between total migraine days and cumulative pain interference across the 28-day monitoring period
- Exploratory analysis involving several statistical comparisons without correction for Type I error

Discussion -5-

■ Perspectives and Implications

- Findings raise the question of *why* and *how* the level of pain intensity experienced by any given person with migraine could affect different types of pain interference to a different degree.
 - Mechanisms by which pain intensity contributes to pain interference may vary for different types of interference and/or that pathways are modulated by different biological and psychosocial factors
 - Different migraine patients with the same level of migraine pain may experience substantially different interference profiles
- Allodynia, pain catastrophizing, and headache management self-efficacy may be promising targets for interventions to reduce pain interference

Acknowledgements

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