

Factors and reasons associated with hesitating to seek care for migraine: results of the OVERCOME (US) study

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Supplemental Table 1. *A priori*-Selected Variables Included in Random Forest Analysis

Domain	Variable	Response Type
Sociodemographic	Age	Continuous
	Sex	Binary (male/female)
	Race	Categorical (White only, Black only, Other [Asian American only, American Indian only, Native Hawaiian only, Other, two or more races])
	Ethnicity	Binary (Hispanic/not Hispanic)
	Education	Categorical (high-school/some college/college degree)
	Employment status	Categorical (full/part/retired/homemaker/other)
	Healthcare insurance	Binary (yes/no)
	Urban/rural	Binary (urban/rural)
	Region	Categorical (Northeast, Midwest, South, West)
	Household income	Ordinal (<\$50,000, \$50,000 to \$99,999, >100,000+)
	Marital status	Binary (yes/no)
	Number of adults and children in household	Categorical (1, 2, 3, 4, 5+)
	Children under 18 living in household	Binary (yes/no)
Comorbidities	Self-reported comorbidity contraindicated for triptan use	Binary (yes/no)
	Number of self-reported cardiovascular comorbidities	Ordinal (0, 1, 2+)
	Number of self-reported joint or pain comorbidities	Ordinal (0, 1, 2+)
	Psychiatric comorbidity	Ordinal (0, 1, 2, 3)
	Digestive comorbidity	Binary (yes/no)
	Patient Health Questionnaire-4 (PHQ-4)	Continuous (range 0 to 12)
	Sleep apnea	Binary (yes/no)
	Allergies	Binary (yes/no)
	Asthma	Binary (yes/no)
	Framingham risk score	Binary (yes/no)
Healthcare utilization behavior	Hesitation to seek care	Binary (yes/no)
Health status	Cannabis use	Binary (yes/no)
	BMI	Categorical (obese, overweight, underweight/normal)
	Tobacco use	Binary (yes/no)

Migraine-related	Years with migraine	Continuous
	Unilateral pain	Ordinal (all or nearly all of the time half the time or more less than half the time never rarely)
	Pain is pounding, pulsating or throbbing	Ordinal (all or nearly all of the time half the time or more less than half the time never rarely)
	Pain has moderate or severe intensity	Ordinal (all or nearly all of the time half the time or more less than half the time never rarely)
	Pain is made worse by routine activities such as walking or climbing stairs	Ordinal (all or nearly all of the time half the time or more less than half the time never rarely)
	Nausea	Ordinal (all or nearly all of the time half the time or more less than half the time never rarely)
	Photophobia	Ordinal (all or nearly all of the time half the time or more less than half the time never rarely)
	Phonophobia	Ordinal (all or nearly all of the time half the time or more less than half the time never rarely)
	Osmophobia	Ordinal (all or nearly all of the time half the time or more less than half the time never rarely)
	Neck pain	Ordinal (all or nearly all of the time half the time or more less than half the time never rarely)
	Sinus pain	Ordinal (all or nearly all of the time half the time or more less than half the time never rarely)
	Vomiting with headache	Ordinal (all or nearly all of the time half the time or more less than half the time never rarely)
	Dizziness	Ordinal (all or nearly all of the time half the time or more less than half the time never rarely)
	MSSS = Migraine Symptom Severity Score (MSSS)	Continuous (range: 0 to 21)
	Allodynia Symptom Checklist-12 (ASC-12)	Ordinal (ASC-12 score: none 0 to 2, mild 3 to 5, moderate 6 to 8, severe 9+)
	Headache Pain Intensity score	Continuous (range: 0 to 10)
	Frequency of headaches	Ordinal (headache days per month: 0 to 3, 4 to 7, 8 to 14, ≥ 15)
Treatment-related	Acute over-the-counter medicine overuse	Binary (yes/no)
	Currently using behavioral techniques for managing migraine	Binary (yes/no)

	Migraine Treatment Optimization Quest (M-TOQ)	Ordinal (very poor, poor, moderate, maximum treatment efficacy)
Patient-reported outcomes	Migraine Specific Quality of Life v2.1 Role Function Restrictive (MSQ-RFR) score	Continuous (range 0 to 100)
	Migraine symptoms interferes with sleep	Ordinal (all of the time, most of the time, a good bit of the time, a little bit of the time, some of the time, none of the time)
	Migraine symptoms interferes with mood	Ordinal (all of the time, most of the time, a good bit of the time, a little bit of the time, some of the time, none of the time)
	Migraine symptoms interferes with driving	Ordinal (all of the time, most of the time, a good bit of the time, a little bit of the time, some of the time, none of the time)
	Migraine symptoms interferes with exercise	Ordinal (all of the time, most of the time, a good bit of the time, a little bit of the time, some of the time, none of the time)
	Migraine Disability Assessment Questionnaire (MIDAS)	Ordinal (MIDAS score: little or none 0 to 5, mild 6 to 10, moderate 11 to 20, severe 21+)
	Migraine-Interictal Burden Scale-4 (MIBS-4)	Ordinal (MIBS-4 score: none 0, mild 1 to 2, moderate 3 to 4, severe 5+)
	Migraine-Related Stigma Questionnaire (MiRS)	Categorical (Never MiRS-SG/ MiRS-MB, Rarely or Sometimes MiRS-SG/ MiRS-MB, (Very) Often MiRS-SG, (Very) Often MiRS-MB, (Very) Often Both MiRS-SG/ MiRS-MB)
	Hiding	Binary (yes/no)

Abbreviations: BMI = body mass index; MiRS-MB = Migraine-related stigma-Minimizing burden; MiRS-SG = Migraine-related stigma-Secondary gain.

Supplemental Table 2. Top Factors Associated With the Reasons Given by >25% People for Hesitating to Seek Care for Migraine - Random Forest Analysis (ordered by association)

Order of Association	Factor Type	Out of Bag Gini	Variable	Variable performance among those who did cite this as reason for hesitating	Variable performance among those who did NOT cite this as reason for hesitating
REASON #1: <i>I wanted to try and take care of/deal with them on my own</i>					
1	Patient-reported outcome	0.00344	MIBS-4	56.4% reported experiencing moderate/severe migraine burden between attacks (MIBS-4)	68.4% reported experiencing moderate/severe migraine burden between attacks (MIBS-4)
2	Treatment-related	0.00158	Currently using behavioral techniques for managing migraine	22.0% currently using behavioral treatments to manage migraine	14.8% currently using behavioral treatments to manage migraine
3	Migraine-related	0.00075	Vomiting with headache	13.6% reported vomiting half the time or more with migraine attack	19.1% who reported vomiting half the time or more with migraine attack
4	Socio-demographic	0.00068	Healthcare insurance	86.5% had healthcare insurance	80.9% had healthcare insurance
5	Health Status	0.00051	Cannabis use	28.0% currently use cannabis	34.6% currently use cannabis

Order of Association	Factor Type	Out of Bag Gini	Variable	Variable performance among those who did cite this as reason for hesitating	Variable performance among those who did NOT cite this as reason for hesitating
REASON #2: <i>I felt my migraine or headache would not be taken seriously</i>					
1	Patient-reported outcome	0.00622	Migraine-related stigma	56.8% reported experiencing migraine-related stigma often/very often (MiRS)	35.6% reported experiencing migraine-related stigma often/very often (MiRS)
2	Migraine-related	0.00228	MHD group category	33.3% reported having ≥ 8 monthly headache days	20.7% reported having ≥ 8 monthly headache days
3	Comorbidity	0.00211	Self-reported medical diagnosis of psychiatric comorbidities	70.8% self-reported medical diagnosis of at least one of anxiety, depression and/or panic attacks	58.0% self-reported medical diagnosis of at least one of anxiety, depression, and/or panic attacks
4	Patient-reported outcome	0.00189	MIDAS	43.5% reported severe migraine-related disability (MIDAS)	28.6% reported severe migraine-related disability (MIDAS)
5	Patient-reported outcome	0.00170	Migraine symptoms interfere with mood	57.9% reported pain and migraine symptoms interfering with mood most/all of the time	41.9% reported pain and migraine symptoms interfering with mood most/all of the time

Order of Association	Factor Type	Out of Bag Gini	Variable	Variable performance among those who did cite this as reason for hesitating	Variable performance among those who did NOT cite this as reason for hesitating
REASON #3: <i>I did not think they were serious/painful enough</i>					
1	Migraine-related	0.00459	Average Headache Pain Intensity score	Mean pain intensity 6.7/10	Mean pain intensity 7.4/10
2	Migraine-related	0.00252	Vomiting with headache	9.7% reported vomiting half the time or more with a migraine attack	19.5% reported vomiting half the time or more with a migraine attack
3	Patient-reported outcome	0.00191	MIBS-4	52.4% reported experiencing moderate/severe migraine burden between attacks (MIBS-4)	67.5% reported experiencing moderate/severe migraine burden between attacks (MIBS-4)
4	Socio-demographic	0.00126	Current age	Mean age was 37.4 years	Mean age was 40.1 years
5	Migraine-related	0.00089	Nausea with headache	42.5% reported nausea half the time or more with a migraine attack	56.2% reported nausea half the time or more with a migraine attack

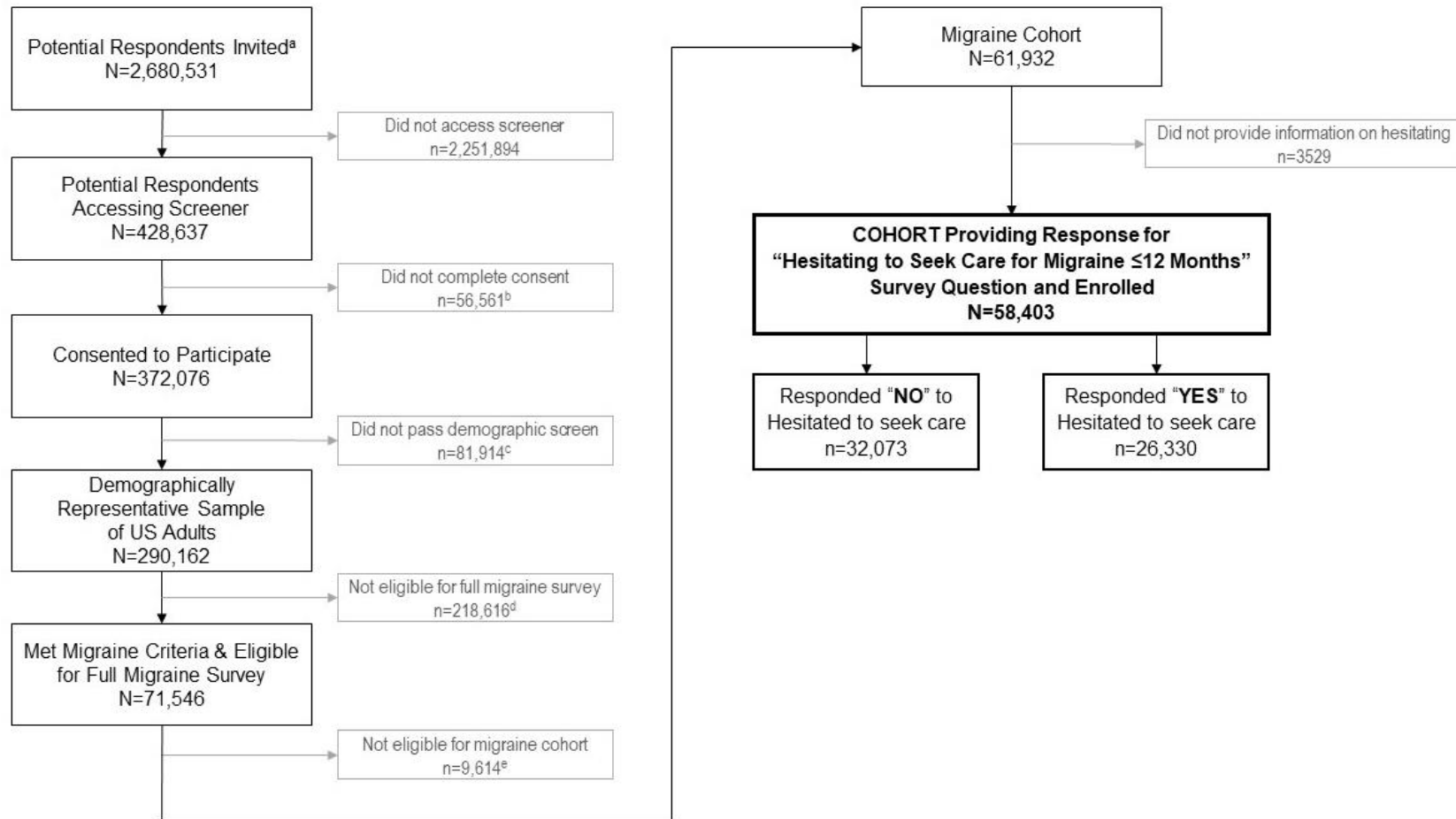
Order of Association	Factor Type	Out of Bag Gini	Variable	Variable performance among those who did cite this as reason for hesitating	Variable performance among those who did NOT cite this as reason for hesitating
REASON #4: <i>I could not afford it or did not want to spend the money</i>					
1	Socio-demographic	0.00790	Healthcare insurance	70.3% had health insurance	88.2% had health insurance
2	Socio-demographic	0.00068	Region	11.0% live in the Northeast 46.0% live in the South	17.8% live in the Northeast 38.6% live in the South
3	Migraine-related	0.00034	MHD group category	28.5% reported having ≥ 8 monthly headache days	23.6% reported having ≥ 8 monthly headache days
4	Comorbidity	0.00031	PHQ-4	Mean score for key symptoms of anxiety and depression over previous 2 weeks: PHQ-4=5.7	Mean score for key symptoms of anxiety and depression over previous 2 weeks: PHQ-4=5.0
5	Comorbidity	0.00023	Self-reported medical diagnosis of psychiatric comorbidities	66.5% self-reported medical diagnosis of at least one of anxiety, depression and/or panic attacks	60.8% self-reported medical diagnosis of at least one of anxiety, depression, and/or panic attacks

Note: For categorical variables (e.g., MIBS-4, MIDAS, etc.), selected categories are listed that best highlight the difference across groups choosing a particular reason for hesitating to seek care.

Abbreviations: MHD = monthly headache day; MIBS-4 = Migraine Interictal Burden Scale-4; MIDAS = Migraine Disability Assessment; MiRS = Migraine-related stigma questionnaire; PHQ-4 = Patient Health Questionnaire-4.

Supplemental Figure 1. Consort Diagram for OVERCOME (US) 2018-2020 Migraine Cohort

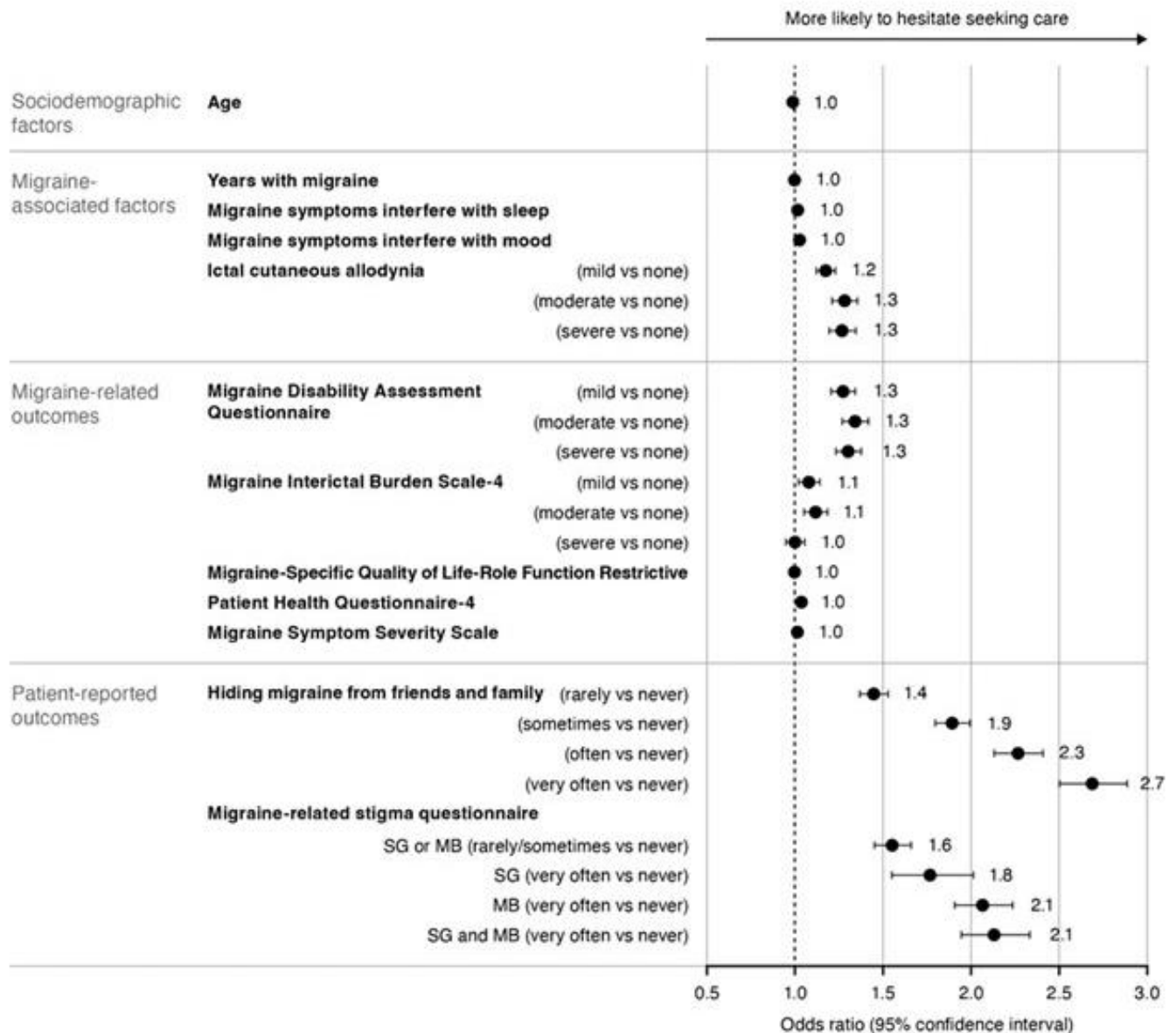
This diagram flow begins with a targeted sampling to represent the United States adult population in terms of key demographic characteristics (age, sex, race, and geography) who were invited to complete the study survey and ends with the cohort of interest, which were participants who provided a response to the survey question regarding hesitation to seek care for migraine within the last 12 months that were further subdivided into groups of ‘yes’ and ‘no’ with regards to hesitating to seek care.



- a: Targeted sampling to represent the US adult population in terms of key demographic characteristics (age, sex, race, and geography) were applied.
- b: Comprised: n=2 disqualified before consent and n=56,559 who did not consent.
- c: Comprised: n=79,014 who did not complete screener, n=1,526 who did not pass data check/inconsistent response, and n=1,374 who did not meet inclusion criteria.
- d: Comprised: n=152,484 who responded no/don't remember headache in past 12 months, n=49,878 who did not meet migraine criteria, and n=16,254 over enrollment quota.
- e: Comprised: n=9,589 who did not complete survey, n=22 who were disqualified, and n=3 duplicates.

Supplemental Figure 2. Variables Most Associated With Hesitating to Seek Care for Migraine – Raw Data

The factors most strongly associated with hesitating to seek care for migraine are shown in this multivariate logistic regression analysis. In this analysis, continuous variables were not standardized (refer to Fig 2, Panel B for results with standardized continuous variables). Values for odds ratios and confidence intervals were rounded up to one decimal place. For factors with an odds ratio=1, the 95% confidence intervals rounded to 1.0 and thus, do not show error bars.



Abbreviations: MiRS = Migraine-related stigma questionnaire, MiRS-MB = Migraine-related stigma - minimizing burden; MiRS-SG = Migraine-related stigma - secondary gain.