

The Relationship Between Migraines and Mental Health in Women

A Thesis

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Abstract

Women are three times more likely than men to experience migraines and endure worse migraine characteristics. Anxiety, depression, trauma, and discrimination have all been identified among migraine populations. The current study aimed at investigating the relationship between migraine characteristics (i.e., frequency, disability), mental health symptoms (i.e., depression, anxiety, trauma) and gender-based discrimination (i.e., anticipated discrimination, lifetime day-to-day discrimination) among adult women. Consequently, a case-control study with a migraine condition and a non-migraine condition was conducted. Eligibility included women who were at least 18 years of age. Recruitment occurred via the University of Regina's Psychology Participant Pool. Participants with migraine completed questionnaires about their migraine characteristics. All participants completed questionnaires on mental health and gendered discrimination. A series of independent samples *t*-tests were conducted to compare mental health symptoms between the two conditions. Hierarchical multiple regressions were conducted to test the influence of migraine characteristics and gender-based discrimination on mental health. Analyses revealed that mental health and gender-based discrimination scores were higher within the migraine group compared to the non-migraine group. Results indicated that migraine frequency and lifetime day-to-day discrimination were a significant predictor for anxiety, depression, and trauma symptoms. Anticipated discrimination was found to be significantly predictive of trauma symptoms. Lifetime-day-to-day discrimination was significantly predictive of migraine-related reduction in work or school productivity, absence of household work, and a decrease in housework. Lastly, findings revealed that gender-based discrimination was a significant predictor of migraine-related absence from social events, however no individual predictors were significant. These findings may contribute to improvements in the assessment

and management of migraines among women, adding to an often under identified population and an emergent field of literature.

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CHAPTER 1: Introduction

1.1 Migraine

Migraines are an incredibly prevalent disorder that affect approximately 11% of adults worldwide (Walter, 2022; World Health Organization, 2011). Migraine is a primary headache disorder, characterized by moderate to severe pain, typically on one side of an individual's head (World Health Organization, 2016). Migraine is a life-long disorder defined by frequent reoccurring attacks that can last from hours up to 2 to 3 days. Migraine attacks are commonly aggravated by physical activity or changes in routine (Amiri et al., 2021; World Health Organization, 2011). Migraines typically first occur during puberty and tend to decline in severity around 45 to 50 years of age (Vetvik & MacGregor, 2017). Common characteristics of migraines include nausea, vomiting, and sensitivity to light and sound (Amiri et al., 2021; World Health Organization, 2011). Women are three times more likely than men to experience migraine and to endure worse migraine characteristics (Amiri et al., 2021; World Health Organization, 2011; Vetvik & MacGregor, 2017). Furthermore, the public often views headache disorders as non-severe or as a normal part of life, thus stigmatizing the act of seeing a doctor or receiving any medical help for headache disorders such as migraines. Consequently, many of those living with headache disorders struggle to find proper diagnosis, with estimates that only 40% of individuals with migraine are medically diagnosed worldwide (Amiri et al., 2021; World Health Organization, 2011).

1.2 Migraine Disability

Most individuals who live with migraine disorder experience some level of migraine disability (Renjith et al., 2016). Migraine disability is a condition which limits a person's ability to complete daily tasks and/or experience a high quality of life (Renjith et al., 2016; Lipton et al.,

2003). Common impacts of migraine disability include missing out on school, work, or social events, trouble completing housework, and reduced productivity at school or work. For example, individuals experiencing headache disorders, such as migraine, often experience a substantial loss of paid work hours and reduced work efficacy, which imposes a large burden on the individual (World Health Organization, 2016). Moderate to severe disability has been found to be more common than little to mild disability among people living with migraine (Renjith et al., 2016). Globally, migraine is ranked the second cause of years lived with disability for all ages and genders (Steiner et al., 2020). Among women, migraine is ranked the fourth cause for years lived with disability (Vetvik & MacGregor, 2017). More specifically, among young women, migraine is ranked the top cause of disability-adjusted life years (Steiner et al., 2020). Furthermore, women are more likely than men to endure increased migraine-related disability and consequently suffer from migraine-associated activity restriction (Vetvik & MacGregor, 2017; Goldstein et al., 2019).

1.3 Anxiety

Anxiety disorders are mental health conditions typically characterized by extreme fear or worry (American Psychiatric Association, 2023). Anxiety disorders, including panic disorder, agoraphobia, specific phobia, social anxiety disorder, and generalized anxiety disorder, are more commonly experienced by women than by men (McLean et al., 2011). Common impacts of anxiety disorders include avoidance of stress-inducing situations, reduced performance in paid work or schoolwork, and strained social relationships (American Psychiatric Association, 2023). Migraine is commonly associated with several anxiety disorders within both clinical and community-based populations (Karimi et al., 2021; McWilliams, 2004). Research has shown that anxiety is about two and a half times higher among individuals living with migraine than those

living without migraine (Fuller-Thomson et al., 2017). In addition, many individuals who experience migraine comorbid with anxiety commonly endure increased headache-related disability and higher migraine frequency (Lipton et al., 2020; Chu et al., 2018).

1.4 Depression

Depression is a severe mental disorder which typically produces intense feelings of sadness or worthlessness and a decline in interest surrounding activities once previously enjoyed (American Psychiatric Association, 2020). Individuals experiencing depression will typically have trouble concentrating, feel regularly fatigued, have an irregular sleep schedule and undergo changes to their appetite (American Psychiatric Association, 2020). Within the general population, women more frequently experience depression than men (American Psychiatric Association, 2020). Depression has also been found to be more prevalent among people living with migraines compared to the general population, suggesting significant comorbidity between migraines and depression (Molgat & Patten, 2005; McWilliams, 2004). Furthermore, individuals who experience migraine comorbid with depression have been found to encounter higher levels of headache-related disability and increased migraine frequency (Lipton et al., 2020; Chu et al., 2018).

1.5 Trauma

Experiencing extreme feelings of helplessness, dissociation, or fear after living through a distressing event is typically categorized as trauma (American Psychological Association, 2018a). In addition, posttraumatic stress disorder (PTSD) is a specific mental disorder where individuals experience intense symptoms of trauma for an extended period of time after living through a life-threatening event (American Psychiatric Association, 2022). Individuals with

PTSD may experience intrusive or negative thoughts, reactive mood swings, or avoidant behaviours which can greatly affect their everyday lives (American Psychiatric Association, 2022). Women tend to exhibit higher prevalence of PTSD and symptoms of trauma (i.e., intrusion, avoidance, alterations in mood, and arousal) compared to men (Farhood et al., 2018). Furthermore, individuals who experience headache disorders tend to exhibit PTSD at higher rates than the general population (De Leeuw et al., 2005). PTSD appears more frequently within individuals experiencing chronic migraine versus episodic migraine, thus suggesting PTSD may impact migraine chronification (Peterlin et al., 2007).

1.6 Discrimination

Discrimination refers to the deliberate choice to treat a person or group unjustly specifically due to their personal characteristics (e.g., race, gender, sexual orientation, etc.; American Psychological Association, 2019). As a result of their gender identity, many women often experience discrimination both within their workplace and private life (Statistics Canada, 2023). Specifically, women often earn less than men, face disadvantaged promotion rates compared to men, and more frequently experience violence or harassment than men (Statistics Canada, 2023). Discrimination and the anticipation of possible future discrimination can negatively impact an individual's overall health and wellbeing (American Psychological Association, 2019). Rosendale et al. (2022) found that individuals living with migraines report having a history of discriminatory experiences. Furthermore, individuals who have experienced both trauma and discrimination report moderate to severe migraine disability (Rosendale et al., 2022). However, current literature is limited on the role that only discrimination plays on migraine characteristics and disability (Rosendale et al., 2022). Nevertheless, the history of

discrimination among women and individuals experiencing migraine suggests a possible impact of gendered discrimination on migraine populations.

1.7 Purpose and Hypotheses

The present study was aimed at investigating the relationship between migraine characteristics, anxiety symptoms, depression symptoms, trauma symptoms, and gender-based discrimination among women. Specifically, the research questions and associated hypotheses were as follows:

Research Question 1. Are levels of mental health and trauma symptoms significantly different in the migraine versus non-migraine sample?

- a. Greater levels of anxiety symptoms are expected for the migraine sample compared to the non-migraine sample.
- b. Greater levels of depression symptoms are expected for the migraine sample compared to the non-migraine sample.
- c. Greater levels of trauma symptoms are expected for the migraine sample compared to the non-migraine sample.

Research Question 2. Are levels of reported gender-based discrimination significantly different in the migraine versus non-migraine sample?

- a. Greater levels of gender-based discrimination are expected for the migraine sample versus non-migraine sample.

Research Question 3. Within the migraine sample, do migraine characteristics significantly predict mental health symptoms?

- a. Migraine frequency and migraine-related disability are expected to positively predict greater levels of anxiety symptoms for the migraine sample.
- b. Migraine frequency and migraine-related disability are expected to positively predict greater levels of depression symptoms for the migraine sample.
- c. Migraine frequency and migraine-related disability are expected to positively predict greater levels of trauma symptoms for the migraine sample.

Research Question 4. Within the migraine sample, does gender-based discrimination predict mental health symptoms?

- a. Gender-based discrimination is expected to positively predict levels of anxiety symptoms for the migraine sample.
- b. Gender-based discrimination is expected to positively predict levels of depression symptoms for the migraine sample.
- c. Gender-based discrimination is expected to positively predict levels of trauma symptoms for the migraine sample.

Research Question 5. Within the migraine sample, does gender-based discrimination predict migraine characteristics?

- a. Gender-based discrimination is expected to positively predict migraine frequency for the migraine sample.
- b. Gender-based discrimination is expected to positively predict migraine-related disability for the migraine sample.

CHAPTER 2: Method

2.1 Study Design

For the present study, a case-control study design with a migraine condition and a non-migraine condition was conducted.

2.2 Participants

Participants included undergraduate students at the University of Regina who were currently enrolled in a 100- or 200-level psychology course, identified as women, and were at least 18 years of age. As part of the case-control study design, both individuals who live with migraine and those who do not live with migraine were eligible to participate. To run a series of one-way ANOVAs with two groups (i.e., migraines, non-migraines), a power analysis using G*Power (Faul et al., 2009) indicated that a minimum sample size of 128 women (i.e., 64 women with migraine, 64 women without migraine) would be required to detect medium-sized effects assuming a 1-beta ($1-\beta$) of .80 and an alpha (α) of .05.

2.3 Procedure

Ethics approval for this study was granted by the University of Regina Ethics Review Board on October 23, 2023 (see *Appendix A*). All participant recruitment was conducted via the University of Regina's Psychology Participant Pool. Participants registered for the survey through the University of Regina's Psychology Participant Pool. After registration, participants were sent the Qualtrics link to access the survey. Upon accessing the survey, participants were asked a brief series of eligibility screening questions (i.e., are at least 18 years of age and identify as a woman; see *Appendix B*), shown the consent form (see *Appendix C*), and given a warm welcome to the study (see *Appendix D*). Participants were then asked if they experienced

migraines. Participants who indicated that they experienced migraines were asked to complete the Pre-Treatment Migraine Headache Questionnaire and the Migraine Disability Assessment Test (MIDAS). Participants that indicated that they did and did not experience migraines were asked to complete the PTSD Checklist for DSM-5 (PCL-5), Patient Health Questionnaire (PHQ-9), Generalized Anxiety Disorder 7-Item Scale (GAD-7), Intersectional Discrimination Index (InDI), and demographics questionnaires. It took no longer than one session of up to 60 minutes for participants to complete the Qualtrics survey.

2.3 Measures

2.31 Pre-Treatment Migraine Headache Questionnaire

The Pre-Treatment Migraine Headache Questionnaire (see *Appendix E*) is a 27-item self-report questionnaire which measures participant's migraine characteristics (Massachusetts General Hospital, n.d.). The questionnaire was developed for the Migraine Surgery Program at Massachusetts General Hospital to assess if patients were eligible for surgery to treat their migraine headaches. For this study, an adapted version of the questionnaire was used to characterize participants' migraine frequency.

2.32 The Migraine Disability Assessment Test (MIDAS)

The Migraine Disability Assessment Test (see *Appendix F*) is a 5-item self-report questionnaire that measures how participants' lives are affected by their migraines (AstraZeneca Pharmaceuticals, 2007). Participants were asked to numerically report how frequently their migraines have interfered within their daily life in the past three months. The MIDAS asks questions such as, "On how many days in the last 3 months did you miss work or school because of your headaches?" For this study, an adapted version of the questionnaire was used to

characterize participants' migraine-related disability. The MIDAS exhibits excellent reliability and good validity (Stewart et al., 2001).

2.33 The PTSD Checklist for DSM-5 (PCL-5)

The PTSD Checklist for DSM-5 (see *Appendix G*) assesses issues participants may experience in response to overtly stressful life events (Weathers et al., 2013). For the current study, the PCL-5 was included to measure participants' possible experiences with trauma. The PCL-5 consists of twenty questions which are rated on a 5-point Likert scale ranging from 0 (i.e., "Not at all") to 4 (i.e., "Extremely") with final scores ranging from 0 to 80. The PCL-5 has been found to show excellent reliability and validity (Belvins et al., 2015).

2.34 Patient Health Questionnaire-9 (PHQ-9)

The Patient Health Questionnaire (see *Appendix H*) was included to measure participants' possible depressive symptoms (Kroenke et al., 2001). The PHQ-9 includes 9-items that participants can rate from 0 (i.e., "Not at all") to 3 (i.e., "Nearly every day"). A total score of 0 to 27 can be calculated, with higher scores indicating more severe depression. The PHQ-9 has demonstrated excellent internal reliability and test-retest reliability (Kroenke et al., 2001).

2.35 Generalized Anxiety Disorder 7-Item Scale (GAD-7)

The Generalized Anxiety Disorder 7-Item Scale (see *Appendix I*) was included to assess participant's levels of anxiety-related symptoms (Spitzer et al., 2006). The GAD-7 consists of 7 items rated on a 4-point Likert scale from 0 (i.e., "Not at all") to 3 ("Nearly every day"). Final scores can range from 0 to 21, with higher scores indicating more severe anxiety. The GAD-7 has exhibited good test-retest reliability and validity (Spitzer et al., 2006).

2.36 Intersectional Discrimination Index (InDI)

The Intersectional Discrimination Index (see *Appendix J*) was used to measure participant's experiences with discrimination (Schein & Bauer, 2019). The InDI is comprised of three different subsections which investigate three areas of discrimination (i.e., anticipated discrimination [InDI-A], lifetime day-to-day discrimination [InDI-D], and major discrimination [InDI-M]). However, for the current study, the InDI-M was excluded due to the extended length of the measure and the constricted time frame of the current project. The InDI-A features nine items rated on a 5-point scale ranging from 0 (i.e., "Strongly disagree") to 4 (i.e., "Strongly agree"). Total scores can range from 0 to 36, with higher scores indicating worse anticipated discrimination. The InDI-D consists of nine items rated on a 3-point scale with the options "Never" (i.e., scored 0), "Yes, but not in the past year" (i.e., scored 0), "Yes, once or twice in the past year" (i.e., scored 1), or "Yes, many times in the past year" (i.e., scored 2). Final scores can range from 0 to 18, with higher scores indicating more frequent lifetime day-to-day discrimination. Overall, the InDI asks questions such as, "Because of who you are, have you ever been threatened with a physical or sexual attack?" For this study, an adapted version of the InDI was used to specifically assess participant's experiences with gendered discrimination. Consequently, the "Because of who you are" statements were adjusted to read as "Because you are a woman." All three sections of the InDI have demonstrated excellent construct validity and test-retest reliability (Schein & Bauer, 2019).

2.37 Demographics Questionnaire

Lastly, participants were asked to complete a demographics questionnaire (see *Appendix K*) which included questions regarding their age, sexual orientation and race. The responses

gathered from the demographics questionnaire were included to assist with characterizing participants included in the analyses.

2.38 Educational Debriefing

At the end of the survey, participants were shown an educational debriefing form (see *Appendix L*) which explained the goals of the study and provided participants with a list of possible mental health resources.

2.5 Data Analysis

Means and standard deviations were calculated for the demographics variables of age within the migraine and non-migraine groups. Frequencies were calculated for the demographics variables of sexual orientation and race. Total scores were calculated for the PCL-5, PHQ-9, GAD-7, InDI-A, and InDI-D. To analyze the results gathered from the Qualtrics survey, a series of independent samples *t*-tests and hierarchal multiple regressions were performed on IBM Statistical Package for Social Sciences (SPSS; IBM Corp, 2020). A total of four separate independent samples *t*-tests were conducted to answer the first and second research questions. More specifically, the migraine and non-migraine samples were compared on levels of anxiety symptoms (1a), depression symptoms (1b), trauma symptoms (1c), and gender-based discrimination (2a). After, a series of bivariate correlations were conducted to assess correlations between demographics and each outcome variable in the migraine group. Next, to evaluate the third, fourth, and fifth research questions, a total of eight hierarchal multiple regressions were conducted. For the third research question, migraine frequency and migraine-related disability were entered as independent variables and levels of anxiety symptoms (3a), depression symptoms (3b), and trauma symptoms (3c) were entered as dependent variables for each of three separate hierarchal multiple regressions. For the fourth research question, gender-based

discrimination was entered as independent variable and levels of anxiety symptoms (4a), depression symptoms (4b), and trauma symptoms (4c) were entered as dependent variables for each of three separate hierarchal multiple regressions. Finally, for the fifth research question, gender-based discrimination was entered as the independent variable and migraine frequency (5a) and migraine-related disability (5b) were entered as dependent variables for each of two separate hierarchal multiple regressions.

Chapter 3: Results

3.1 Data Cleaning

3.11 Accuracy of Data Entry

All dependent variables were evaluated for data accuracy through the examination of descriptive statistics. Recorded values for each variable were within range. Means and standard deviations for each variable were plausible. Codes for missing values were accurately programmed.

3.12 Missing Data

All dependent variables were screened for missing values through the assessment of descriptive statistics. Missing values for each scale were excluded using pairwise. On SPSS, excluding cases pairwise removes participant's data if they are missing responses for particular analyses, but these participants' data will still be included within other analyses if their responses are present (Pallant, 2020).

3.13 Univariate Outliers

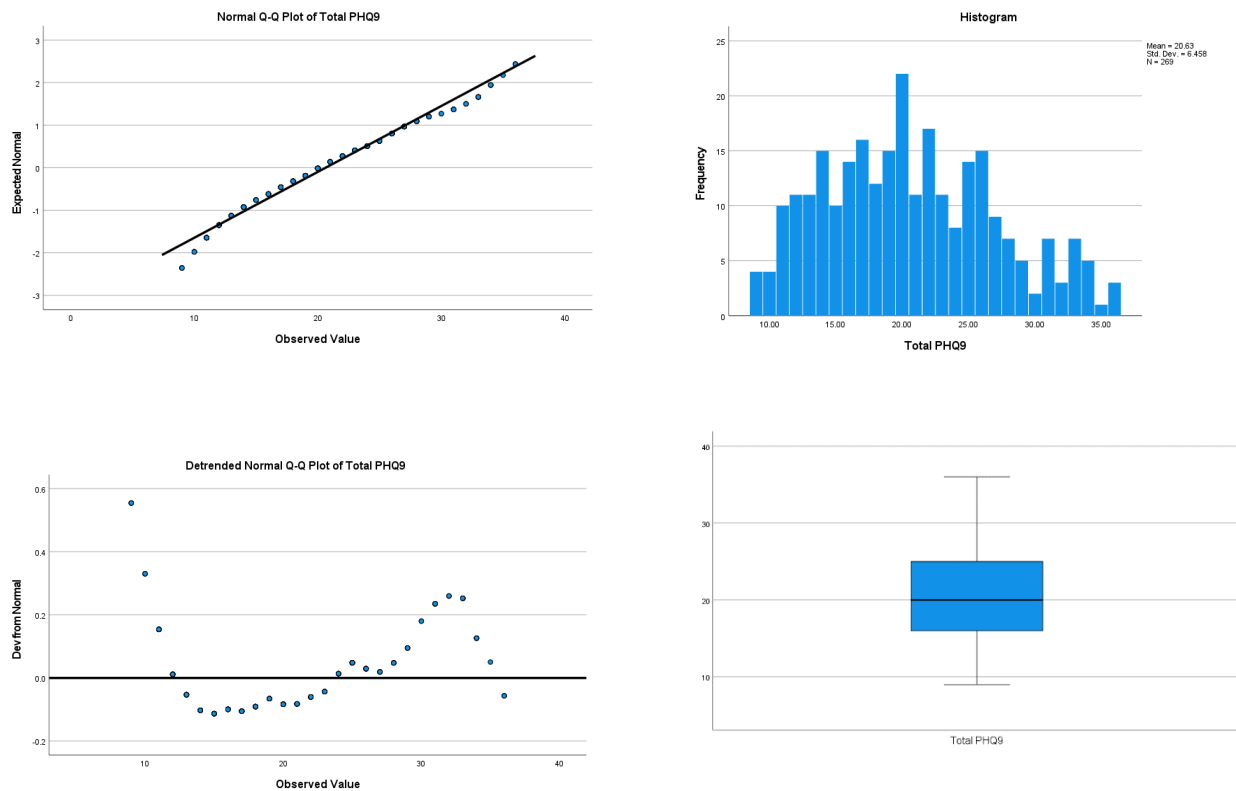
Dependant variables were evaluated for univariate outliers through the examination of boxplot distributions. Potential outliers were identified by circles outside of the boxplots generated by SPSS. Outliers appear if they range 1.5 box-lengths from the edge of the box

(Pallant, 2020). No outliers were identified for any of the dependant variables (see *Figures 1, 2, and 3*).

3.14 Normality of the distributions

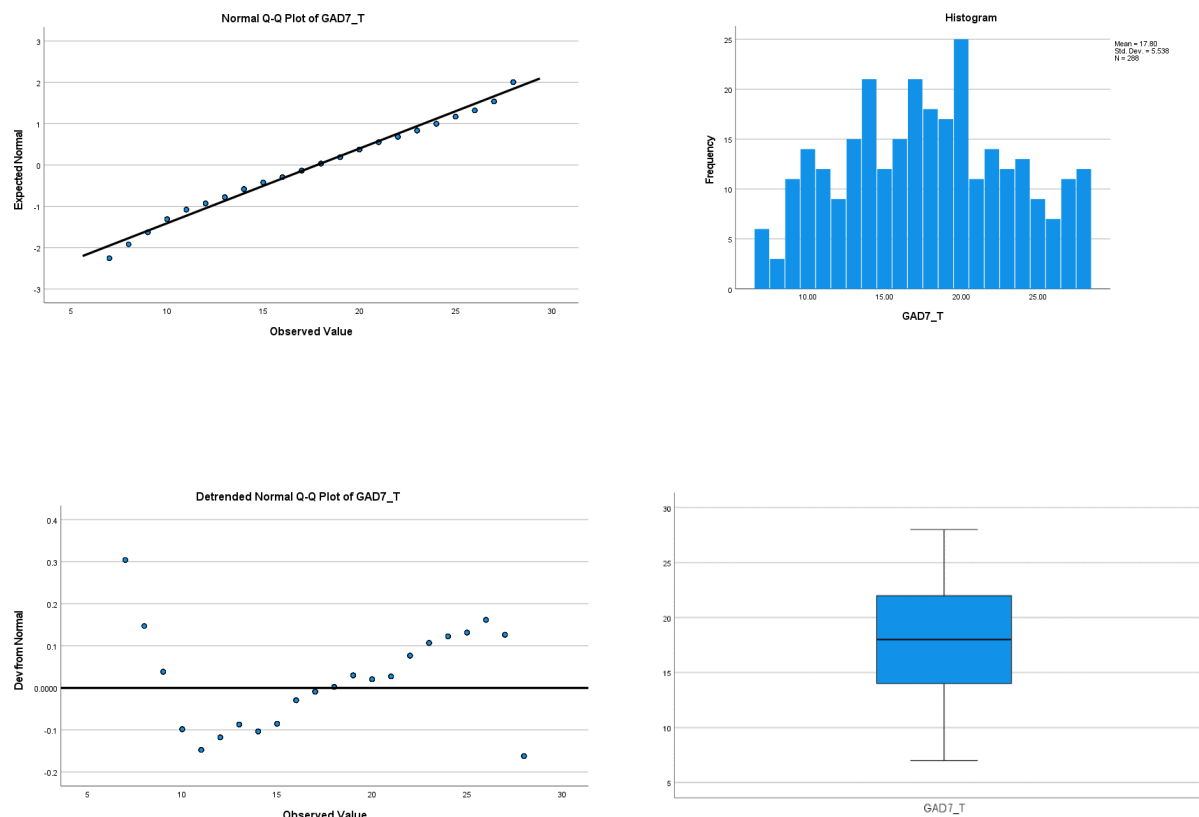
All dependent variables (i.e., anxiety, depression, & trauma) were screened for the assumption of normality through the examination of histograms, boxplots, and detrended normal Q-Q plots (see *Figures 1, 2, and 3*). Anxiety and depression values were identified as meeting the assumption of normality; however, trauma values were identified as not meeting the assumption of normality. Consequently, square root transformations were performed on the trauma values (see *Figure 4*). All outlined analyses were conducted with both non-transformed and transformed variables to determine if changes in significance were present. Both non-transformed and transformed variables resulted in the same significance level; therefore, only the non-transformed results are reported.

Figure 1. Normal Q-Q Plot, Histogram, Detrended Normal Q-Q Plot and Boxplot for Total PHQ9



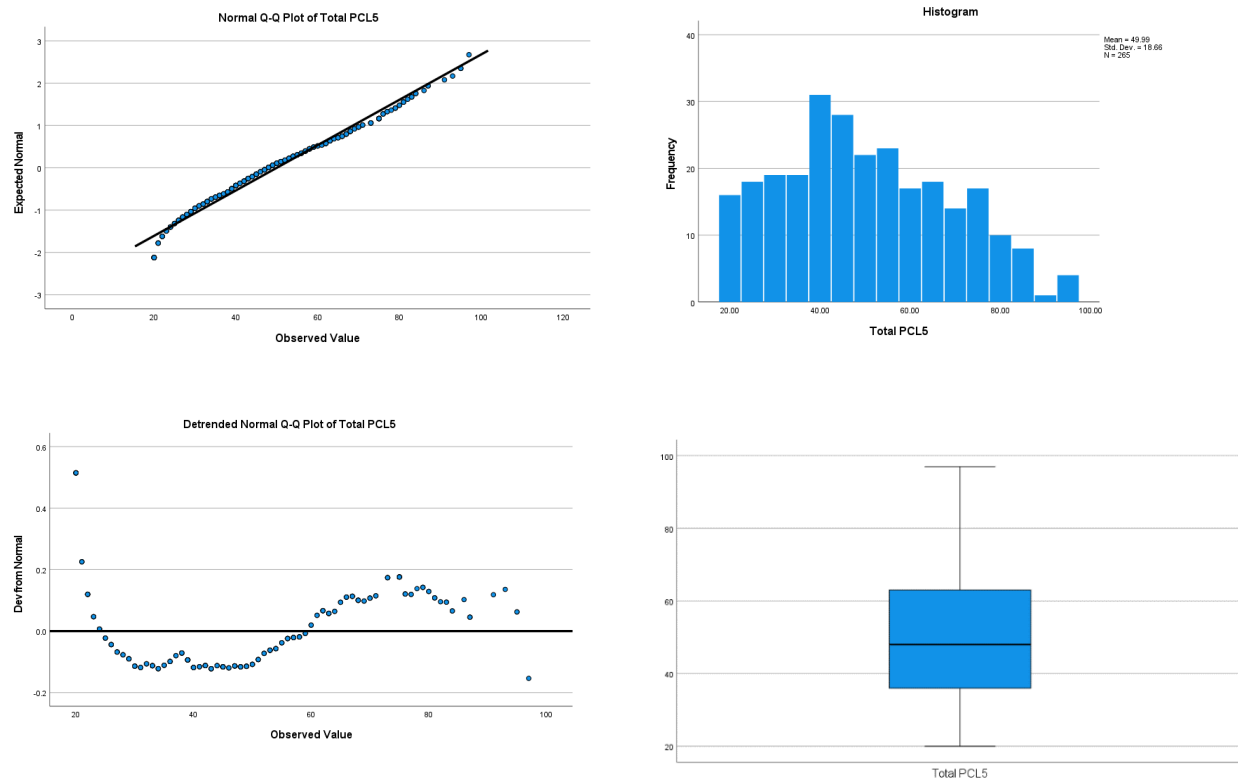
Note. $N = 269$. PHQ9 = Patient Health

Figure 2. Normal Q-Q Plot, Histogram, Detrended Normal Q-Q Plot and Boxplot for Total GAD7



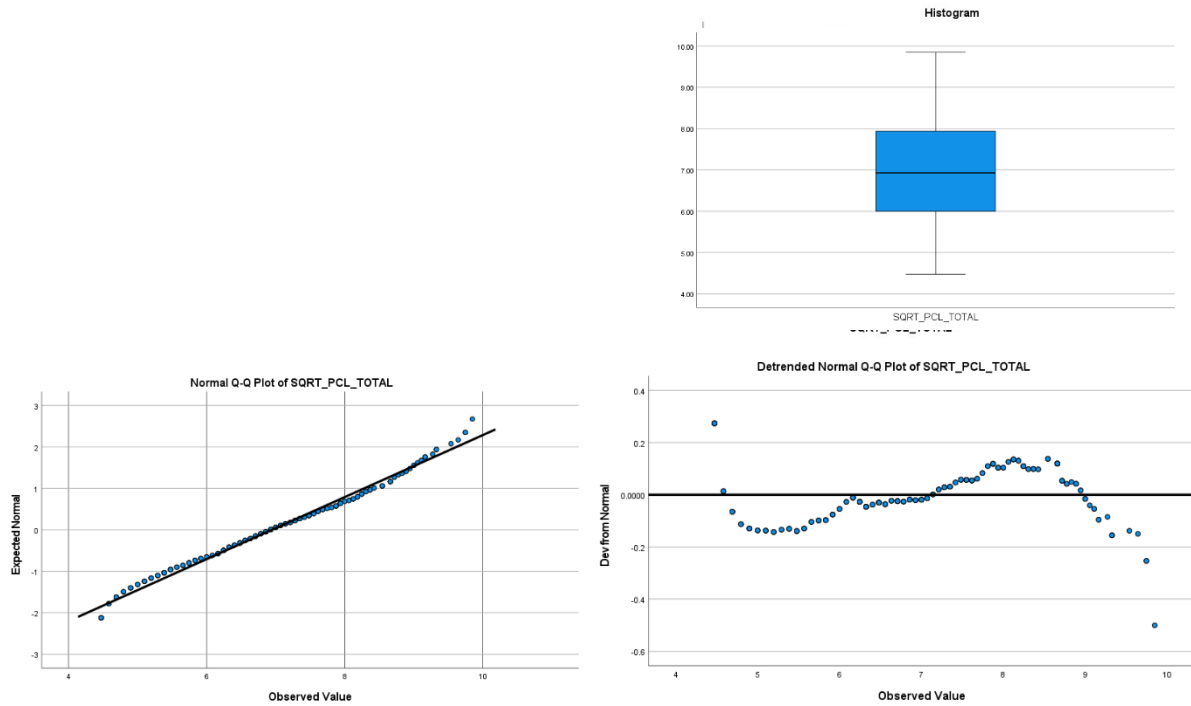
Note. $N = 288$. GAD7 = Generalized Anxiety Disorder.

Figure 3. Normal Q-Q Plot, Histogram, Detrended Normal Q-Q Plot and Boxplot for Total PCL5



Note. $N = 265$. PCL5 = The PTSD Checklist for DSM-5.

Figure 4. Normal Q-Q Plot, Histogram, Detrended Normal Q-Q Plot and Boxplot for Square Root Transformed PCL5



Note. $N = 265$. PCL5 = The PTSD Checklist for DSM-5.

3.15 Internal Consistency

All outcome scales demonstrated good (i.e., $\alpha > .80$) to great (i.e., $\alpha > .90$) reliability (see *Table 1*).

Table 1. Cronbach's Alphas for Each Questionnaire

Variable	α	N of Items
GAD-7	.899	7
PHQ-9	.890	9
PCL-5	.949	20
InDI-A	.912	9
InDI-D	.904	9

3.2 Demographic Characteristics

Participants were excluded if they did not fill out any part of the questionnaire (i.e., $n = 62$) or only filled out the demographics questionnaire (i.e., $n = 9$). After excluding the participants who did not complete the required survey components a total of 292 participants were included within the sample. Within the participant sample, 110 participants identified as living with migraine and 182 indicated they did not experience migraine. Overall, participants self-reported their sexual orientation as straight (i.e., 225), lesbian (i.e., 2), bisexual (i.e., 29),

queer (i.e., 7), pansexual (i.e., 7), asexual (i.e., 3), and other (i.e., 11). Further, participants identified their race to be White, (i.e., 139), Black (i.e., 32), Indigenous (i.e., 13), Chinese (i.e., 4), Filipino (i.e., 7), South Asian (i.e., 33), Arab (i.e., 2), and other (i.e., 19). All participants were between the ages of 18 and 61. Participant characteristics in between the migraine versus non-migraine sample are outlined in *Table 2* and *Table 3*.

Table 2. Participants age in years

Variable	<i>M</i> (SD)
<i>Migraine Group</i>	24.03 (8.30)
<i>Non-Migraine Group</i>	21.74 (5.79)

Table 3. Participant Demographics

Variable	N (%)	
	Migraine (n = 110)	Non-Migraine (n = 182)
Sexual Orientation		
<i>Straight</i>	81 (73.63%)	144 (79.12%)
<i>Lesbian</i>	—	2 (1.09%)
<i>Bisexual</i>	18 (16.36%)	11 (6.04%)
<i>Queer</i>	1 (0.90%)	6 (3.29%)
<i>Pansexual</i>	3 (2.72%)	4 (2.19%)
<i>Asexual</i>	—	3 (1.64%)
<i>Other</i>	4 (3.63%)	7 (3.84%)
Race		

<i>White</i>	62 (55.45%)	77 (42.30%)
<i>Black</i>	5 (4.54%)	27 (14.83%)
<i>Indigenous</i>	4 (3.63%)	9 (4.94%)
<i>Chinese</i>	2 (1.81%)	2 (1.09%)
<i>Filipino</i>	2 (1.81%)	5 (2.74%)
<i>South Asian</i>	14 (12.72%)	19 (10.43%)
<i>Arab</i>	—	2 (1.09%)
<i>Other</i>	5 (4.54%)	14 (7.69%)

Note. $N = 192$.

3.3 Independent Samples *T*-Tests

To test Research Question 1 (i.e., Are levels of mental health symptoms significantly different in the migraine versus non-migraine sample?) and Research Question 2 (i.e., Are levels of reported gender-based discrimination significantly different in the migraine versus non-migraine sample?), a series of independent samples *t*-tests were conducted. Specifically, it was hypothesized that worse mental health symptoms (i.e., anxiety, depression, trauma) and gender-based discrimination (i.e., anticipated discrimination, lifetime day-to-day discrimination) would

be reported within the migraine group compared to the non-migraine group. A series of independent samples *t*-tests indicated a significant difference in the migraine sample in anxiety scores ($t(286) 5.190, p < .001$, one-tailed), depression scores ($t(267) 4.276, p < .001$, one-tailed), and trauma scores ($t(263) 4.457, p < .001$, one-tailed) compared to the non-migraine group. The effect sizes for anxiety (Cohen's $d = .632$), depression (Cohen's $d = .538$), and trauma (Cohen's $d = .570$) scores were all in the medium range. Further, a series of independent samples *t*-tests indicated significant differences in the migraine group in anticipated discrimination ($t(268) 2.225, p = .013$, one-tailed) and lifetime day-to-day discrimination ($t(196.077) 2.692, p = .004$, one-tailed) compared to the non-migraine group. Anticipated discrimination (Cohen's $d = .280$) and lifetime day-to-day discrimination (Cohen's $d = .346$) had a small effect size. Independent samples *t*-test results are shown in *Table 4*.

Table 4. *Independent Samples T-Tests Results*

Variable	Migraine	Non-Migraine	
	<i>M</i> (SD)	<i>M</i> (SD)	<i>p</i>
<i>Anxiety</i>	19.88 (5.70)	16.53 (5.04)	<.001
<i>Depression</i>	22.73 (6.69)	19.36 (5.98)	<.001
<i>Trauma</i>	56.54 (19.75)	46.27 (16.97)	<.001

<i>Anticipated Discrimination</i>	22.84 (8.82)	20.41 (8.57)	.013
<i>Lifetime Day-to-Day Discrimination</i>	25.27 (8.95)	22.33 (8.20)	.004

3.4 Correlations

One significant Pearson correlation was found between demographic characteristics and outcome variables in the migraine group. Sexual orientation was significantly correlated with trauma ($p = .010$).

3.5 Regression Results

3.5.1 Migraine Frequency and Migraine-Related Disability

To test Research Question 3 (i.e., Within the migraine sample, do migraine characteristics significantly predict mental health symptoms?). A series of hierarchal multiple regressions was conducted. First, a two-model regression with trauma symptoms as the dependant variable and sexual orientation and migraine characteristics (i.e., migraine frequency and migraine-related disability) as the predictor variables in the first and second step, respectively, was conducted. The first model, $N = 107$, $F(1, 75) = 5.780$, $p = .019$, $R^2 = .072$, and second model, $N = 96$, $F(8, 68) = 3.599$, $p = .002$, $R^2 = .297$, were statistically significant. Further, the change from the first to second model, $\Delta F(1, 68) = 3.124$, $p = .006$, $\Delta R^2 = .226$, was statistically significant. In model one, sexual orientation ($\beta = 2.893$, $t = 2.404$, $p = .019$) was a significant predictor of trauma symptoms and migraine frequency ($\beta = .325$, $t = 2.680$, $p = .009$) significantly predicted trauma symptoms in model two. The last model accounted for 29.7% ($R^2 = .297$) of the variance in trauma symptoms.

In addition, a second two-model regression was conducted with anxiety symptoms as the dependant variable and sexual orientation and migraine characteristics as the predictor variables in the first and second steps, respectively. The first model, $N = 107$, $F(1, 77) = 2.512$, $p = .117$, $R^2 = .032$, was not statistically significant, while the second model, $N = 108$, $F(8, 70) = 2.215$, $p = .036$, $R^2 = .202$, was statistically significant. In addition, the change from the first to second model, $\Delta F(7, 70) = 2.135$, $p = .051$, $\Delta R^2 = .170$, approached statistical significance. In model two, migraine frequency ($\beta = .100$, $t = 2.718$, $p = .008$) was a significant predictor for anxiety symptoms. The final model accounted for 20.2% ($R^2 = .202$) of the variance in anxiety symptoms.

Lastly, a third two-model regression was conducted with depression symptoms as the dependent variable and sexual orientation and migraine characteristics as the predictor variables in the first and second steps, respectively. The first model, $N = 107$, $F(1, 77) = 2.302$, $p = .133$, $R^2 = .029$, was not statistically significant; however, the second model, $N = 101$, $F(8, 70) = 3.818$, $p = .001$, $R^2 = .304$, was significant. The change from the first to second model, $\Delta F(7, 70) = 3.946$, $p = .001$, $\Delta R^2 = .275$, was also statistically significant. For the second model, migraine frequency ($\beta = .133$, $t = 3.287$, $p = .002$) was significantly predictive of depressive symptoms. Model two accounted for 30.4% ($R^2 = .304$) of the variance in depressive symptoms.

3.52 Gender Based Discrimination & Mental Health Symptoms

To investigate Research Questions 4 (i.e., Within the migraine sample, does gender-based discrimination predict mental health symptoms?) a series of hierarchal multiple analyses was conducted. First, a two-model regression with depression symptoms as the dependent variable and sexual orientation as well as gender-based discrimination (i.e., anticipated discrimination, lifetime day-to-day discrimination) as the predictor variables in the first and second steps,

respectively, was conducted. The first model, $N = 107$, $F(1, 93) = 2.781$, $p = .099$, $R^2 = .029$, was not significant, while the second model, $N = 101$, $F(3, 91) = 17.526$, $p = .001$, $R^2 = .366$, was statistically significant. The change from the first to second model, $\Delta F(2, 91) = 24.204$, $p = .001$, $\Delta R^2 = .337$, was also statistically significant. In model two, lifetime day-to-day discrimination ($\beta = .426$, $t = 5.921$, $p < .001$) was a significant predictor of depressive symptoms. The final model accounted for 36.6% ($R^2 = .366$) of the variance in depressive symptoms.

A second two-model regression was conducted with anxiety symptoms as the dependant variable and sexual orientation and gender-based discrimination as predictor variables in the first and second steps, respectively. The first model, $N = 107$, $F(1, 94) = 3.067$, $p = .083$, $R^2 = .032$, was not statistically significant, while the second model, $N = 101$, $F(3, 92)$, $p < .001$, $R^2 = .297$, was significant. The change from the first to second model, $\Delta F(2, 92) = 17.352$, $p < .001$, $\Delta R^2 = .265$, was significant. In the second model, lifetime day-to-day discrimination ($\beta = .273$, $t = 4.254$, $p < .001$) was a significant predictor of anxiety symptoms. The second model accounted for 29.7% ($R^2 = .297$) of the variance of anxiety.

Finally, a third two-model regression was completed with trauma symptoms as the dependent variable and sexual orientation and as gender-based discrimination as the predictor variables in the first and second steps, respectively. The first model, $N = 107$, $F(1, 89) = 6.859$, $p = .010$, $R^2 = .072$, and the second model, $N = 101$, $F(3, 87) = 20.294$, $p < .001$, $R^2 = .642$, were statistically significant. The change from the first to second model, $\Delta F(2, 87) = 25.150$, $p < .001$, $\Delta R^2 = .340$, was significant. In model one, sexual orientation ($\beta = 2.893$, $t = 2.619$, $p = .010$) was a significant predictor of trauma symptoms. Further, in model two, anticipated discrimination ($\beta = .469$, $t = 2.171$, $p = .033$) and lifetime day-to-day discrimination ($\beta = 1.060$, t

= 5.073, $p = <.001$) were significant predictors of trauma. The final model accounted for 64.2% ($R^2 = .642$) of the variance in trauma.

3.53 Gender Based Discrimination & Migraine Characteristics

To examine Research Question 5 (i.e., Within the migraine sample, does gender-based discrimination predict migraine characteristics?), a series of hierarchical multiple regressions were performed. First, a two-model regression with migraine frequency as the dependent variable and sexual orientation and gender-based discrimination as predictors in the first and second step, respectively. The first model, $N = 107$, $F(1, 92) = .153$, $p = .697$, $R^2 = .002$, and the second model, $N = 101$, $F(3, 90) = 35.746$, $p = .194$, $R^2 = .051$, were not statistically significant. Further, the change from the first to second model, $\Delta F(2, 90) = 2.327$, $p = .103$, $\Delta R^2 = .049$, was not statistically significant. In the second model, lifetime day-to-day discrimination ($\beta = .132$, $t = 2.091$, $p = .039$) was a significant predictor of migraine frequency. The final model accounted for 5.1% ($R^2 = .051$) of the variance in migraine frequency.

Second, a two-model regression was conducted with migraine disability (i.e., migraine-related absence from work or school) as a dependent variable with sexual orientation and gender-based discrimination as predictors in the first and second step, respectively. The first model, $N = 107$, $F(1, 79) = .327$, $p = .569$, $R^2 = .064$, and the second model, $N = 101$, $F(3, 77) = 1.246$, $p = .299$, $R^2 = .046$, were not statistically significant. The change from the first to second model, $\Delta F(2, 77) = 1.703$, $p = .189$, $\Delta R^2 = .042$, was also not statistically significant. No significant predictors were found for model one or two. The second model accounted for 4.6% ($R^2 = .046$) of the variance in migraine-related absence from work or school.

Third, a two-model regression with migraine disability (i.e., migraine-related decrease in work or school productivity) as the dependent variable and sexual orientation as well as gender-based discrimination as predictors in the first and second step, respectively. The first model, $N = 107$, $F(1, 79) = .229$, $p = .633$, $R^2 = .054$, was not significant, however the second model, $N = 101$, $F(3, 77) = 3.307$, $p = .025$, $R^2 = .338$, was statistically significant. The change from the first to second model, $\Delta F(2, 77) = 4.834$, $p = .011$, $\Delta R^2 = .111$, was statistically significant. In the second model, lifetime day-to-day discrimination ($\beta = .494$, $t = 2.952$, $p = .004$) was a significant predictor of migraine-related decrease in work or school productivity. The last model accounted for 33.8% ($R^2 = .338$) of the variance in migraine-related decrease in work or school productivity.

Fourth, a two-model regression with migraine disability (i.e., migraine-related absence in housework) as the dependent variable, with sexual orientation and gender-based discrimination as predictors in the first and second step, respectively. The first model, $N = 107$, $F(1, 78) = .072$, $p = .789$, $R^2 = .030$, was not significant, while the second model, $N = 101$, $F(3, 76) = 3.247$, $p = .026$, $R^2 = .337$, was statistically significant. The change from the first to second model, $\Delta F(2, 76) = 4.831$, $p = .011$, $\Delta R^2 = .113$, was statistically significant. For the second model, lifetime day-to-day discrimination ($\beta = .289$, $t = 2.918$, $p = .005$) was a significant predictor of migraine-related absence in housework. The final model accounted for 33.7% ($R^2 = .337$) of the variance in migraine-related absence in housework.

Further, a fifth two-model regression was conducted with migraine disability (i.e., migraine-related reduction in housework) as the dependent variable, as well as sexual orientation and gender-based discrimination as predictors in the first and second step, respectively. The first model, $N = 107$, $F(1, 79) = .009$, $p = .926$, $R^2 = .000$, was not significant, however the second

model, $N = 101$, $F(3, 77) = 6.299$, $p < .001$, $R^2 = .010$, was statistically significant. The change from the first to second model, $\Delta F(2, 77) = 9.443$, $p < .001$, $\Delta R^2 = .197$, was statistically significant. In model two, lifetime day-to-day discrimination ($\beta = .725$, $t = 4.012$, $p < .001$) was a significant predictor of migraine-related reduction in housework. The final model accounted for 1.0% ($R^2 = .010$) of the variance in migraine-related reduction in housework.

Lastly, a sixth two-model regression with migraine disability (i.e., migraine-related absence from social events) as the dependent variable, with sexual orientation and gender-based discrimination as predictors in the first and second step, respectively. The first model, $N = 107$, $F(1, 79) = 4.261$, $p = .042$, $R^2 = .226$, was not significant, while the second model, $N = 101$, $F(3, 77) = 3.482$, $p < .020$, $R^2 = .346$, was statistically significant. The change from the first to second model, $\Delta F(2, 77) = 2.985$, $p < .056$, $\Delta R^2 = .068$, was marginally significant. In model one, sexual orientation ($\beta = .658$, $t = 2.064$, $p = .042$) was a significant predictor of migraine-related absence from social events. The last model accounted for 34.6% ($R^2 = .346$) of the variance in migraine-related absence from social events.

CHAPTER 4: Discussion

4.1 Summary

The current study aimed at investigating the relationship between migraine characteristics (i.e., frequency, disability), gender-based discrimination (i.e., anticipated discrimination, lifetime day-to-day discrimination) and mental health symptoms (i.e., depression, anxiety, trauma) among adult women. Participants registered via the University of Regina's Psychology Participant Pool and completed a set of online self-report questionnaires pertaining to their experiences of gender-based discrimination, mental health symptoms and (as appropriate) migraine-related symptoms.

Analyses revealed that mental health symptoms and gender-based discrimination scores were higher within the migraine group versus the non-migraine group. Further, among the migraine group, results indicated that migraine frequency and lifetime day-to-day discrimination was a significant predictor for anxiety, depression, and trauma symptoms. Among the migraine sample, anticipated discrimination was found to be significantly predictive of trauma symptoms. Further, gender-based discrimination and, specifically, lifetime day-to-day discrimination, was a marginally significant predictor of migraine frequency, among participants who experience migraine. Gender-based discrimination was not significantly predictive of migraine-related absence from work or school for individuals with migraine. However, lifetime-day-to-day discrimination was significantly predictive of migraine-related reduction in work or school productivity, absence of household work, and a decrease in housework within the migraine only sample. Lastly, within the migraine group, findings revealed that gender-based discrimination was a significant predictor of migraine-related absence from social events, however no individual predictors were significant.

4.2 Interpretation

The first research question, which hypothesized that anxiety, depression, and trauma scores would be higher within the migraine sample versus the non-migraine sample, was supported by the current study's findings. All three mental health symptoms (i.e., anxiety, depression, trauma) were higher scores among the participants who indicated experiencing migraines than those who indicated they did not. This finding coincides with previous studies which outline mental health symptoms to be more prevalent among individuals living with migraine compared to those without (De Leeuw et al., 2005; Fuller-Thomson et al., 2017; McWilliams, 2004; Molgat & Patten, 2005).

The second research question, which hypothesized that levels of gender-based discrimination would be greater within the migraine group compared to the non-migraine group, was supported by our results. Anticipated discrimination and lifetime day-to-day discrimination scores were both higher within the migraine sample versus the non-migraine sample. This result is partially consistent with previous research, which has found a history of discriminatory experiences among samples of individuals living with migraines and women generally (Rosendale et al., 2022; Statistics Canada, 2023). To our knowledge, little research has been conducted specifically on the role discrimination against women plays in migraine samples. Since both women and individuals living with migraine are likely to experience discrimination, it is likely gender-based discrimination would be reported more among women experiencing migraines than those who do not.

The third research question, which hypothesized that migraine frequency and migraine-related disability would positively predict greater levels of anxiety, depression, and trauma symptoms, was partially supported by the present study's findings. Migraine frequency was found to be significantly predictive of symptoms of anxiety, depression and trauma. These findings support previous research which demonstrates that more frequent migraines often lead to greater psychiatric symptoms (Minen et al., 2016; Zwart et al., 2002). In contrast with our predictions, migraine-related disability was not a significant predictor for any of the mental health symptoms. These findings contrast with past literature which demonstrates that anxiety and depressive symptoms lead to greater migraine-related disability (Seng et al., 2018). However, studies also suggest that symptoms of anxiety and depression themselves, over symptoms of migraines, are what prevent individuals from participating in their daily activities (Seng et al., 2018). For example, individuals with depression may experience anhedonia, which

leads them to not engage in daily activities, rather than their head pain (Seng et al., 2018). For this reason, perhaps participants in the current study understood their daily disability to be attributable to their mental health symptoms rather than their migraine symptoms, resulting in an insignificant relationship between migraine-related disability and mental health symptoms.

The fourth research question, which hypothesized that gender-based discrimination would positively predict levels of anxiety, depression, and trauma, was partially supported by our results. Lifetime day-to-day discrimination was significantly predictive of depression, anxiety, and trauma symptoms, while anticipated discrimination was only a significant predictor for symptoms of trauma. These findings are consistent with previous research which demonstrates that women who experience gender-based discrimination typically have worse mental health symptoms (Hackett et al., 2019). Further, individuals with trauma often report significant levels of anxiety surrounding future events (Center for Substance Abuse Treatment, 2014). Consequently, the higher level of prospective anxiety endured among individuals with PTSD may explain the stronger association between anticipated discrimination and trauma over the other mental health symptoms.

The fifth research question, which hypothesized that gender discrimination would positively predict migraine frequency and migraine-related disability, was partially supported by the present findings. Lifetime day-to-day discrimination was a significant predictor of migraine frequency. Further, lifetime day-to-day discrimination was a significant predictor of migraine-related decrease in work or school productivity and reduction in housework. However, lifetime day-to-day discrimination was not significantly predictive of migraine-related absence in work or school or absence from social events. Further, anticipated discrimination was not significantly predictive of migraine frequency or migraine-related disability. Current literature suggests that

individuals who experience higher levels of discrimination may see negative impacts to their health (American Psychological Association, 2019). Therefore, it is anticipated to see that lifetime day-to-day discrimination had a significant impact on individuals migraine characteristics. A study investigating the relationship between anticipated discrimination, experienced discrimination, and symptoms of depression found experienced discrimination to be associated with worse long-term depressive symptoms (Jhon et al., 2021). Consequently, perhaps it possible that the stress of experiencing gendered discrimination, rather than thinking about potential discrimination (i.e., anticipated discrimination), may have a greater effect on long-term physical health outcomes (e.g., migraine symptoms). However, due to the limited literature on gender-based discrimination within individuals living with migraine, the different effects discrimination had on migraine-related disability are difficult to precisely identify.

4.3 Implications

Findings from this study contribute to the understanding of the relationship between mental health symptoms and migraine among adult women. Current research suggests that mental health symptoms (i.e., anxiety, depression, trauma) are comorbid with migraines (De Leeuw et al., 2005; Fuller-Thomson et al., 2017; McWilliams, 2004; Molgat & Patten, 2005). The current study aligns with these findings, suggesting mental health symptoms are worse among individuals living with migraine. Further, discriminatory experiences have been found among both women and migraine samples (Rosendale et al., 2022; Statistics Canada, 2023). However, the role that discrimination, generally, and gender-based discrimination, specifically, plays on migraine characteristics is greatly understudied. Adding to emergent literature, the current study suggests that gender-based discrimination plays a role in mental health symptoms and migraine-related disability among individuals living with migraine. Current literature

suggests that many healthcare professionals are uneducated and/or inexperienced in providing proper treatment and management for migraines among women (Verhaak et al., 2021).

Therefore, considering the current study's findings, adjusting the medical treatment of migraine to target women and individuals who have experienced gender-based discrimination may significantly improve the lives of those living with migraine. In addition, research suggests that women's healthcare providers currently lack in-depth knowledge surrounding non-pharmaceutical migraine interventions (Verhaak et al., 2021). The comorbidity of mental health symptoms and migraine, highlights a pressing need to update the current healthcare curriculum. Further, the present findings suggest that healthcare education should be reformed to include more comprehensive teachings surrounding psychological-based treatment of migraine. Lastly, the findings provide direction for future research which further investigates the unique relationship between mental health symptoms, discriminatory experiences, and migraines.

4.4 Limitations and Future Directions

When interpreting these findings, it is important to consider the current study's limitations. Since the data was gathered using the University of Regina's Psychology Participant Pool, all participants were students registered in 100-or-200 level psychology courses, leading most participants to be predominantly young adults (i.e., 18 to 26 years of age), and therefore limiting the generalizability of the findings. In addition, since the surveys were administered via online self-report measures the effects of social desirability and response biases among participants may have affected the results (Salters-Pedneault, 2023; Wright, 2005). Furthermore, not all eligible individuals were represented within the current study's sample due to possible limited accessibility to proper technology (i.e., computer and Internet access). It should also be

noted that most of the participants self identified their race as White and their sexuality as straight, further limiting the generalizability of the findings.

Future research is needed to better understand the intersectional relationship between mental health symptoms, discriminatory experiences, and migraine characteristics among women. Considering lifetime day-to-day discrimination was more frequently found to be predictive of mental health symptoms and migraine-related disability, future studies should investigate the effect different discrimination experiences have on migraine characteristics. Further, future studies should investigate similar symptoms within different age, racial backgrounds, and sexual orientation samples to increase the generalizability of the findings. Within future work, longitudinal study designs may offer more insight towards the consistency and severity of the role between mental health and migraines. In addition, only individuals who self-identified as women were included within the sample. Consequently, future research may investigate these outcomes within a sample of individuals whose sex is female, since both biological and social factors can influence one's overall health outcomes and pain experiences (American Psychological Association, 2018b).

4.6 Conclusion

The present study contributes towards the current body of existing research literature investigating mental health symptoms among individuals experiencing migraine. Specifically, it explores the impact of migraine characteristics and gendered discrimination on anxiety, depression, and trauma symptoms among women living with migraine. The results of the current study support existing literature suggesting that mental health symptoms are worse within migraine populations compared to the general population (De Leeuw et al., 2005; Fuller-Thomson et al., 2017; McWilliams, 2004; Molgat & Patten, 2005). Further, the present findings

support previous literature, that individuals with migraine have a history of discriminatory experiences (Rosendale et al., 2022). The results of the current study add to an emergent field of literature suggesting that gender-based discrimination influences mental health symptoms and migraine-related disability among women experiencing migraine. Specifically, findings from this study demonstrate that gender-based discrimination plays a role in work or school productivity and household work among women living with migraine. Therefore, application of this study's results may influence mental health and migraine assessments and treatments that are tailored specifically towards women living with migraine. Further, these findings suggest future research needs to investigate the unique experiences and needs of women experiencing migraine.

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Appendix A

Ethics Approval

Research Ethics Board (REB): Application # 369

Title: The Relationship Between Migraines and Mental Health in Women

Approval Date: 23-Oct-2023

Renewal Date: 23-Oct-2024

- PI: Venezya Thorsteinson
- Supervisor: Natasha Gallant

The University of Regina Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol, or related documents.

Any significant changes to your proposed method, procedures or related documents should be submitted as an amendment for Research Ethics Board consideration in advance of implementation.

ONGOING REVIEW REQUIREMENTS

In order to receive annual renewal, a status report must be submitted to the Research Ethics Board for consideration one month in advance of the current expiry date each year the study remains open, and upon study completion.

Please refer to the following website for the renewal and closure forms:

<https://www.uregina.ca/research/for-faculty-staff/ethics-compliance/human/ethicsforms.html>

- Kim Dorsch
Research Ethics Board Chair
University of Regina

Appendix B
Eligibility Questionnaire

Thank you for your interest in this study! Before you can proceed, we need to make sure that you are eligible for this study. Please answer the following question(s).

Are you at least 18 years of age?

- Yes
- No

Skip To: End of Survey If Are you at least 18 years of age? = No

Do you identify as a woman?

- Yes
- No

Skip To: End of Survey If Do you identify as a woman? = No

Appendix C

Consent Form

Project Title: The Relationship Between Migraines and Mental Health in Women

Researcher: Venezya Thorsteinson, Undergraduate Honours Student, Department of Psychology, University of Regina, (306) 337-3227, Venezya.Thorsteinson@uregina.ca

Supervisor: Natasha Gallant, Ph.D. Director, Aging, Residents, and Caregivers (ARC) Research Unit, Assistant Professor, Department of Psychology, University of Regina, (306) 585-4219, Natasha.Gallant@uregina.ca

Co-Investigator: Chelsea Russill, Research Coordinator, Aging, Residents, and Caregivers (ARC) Research Unit Honours Student, Department of Psychology, University of Regina, (306) 337-3227, Chelsea.Russill@uregina.ca

What is the purpose of this study?

The aim of the proposed study is to better understand the relationship between migraines and mental health outcomes within women. We are interested in seeing how anxiety, depression, trauma and discrimination play a role in the experiences of women with migraines. We are also interested in understanding how these outcomes affect the ways in which women experiencing migraines are able to comfortably live their lives and complete their daily tasks. In addition, we seek to investigate how mental health outcomes and trauma experiences differ between women who do and do not experience migraines.

What does participation in this study involve?

If you choose to participate in this study, you will be asked to follow a link to a Qualtrics survey. You will be asked to complete a series of eligibility screening questions to ensure that you are at least 18 years of age and identify as a woman. You will then be asked if you experience migraines. If you experience migraines, you will be asked to answer questions about your migraines including your migraine frequency, pain intensity, characteristics of your migraines, and diagnosis. You will then be asked to ask a series of questionnaires on the topics of anxiety, depression, discrimination, and trauma. Lastly, you will be asked to complete a demographics questionnaire asking about your age, gender identity, sexual orientation, racial background, and location. It should take you no longer than 1 session of up to 60 minutes to complete the set of online self-report questionnaires. Please feel free to ask any questions regarding the procedures and goals of the study or your role.

What are the potential risks of participating in this study?

Due to the topic of study, some questions may be distressing to you. If you experienced significant distress during or following your participation in this study, we encourage you to call your local crisis helpline or emergency department. Community supports include the University of Regina's Counselling Services (<https://www.uregina.ca/student/counselling/>), Online Therapy

Unit (<https://www.onlinetherapyuser.ca/>), Psychology Training Clinic (<https://www.uregina.ca/arts/psychology/programs/graduate-programs/clinical-program/training-clinic.html>), and the Regina Mental Health Clinic (<https://www.rqhealth.ca/departments/mental-health/adult-mental-health-clinics>). Additional resources include Wellness Together Canada (<https://wellnesstogether.ca/en-CA>) and the Canadian Mental Health Association (<https://cmha.ca/>).

What are the potential benefits of participating in this study?

Findings from this study may lead to improvements in the assessment and management of migraines among women. In appreciation for your time taking this survey, you will receive one credit towards any qualifying 100 or 200 level psychology course that you are currently enrolled in.

Will my participation in this study be kept anonymous and confidential?

The study's researchers and supervisor will be the only persons with access to the data and these persons will employ the strictest rules of anonymity and confidentiality. Electronic data will be kept in password-protected databases on password-protected computers. To keep your electronic data confidential, it is strongly recommended that you complete the survey on a private (rather than public) computer and/or server as well as clear your browser history and/or cache following survey completion. The data will be used to fulfill completion of the Undergraduate Psychology Honours thesis. Additionally, data from this study will be published in peer-reviewed journal articles, shared on the ARC Research Unit website (www.arcresearch.ca), Twitter (@ARCResearchUnit), Instagram (@arcresearchunit), Facebook (@ARC Research Unit), and presented at academic conferences and community events. Participants will not be directly identified in any research presentation. All data will be stored for no less than seven years following publication. When it is time to destroy the data, electronic data will be permanently deleted.

What happens if I decide to withdraw my consent to participate in the study?

We hope that you will assist us with this study; however, your decision to participate is completely voluntary. You can choose to answer only those questions that you are comfortable answering by selecting the "Prefer not to answer" option or skipping past certain questions. You may withdraw from the study at any time and for any reason without a need for explanation and without penalty of any sort. If you wish to exit the survey at any time, click the "End Survey" button at the bottom of your survey page. Whether you choose to complete the entire set of questionnaires or not will have no effect on you receiving your course credit. Should you wish to withdraw from completing the set of questionnaires, please click the "Skip to Next Questionnaire" buttons. You will have until you click "Finish Survey" button at the end of the survey to review and change your information. However, due to the anonymous nature of the online questionnaires, your data cannot be withdrawn from the study after it has been collected. Therefore, partial responses will be kept.

What will happen after this study?

Results of this study will be available by the end of August 2024. To obtain results from the study, you may request a copy of the results from the Researchers or Supervisor. Please note that reaching out to the Researchers or Supervisor will result in your identity no longer being anonymous. If you wish to remain anonymous, you are welcome to access a summary of the results the Supervisor's website at www.arcresearch.ca.

Who do I contact if I have any questions or concerns?

This project has been approved on ethical grounds by the University of Regina Research Ethics Board on (insert date). If you have any questions, or would like more information about the study, please contact the principal investigator, Venezya Thorsteinson, at Venezya.Thorsteinson@uregina.ca or at (306) 337-3227 or the Supervisor, Natasha Gallant, at Natasha.Gallant@uregina.ca or at (306) 585-4219. If you have any questions or concerns about your rights as a research participant, you may contact the Chair of the University of Regina's Research Ethics Board at (306) 585-4775 or at research.ethics@uregina.ca. Participants may call the Research Ethics Office's toll-free number at (866) 966-2975.

How do I provide my consent to participate in this study?

If you have read and understood the information in the Participant Consent Form, and are still interested in participating in this study, then you can proceed to the questionnaires. By completing and submitting the questionnaires, your free and informed consent is implied and indicates that you understand the above conditions of participation in this study.

Appendix D

A Warm Welcome to the Study

Welcome to our study!

We are looking to better understand the role that trauma, anxiety, and depression play within individuals living with migraines. To do so, we want to hear from people like you. That's why we designed this survey.

For the next 60 minutes, you will navigate through several survey questions. We will ask you about your migraines, your response to stressful life events, your experiences with depression, anxiety, and discrimination. Lastly, we will ask a few pieces of information about you (e.g., age, gender). Your answers to these questions will help our team better understand people's experiences of migraines.

Finally, please be aware that some of the survey questions will ask you about your personal experiences with discrimination and mental health. Some people may be uncomfortable with these types of questions; therefore, if you prefer not to answer a set of questions on one of these topics, please select the "Skip to the next questionnaire" option at the bottom of that survey page.

We thank you for your interest in our study!

Appendix E
Pre-Treatment Migraine Headache Questionnaire

How many migraine headaches do you experience per month?

How many regular headaches do you have per month?

	Mild									Severe
How painful are your migraine headaches?	1	2	3	4	5	6	7	8	9	10

Where are your migraine headaches usually located? (Check all that apply)

- Behind right eye
- Right temple
- Above right eyebrow
- Back of head on right
- Behind left eye
- Left temple
- Above left eyebrow
- Back of head on left
- Behind both eyes
- Both temples
- Above both eyebrows
- Back of head on both sides
- Other: _____

- Prefer not to answer

How old were you when your migraine headaches started?

How would you describe your migraine headaches? (Check all that apply)

- Throbbing/pounding
- Ache/pressure
- Like a tight band
- Dull
- Other: _____
- Prefer not to answer

Do your migraine headaches awaken you at night?

- Never
- Occasionally
- Often

Do any of the following occur before or during your migraine headaches? (Check all that apply)

- Nausea
- Bothered by light/noise
- Eyelid puffy
- Feeling lightheaded
- Difficulty concentrating
- Runny nose
- Vomiting
- Blurred/double vision
- Eyelid droops
- Numbness/tingling
- Speech difficulty
- Diarrhea
- Sparkling, flashing, or coloured lights
- Loss of vision
- Weakness of arm or leg
- Loss of consciousness
- Other: _____
- Prefer not to answer

Do any of the following bring on your migraine headaches or make them worse? (Check all that apply)

- Stress (worry, anger)
- Letdown after stress
- Air travel
- Missed meals
- Certain foods (chocolate, cheese, beer, MSG)
- Bright sunshine
- Loud noise
- Fatigue
- Sexual activity
- Weather change
- Heavy lifting
- Certain smells or perfume
- Coughing, straining, bending over
- Other: _____
- Prefer not to answer

Do any of the following make your migraine headaches better?

- Rest
- Hot or cold compress
- Pressure over migraine headache area
- Exercise

- Massage
- Quiet and darkness
- Warm shower
- Other: _____
- Prefer not to answer

If applicable, do your migraine headaches change with the following? (Check all that apply)

- Menstrual periods
- Birth control pills
- Pregnancy
- Other hormonal drugs
- Other: _____
- Not applicable
- Prefer not to answer

Do any of your family members have migraine headaches?

- No
- Yes, explain who: _____

Have you ever had a head or a neck injury requiring medical treatment?

- No
- Yes, describe: _____

Have you ever been diagnosed to have any health disorder (e.g. high blood pressure, asthma, heart disease, gastric ulcers)?

- No
- Yes, please list: _____

Have you had your migraine headaches evaluated by a neurologist?

- No
- Yes, when: _____

Display This Question:

If Have you had your migraine headaches evaluated by a neurologist? = Yes, when:

What was the diagnosis? (Check all that apply)

- Migraine
- Tension-type
- Cluster
- Other: _____
- Prefer not to answer

List all past tests you had for your migraine headaches:

List all past treatment(s) for your migraine headaches:

Are you taking any prescription drugs to treat your migraine headaches?

- No
- Yes, list the medications:

Display This Question:

If Are you taking any prescription drugs to treat your migraine headaches? = Yes, list the medications:

How many times in the last month have you used the prescribed medications?

Are you taking any over-the-counter drugs to treat your migraine headaches?

- No
- Yes, list the medications:

Display This Question:

If Are you taking any over-the-counter drugs to treat your migraine headaches? = Yes, list the medications:

How many times in the last month have you used the over-the-counter medications?

What is your estimated cost per month of your migraine headache medications and visits to the physician?

How much of these medical expenses are covered by your health insurance?

How would you rate your general health in the last month? (Check one)

- Excellent
- Good
- Fair
- Poor

To what extent do your migraine headaches affect your quality of life? (Check one)

- Extremely
- Moderately
- Very little
- Not at all

Appendix F

The Migraine Disability Assessment Test

Please answer the following questions about ALL of the headaches you have had over the last 3 months. Write your answer in the box below each question. Write zero if you did not have the activity in the last 3 months.

On how many days in the last 3 months did you miss work or school because of your headaches?

How many days in the last 3 months was your productivity at work or school reduced by half or more because of your headaches? (Do not include days you counted in question 1 where you missed work or school.)

On how many days in the last 3 months did you not do household work (such as housework, home repairs and maintenance, shopping, caring for children and relatives) because of your headaches?

How many days in the last 3 months was your productivity in household work reduced by half or more because of your headaches? (Do not include days you counted in question 3 where you did not do household work.)

On how many days in the last 3 months did you miss family, social or leisure activities because of your headaches?

On how many days in the last 3 months did you have a headache? (If a headache lasted more than 1 day, count each day.)

	No pain at all									Pain as bad as it can be
On a scale of 0 - 10, on average how painful were these headaches?	1	2	3	4	5	6	7	8	9	10

Appendix G

The PTSD Checklist for DSM-5

Below is a list of problems that people sometimes have in response to a very stressful experience. Please read each problem carefully and then indicate how much you have been bothered by that problem in the past month.

	Not at all	A little bit	Moderately	Quite a bit	Extremely
Repeated, disturbing, and unwanted memories of the stressful experience?	1	2	3	4	5
Repeated, disturbing dreams of the stressful experience?	1	2	3	4	5
Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it)?	1	2	3	4	5
Feeling very upset when something reminded you of the stressful experience?	1	2	3	4	5
Having strong physical reactions when something reminded you of the stressful experience (for example,	1	2	3	4	5

heart pounding, trouble breathing, sweating)?					
Avoiding memories, thoughts, or feelings related to the stressful experience?	1	2	3	4	5
Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)?	1	2	3	4	5
Trouble remembering important parts of the stressful experience?	1	2	3	4	5
Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted,	1	2	3	4	5

the world is completely dangerous)?					
Blaming yourself or someone else for the stressful experience or what happened after it?	1	2	3	4	5
Having strong negative feelings such as fear, horror, anger, guilt, or shame?	1	2	3	4	5
Loss of interest in activities that you used to enjoy?	1	2	3	4	5
Feeling distant or cut off from other people?	1	2	3	4	5
Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?	1	2	3	4	5
Irritable behavior, angry outbursts, or acting aggressively?	1	2	3	4	5
Taking too	1	2	3	4	5

many risks or doing things that could cause you harm?					
Being “superalert” or watchful or on guard?	1	2	3	4	5
Feeling jumpy or easily startled?	1	2	3	4	5
Having difficulty concentrating?	1	2	3	4	5
Trouble falling or staying asleep?	1	2	3	4	5

Appendix H

The Patient Health Questionnaire

Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	1	2	3	4
Feeling down, depressed, or hopeless	1	2	3	4
Trouble falling or staying asleep, or sleeping too much	1	2	3	4
Feeling tired or having little energy	1	2	3	4
Poor appetite or overeating	1	2	3	4
Feeling bad about yourself – or that you are a failure or have let yourself or your family down	1	2	3	4
Trouble concentrating on things, such as reading the newspaper or watching television	1	2	3	4
Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a	1	2	3	4

lot more than usual				
Thoughts that you would be better off dead or of hurting yourself in some way	1	2	3	4

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

- Not difficult at all
- Somewhat difficult
- Very difficult
- Extremely difficult

Appendix I

GAD-7

Over the last two weeks, how often have you been bothered by the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Feeling nervous, anxious, or on edge	1	2	3	4
Not being able to stop or control worrying	1	2	3	4
Worrying too much about different things	1	2	3	4
Trouble relaxing	1	2	3	4
Being so restless that it is hard to sit still	1	2	3	4
Becoming easily annoyed or irritable	1	2	3	4
Feeling afraid, as if something awful might happen	1	2	3	4

If you checked any problems, how difficult have they made it for you to do your work, take care of things at home, or get along with other people?

- Not difficult at all
- Somewhat difficult
- Very difficult
- Extremely difficult

Appendix J

Intersectional Discrimination Index

These questions are about experiences related to **you being a woman**. This includes both how you describe yourself and how others might describe you.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Because of who I am, a doctor or nurse, or other health care provider might treat me poorly.	1	2	3	4	5
Because of who I am, I might have trouble finding or keeping a job.	1	2	3	4	5
Because of who I am, I might have trouble getting an apartment or house.	1	2	3	4	5
I worry about being treated unfairly by a teacher, supervisor, or employer.	1	2	3	4	5
I may be denied a bank account, loan, or mortgage because of who I am.	1	2	3	4	5
I worry about being harassed or stopped by	1	2	3	4	5

police or security.					
Because of who I am, people might try to attack me physically.	1	2	3	4	5
I expect to be pointed at, called names, or harassed when in public.	1	2	3	4	5
I fear that I will have a hard time finding friendship or romance because of who I am.	1	2	3	4	5

Because you are a woman, have you ...

	Never	Yes, but not in the past year	Yes, once or twice in the past year	Yes, many times in the past year	Always
Heard, saw, or read other joking or laughing about you (or people like you)	1	2	3	4	5
Been treated as if you are unfriendly, unhelpful, or rude	1	2	3	4	5
Been called names or heard/saw your identity used as an insult	1	2	3	4	5
Been treated as if others are afraid of you	1	2	3	4	5
Been stared or pointed at in public	1	2	3	4	5
Been told that you should think, act, or look more like others	1	2	3	4	5
Heard that you or people like you don't belong	1	2	3	4	5
Asked inappropriate, offensive, or overly personal questions	1	2	3	4	5
Been treated	1	2	3	4	5

as if you are less smart or capable than others					
--	--	--	--	--	--

Appendix K

Demographics Questionnaire

Lastly, we would like to ask you for some demographic information. Collecting demographic information enables us to see if differences in migraine experiences exist based on personal characteristics such as gender identity or racial background. It also helps us to understand if there are any gaps in our data to ensure that the information we have is as representative as possible.

What is your age?

- Age: _____
- Prefer not to answer

What is your sexual orientation (for example, straight, gay, lesbian, queer, etc.)?

- Sexual Orientation: _____
- Prefer not to answer

We know that race is a social construct, and that race does not result in biological (including genetic) differences. However, our racial background still has important consequences for us, including how we are treated by individuals, groups, and institutions. What is your racial background (for example, Arab, Black, Indigenous, Chinese, Filipino, South Asian, White, etc.)?

- Race _____
- Prefer not to answer

Where do you currently live?

- Country: _____
- Province/State: _____
- City: _____

Thank you for taking the time to participate in this survey!

Due to the topic of study, some questions may be distressing to you. If you experienced significant distress during or following your participation in this study, we encourage you to call your local crisis helpline or emergency department. Community supports include the University of Regina's Counselling Services (<https://www.uregina.ca/student/counselling/>), Online Therapy Unit (<https://www.onlinetherapyuser.ca/>), Psychology Training Clinic (<https://www.uregina.ca/arts/psychology/programs/graduate-programs/clinical-program/training-clinic.html>), and the Regina Mental Health Clinic (<https://www.rqhealth.ca/department/mental-health/adult-mental-health-clinics>). Additional resources include Wellness Together Canada (<https://wellnesstogether.ca/en-CA>) and the Canadian Mental Health Association (<https://cmha.ca/>).

Appendix L

Survey Educational Debriefing

Thank you for participating in the study entitled “The Relationship Between Migraines and Mental Health in Women.” Below you will find more information on what the study is exploring.

Worldwide migraines are a highly prevalent disease, specifically around one in every nine adults worldwide experience migraines. Research has found that migraines are more frequently experienced by women than by men. In addition, mental health outcomes including anxiety and depression often increase migraine related disability. Trauma and discrimination have also been shown to contribute to higher disability among individuals who suffer from migraine. Migraine disability impacts an individual’s ability to complete their daily tasks and enjoy their lives. However, little research has investigated mental health and trauma outcomes among women experiencing migraines.

The present study was developed to further this area of research by investigating how mental health outcomes and trauma impact women with and without migraine. Specifically, the present study examined the relationship between migraines, anxiety, depression, trauma, discrimination among women. Participants with migraines were asked about their migraines including their migraine frequency, pain intensity, characteristics of your migraines, and migraine diagnosis. All participants, both with and without migraines, were asked about their experience with anxiety, depression, discrimination, and trauma. Both women with and without migraines were included within the present study in order to gain a better understanding of what outcomes were specific to the migraine population.

If you are interested in learning more about this study, or you would like to learn about the results of the study, you may contact the principal investigator, Venezya Thorsteinson, (Venezya.Thorsteinson@uregina.ca), or the supervisor, Natasha Gallant (Natasha.Gallant@uregina.ca). If you have any concerns about your rights as a participant in this study, you may also contact the Research Ethics Board (306-585-4775 or research.ethics@uregina.ca).

Given the nature of the topic under study, some of the questions asked may have been distressing to you. As a reminder, if you experienced significant distress during or following your participation in this study, we encourage you to call your local crisis helpline or emergency department, or access the resources below.

Thank you again for your participation in this study.

Wellness Together Canada

Phone: 1-866-585-0445

Text: WELLNESS (741741)

<https://wellnesstogether.ca/en-CA>

Counselling Services – University of Regina

Location: Room 251 Riddell Centre

Phone: 306-585-4491
Email: counselling.services@uregina.ca
<https://www.uregina.ca/student/counselling/>

Online Therapy Unit - University of Regina
Location: 3737 Wascana Parkway
Phone: [+1.306.337.3331](tel:+13063373331)
Email: Online.Therapy.USER@uregina.ca
<https://www.onlinetherapyuser.ca>

Psychology Training Clinic – University of Regina
Location: College West – Room 020
Phone: 306-585-5685
<https://www.uregina.ca/arts/psychology/programs/graduate-programs/clinical-program/training-clinic.html>

Mental Health Clinic
Location: 3rd Floor, 2110 Hamilton Street, Regina
Phone: 306-766-7800

Canadian Mental Health Association
Location: 1810 Albert Street
Phone: 306-525-9543
<https://cmha.ca/>

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