Exploring the connection between mental health status and coping strategies in chronic migraine patients

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Abstract

Introduction: Migraine, affects a substantial portion of the population, with chronic migraine impacting 1% to 2.2% globally. This study explores the relationship between mental health and coping strategies in chronic migraine patients. Understanding the relationship between mental health and coping strategies in chronic migraine patients is crucial for improving treatment outcomes and enhancing quality of life.

Methods: The quantitative cross-sectional study surveyed chronic migraine patients aged 18-65 within Facebook support groups. The study included 419 respondents. Spearman's correlation analysis, conducted in SPSS, examined the correlations between mental health, coping strategies, neuroticism, and barriers through bivariate correlations. In partial correlation analysis, demographic variables were controlled for by incorporating them into the correlation calculations. The effectiveness of coping strategies in relation to mental health was analysed through descriptive analysis.

Results: Significant negative correlations were found between mental health and both passive coping strategies and neuroticism (r -0.277, $p<0.001$; r -0.448, $p<0.001$), as well as significant positive correlations between mental health and active coping strategies (r 0.198, $p<0.001$). Neuroticism and passive coping are significantly positively correlated (r 0.238, $p<0.001$) and neuroticism and active coping are significantly negatively correlated (r -0.099, p0.045). Mental health and barrier scores are significantly negatively correlated (r -0.396, $p< 0.001$). The active coping mechanisms ‘acceptance of the pain’ and ‘Acceptance of your life with chronic pain’ showed the biggest difference in mental health scores from not finding the coping mechanism effective to finding it effective (1.43;1.45).

Discussion: Low mental health is associated with high levels of neuroticism, greater reliance on passive coping, and reduced engagement in active coping, highlighting that coping cannot be seen separate from the mental health issues patients have. Additionally, barriers to active coping are experienced more when mental health is low and depression is the most prominent barrier, demonstrating the significant impact of mental health. Mental health status influences how effective certain active coping strategies will be, emphasizing the importance of considering psychological well-being in assessing coping outcomes. This analysis underscores the complex interplay between barriers, coping strategies, and mental health in chronic migraine, emphasizing the need for tailored interventions to manage these dynamics effectively and improve patients' quality of life.

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1. Introduction

Migraine is regarded as one of the most prevalent global health conditions and represents the most common neurological disorder (Amiri et al., 2022). The prevalence of migraine is relatively high, impacting approximately 12% to 15% of the global population, while chronic migraine, though less common, still impacts an estimated 1 - 2.2% of individuals globally (Amiri et al., 2022).

A migraine is not just a headache; it is primarily a neurological disorder, directly affecting the brain (Goadsby, 2018). Symptoms encompass more than solely the experience of intense throbbing pain. Symptoms like nausea, vomiting, visual disturbances (aura), sensitivity to light, sound, and smells, as well as cognitive difficulties, can disrupt patients' daily routines and activities. Chronic migraine entails severe headaches occurring on fifteen or more days per month for over three months consecutively, significantly impacting one's physical, social, and professional aspects of life (Murinoca & Krashin, 2015); The Migraine Trust, 2021).

Numerous studies have demonstrated the profound negative impact of chronic migraine on patients' overall quality of life (e.g., Holroyd et al., 2007; Taşkapilioğlu & Karli, 2013; Palacios-Ceña et al., 2017; Buse et al., 2019). Quality of life depends on personal satisfaction with health, including physical, mental, social, and functional well-being (Karimi & Brazier, 2016). Patients frequently describe how pain plays a central role in their lives, calling for strong self-control to mitigate its daily impact (Palacios-Ceña et al., 2017). This involves managing pain-related emotions, adhering to treatment plans, practicing healthy coping strategies, and maintaining a positive mindset despite the challenges posed by pain. Mental health status is an important element within the psychological dimension of quality of life, reflecting emotional, psychological, and social well-being (WHO, 2022). Of particular importance is the negative influence of chronic migraine on the mental health status of patients (Antonaci et al., 2011; Battista et al., 2023).

This negative relationship between chronic migraine and mental health extends to its strong connection with depression, anxiety, and their underlying conditions or feelings. Migraine patients are two to four times more likely to develop depression than people without migraine (Al Ghadeer et al., 2022). Furthermore, approximately 50% of migraine patients report experiencing anxiety symptoms, either from the onset of a migraine, or following a period of chronic migraine. This relationship is reciprocal, as chronic migraine can contribute to depression or anxiety, while depression and anxiety can also increase migraine frequency and severity (Amoozegar, 2017). Mental defeat, which is the inability to manage the pain is also common in chronic migraine patients and contributes to the emotional toll of living with this condition (Pompili et al., 2010). It leads to feelings of helplessness, frustration, being overwhelmed, isolation, emotional distress, and low self-esteem (Tang et al., 2015). These links can be traced back to the significant influence chronic migraine has on one's quality of life. The relentless pain and frequent attacks hinder participation in activities, necessitate plan cancellations, hinder interactions with friends and family, and prevent individuals from living the life they desire. This leads to feelings of sadness and a growing sense of isolation (Parikh & Young, 2019). The persistent pain also results in fatigue, decreased resilience, and heightened anxiety about future migraine episodes. When combined with stress and unhappiness, this situation significantly increases the risk of developing depression, and if left unaddressed, may even lead to suicidal thoughts (Novic et al., 2016; Pompili et al., 2010).

In understanding the mental health of chronic migraine patients, it's important to focus on a specific aspect called neuroticism. Neuroticism is a personality trait associated with heightened emotional responsiveness and vulnerability to stress. It is prevalent among chronic migraine patients. Recent research by Galvez-Sánchez and Montoro Aguilar (2022) emphasizes the significant role of neuroticism

in influencing the choice of coping strategies for these patients, shedding light on the intricate relationship between mental health status and coping choices. People with high levels of neuroticism who for instance experience more negative emotions, worry, and emotional stability, often tend to take refuge in passive coping strategies (Afshar et al., 2015). When emotions are high and overwhelming, active problem-solving and rational thinking are more difficult, resulting in passive coping rather than active coping (Ashina et al., 2017). The mental defeat, comorbid depression, and anxiety that chronic migraines often deal with contribute to elevated neuroticism levels. These high levels of neuroticism and therefore unhelpful coping strategies exacerbate detrimental effects on patients' engagement in activities that enhance their quality of life.

To minimize the impact of chronic migraine and possibly related high levels of neuroticism on the mental health status and quality of life of chronic migraine patients, effectively coping with the disease is of great importance. Coping refers to the specific strategies individuals use to deal with stressors (Peres & Lucchetti, 2010). The outcome of coping should be improved quality of life. Coping well with pain is a highly individual experience, which depends on several factors: being able to identify and avoid migraine triggers, maintaining a regular sleep schedule, adopting a balanced diet, exercising regularly, using positive coping techniques such as mindfulness and relaxation, having a supportive social network, seeking professional help, and adhering to recommended treatment plans (Vowles & McCracken, 2010). Active coping involves taking proactive steps to address and manage chronic migraine symptoms, reduce their impact on daily life, and improve overall well-being (Brown & Nicassio, 1987), whereas passive coping strategies involve avoiding or denying the challenges of chronic migraine rather than actively addressing them (Brown & Nicassio, 1987). Depressive symptoms often coincide with ineffective coping, which naturally seems likely to occur for chronic migraine patients (e.g. Brown et al., 1989; Choi et al., 2012).

Effectively coping with chronic migraine, remains a challenging issue. While cognitive behavioural therapy, mindfulness, and relaxation strategies are often suggested in literature reviews (e.g., Kwekkeboom et al., 2006; Nicholson, 2010; Morley & Williams, 2015; Han, 2023; Sturgeon et al., 2023) as potential ways to improve chronic migraine management and coping for patients, other studies (e.g., Eccleston, 2009; Meise et al., 2022) suggest weak effects of cognitive behavioural therapy. There is a lack of studies on whether chronic migraine patients use active coping strategies, and whether these strategies are effectively helping them to deal with their chronic condition. Possible obstacles to using active coping mechanisms that patients might come across have been looked into in some studies (e.g Bair et al., 2009), but not in relation to mental health and chronic migraine, but concerning patients with other chronic diseases. There are, however, studies on chronic conditions other than chronic migraine that show a relationship between passive coping strategies and depressive symptoms (e.g., Bair et al., 2009; Tomé-Pires et al., 2023; Prell et al., 2021). Passive coping mechanisms such as isolation, not seeking help, medication overuse, and catastrophizing are all linked to poorer quality of life (Holroyd, 2007), more frequent and severe migraines, reduced treatment effectiveness, increased depression, and increased anxiety (Geisser et al., 1994).

To date, there is a notable absence of published research that explored whether individuals with chronic migraines tend to use active or passive coping strategies and what role mental health plays in how patients cope with their chronic condition, i.e. whether people with poor mental health tend to use passive coping strategies and divert to more active coping strategies when their mental health improves, or otherwise. Given the substantial evidence regarding the profound psychological impact of chronic migraine (Pompili et al., 2010; Amoozegar, 2017; Parikh & Young, 2019), and the identification of a specific passive coping mechanism associated with chronic migraine (Rome, 2018) and other chronic conditions (Bair et al., 2009; Tomé-Pires et al., 2023; Prell et al., 2021), there is a

need to investigate the relationship between mental challenges related to these conditions and how people cope.

This study aims to address the lack of understanding of how mental health influences strategies for coping with chronic migraine. Four sub-knowledge gaps were identified and addressed. Firstly, current interventions often overlook the role of mental health, potentially neglecting the need for tailored coping approaches, and thus this study investigated the relationship between mental health status and the use of active or passive coping strategies among chronic migraine patients (e.g. Meise et al., 2022; Kwekkeboom & Gretarsdottir, 2006). Secondly, the influence of neuroticism on coping strategies is insufficiently studied and therefore included in this study by looking at neuroticism levels in relation to mental health (Galvez-Sánchez & Montoro Aguilar, 2022). Thirdly, there is a lack of research on barriers to active coping, particularly in the context of chronic conditions such as migraine (e.g. Jerant et al., 2005; Lindsay et al., 2011; Tomé-Pires et al., 2023). Identifying such barriers can shed light on factors hindering the adoption of active coping mechanisms. Lastly, conflicting findings between theoretical and practical studies regarding the effectiveness of coping mechanisms underscore the importance of understanding patients' needs and the real-world effectiveness of coping strategies (e.g., Kwekkeboom et al, 2006; Nicholson, 2010; Morley & Williams, 2015; Han, 2023; Sturgeon et al., 2023). This study therefore examines the effectiveness of specific active coping mechanisms in improving participants' quality of life and explores the potential influence of mental health on their effectiveness.

The sub-knowledge gaps have led to four research questions. For each research question, a hypothesis was formulated based on the studied literature.

Research Question 1
To what extent is the mental health status of chronic migraine patients related to the use of active or passive coping strategies for chronic migraine?

Hypothesis: The mental well-being of individuals with chronic migraine influences their coping strategies, leading to a greater reliance on passive coping mechanisms and reduced use of active coping strategies to manage their condition.

Research Question 2
To what extent does the neuroticism level of chronic migraine patients relate to and influence the use of active or passive coping strategies for managing chronic migraine?

Hypothesis: A high level of neuroticism results in greater use of passive coping strategies for managing chronic migraine.

Research Question 3
To what extent do barriers hindering active coping exhibit relations with mental health, neuroticism, and both active and passive coping strategies?

Hypothesis: A high level of neuroticism results in greater use of passive coping strategies for managing chronic migraine.

Research question 4
To what extent is the mental health status of chronic migraine patients related to the effectiveness of coping strategies for chronic migraine?

Hypothesis: The mental health status of chronic migraine patients has a negative effect on the effectiveness of coping strategies for chronic migraine.

2. Theoretical Framework

This theoretical framework contains all concepts important to the explanation of why there is a relationship between mental health status and the use of active or passive coping strategies. The following image (Figure 1) explains this relationship and was assembled for this study with the use of an existing theoretical model on neuroticism (Galvez-Sánchez & Montoro Aguilar, 2022*)* in combination with different theories from literature (e.g. Brown & Nicassio, 1987; Holroyd et al., 2007; Tang et al, 2015 Higgins et al, 2015). Galvez-Sanchez and Montoro Aguilar theorized about the link between mental health and coping but did not include the role of coping in the model on neuroticism. This is why for this study the original model was extended with the relationship between mental health, neuroticism and coping, and different types of passive and active coping mechanisms. This new model makes important links between mental health and coping mechanisms that are often overlooked, but essential in understanding the chronic migraine patient.

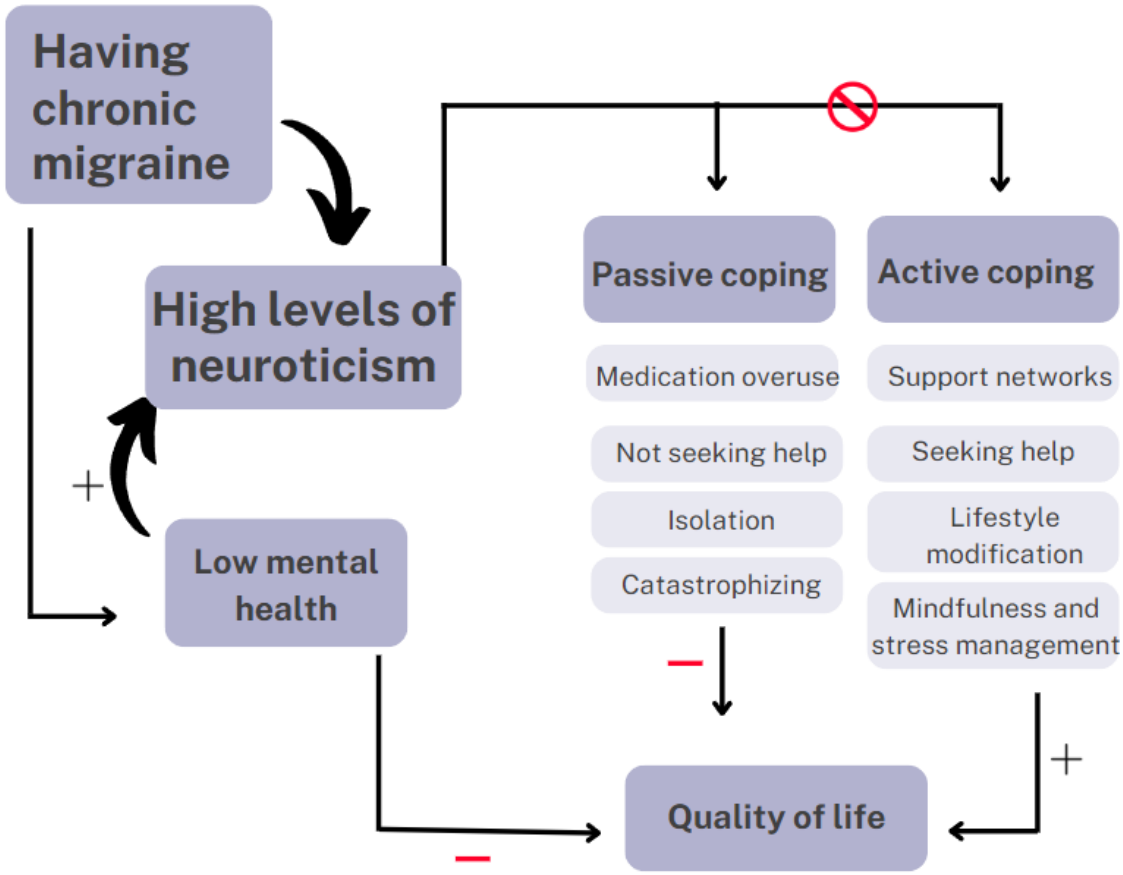


Figure 1: Theoretical model, illustrating the relationship between mental health status and coping strategies in chronic migraine.

Mental health specifically focuses on the psychological and emotional aspects of well-being. It encompasses an individual's emotional resilience, coping mechanisms, cognitive functioning, and ability to cope with stressors and challenges effectively and function productively (Fusar-Poli et al., 2020). Mental health is a state of optimal psychological functioning characterized by positive emotions, resilience, and adaptive coping strategies (Gautam et al., 2024). This implies that good mental health and healthy coping go hand in hand.

Neuroticism is one of the five major personality traits in the Five-Factor Model of personality and is characterized by susceptibility to anxiety and emotional disorders (Widiger & Oltmanns, 2017). Neuroticism is prevalent in migraine patients, and they tend to experience more negative emotions, anxiety, worry, and emotional instability and are more sensitive to stressors than non-migraine individuals. Recently, Galvez-Sánchez & Montoro Aguilar (2022) found that the personality trait known as neuroticism plays a crucial role in determining whether chronic migraine patients employ active or passive coping strategies to deal with their condition. Neuroticism has been known to play a role in chronic migraine for some time (Ashina et al., 2017), however, the link to coping has not been extensively investigated before. More insight into its role in the coping process might provide a plausible explanation for the connection between mental health status and the use of coping strategies as neuroticism and mental health seem to be linked.

Migraine patients with comorbid depression and anxiety often exhibit higher neuroticism levels. Depression may increase the risk of migraine becoming chronic, with neuroticism potentially playing a mediating role (Galvez-Sánchez, & Montoro Aguilar, 2022). There exists a bidirectional relationship between neuroticism and chronic migraine. Chronic migraine often coincides with higher levels of neuroticism, potentially worsening the condition and leading to its prolonged presence. In turn, having a predisposition to neuroticism can influence the development and course of the disease (Galvez-Sánchez, & Montoro Aguilar, 2022).

Chronic migraine is frequently accompanied by feelings of mental defeat (Tang et al, 2015). The inability to control migraine onset can intensify these emotions, especially when treatment options prove ineffective. Additionally, chronic migraine often brings about anxiety and fear as individuals anticipate the next debilitating attack (Estave et al, 2021). This anxiety can lead to constant vigilance (a state of high awareness to detect potential danger, threats, or changes in a situation), hindering one's ability to fully enjoy life (Estave et al, 2021). Depression is also a common consequence of chronic migraines (Parikh & Young, 2019). Depression can both result from and trigger migraine attacks, creating a vicious cycle that affects mental well-being. These emotional experiences all contribute to elevated levels of neuroticism among patients as well as diminish the quality of life and overall mental health of the patients.

Individuals with high levels of neuroticism often resort to passive coping strategies in response to stressors. This inclination can be a result of their negative interpretation of events, avoidance of negative emotions, perceived lack of control over their disease, fear of failure and rejection, and the short-term relief provided by these strategies (Afshar et al., 2015). Consequently, they may withdraw from challenging situations, suppress their feelings, avoid seeking help, fear taking proactive steps, and prioritize temporary relief over long-term solutions (Galvez-Sánchez, & Montoro Aguilar, 2022). The use of passive coping strategies means patients engage less in activities that could enhance their quality of life and thereby further diminish their quality of life and mental health (Rotman et al., 2018; Cerea et al., 2021).

3. Methods

To answer the research questions, quantitative research was conducted through a cross-sectional study. In this cross-sectional study, data is collected from a sample of chronic migraine patients at a single point in time to assess relationships between mental health, neuroticism, coping, barriers, and effectiveness. The study participants were approached and questioned by means of an online standardized questionnaire.

3.1 Data collection

3.1.1 Sample selection

Participants were recruited from online Facebook support groups for patients with chronic migraine (Table 1) and came from different regions worldwide. In order to gain access to these support groups, an initial approach was made to the group administrators. The study was done by means of an online questionnaire, which was created in Qualtrics and assessed the variables neuroticism, mental health, passive coping, active coping, barriers to coping, and effectiveness (Appendix A). The survey had the potential to reach a maximum of 66,240 individuals across the Facebook groups where it was posted. However, the exact number of individuals with chronic migraine within these groups is uncertain because individuals with other headache disorders may also join the Facebook groups, and some individuals may belong to multiple support groups.

Table 1: Facebook support groups in which the survey was distributed.

Support Group	**Number of members**
Chronic migraine warriors	4498
Support for chronic migraine	2585
ORIGINAL Chronic migraine support group	3216
Hoofdpijnnet	6000
Chronic migraine awareness UK & ROI	6200
Migraine + Chronic Pain + Depression / Anxiety etc Support Group	3513
Hoofdpijn, migraine, clusterhoofdpijn	4000
Migraine Community: Support, Resources, and Discussion	6398
New chronic migraine support group	29830
Total	**66240**

The survey targeted individuals aged 18-65 suffering from chronic migraine, excluding children and the elderly due to the higher prevalence of migraine within the specified age group (Victor et al., 2010). Inclusion was limited to individuals experiencing chronic migraine, while those dealing with periodic migraine or other forms of headache were excluded. This decision was motivated by the substantial impact of chronic migraine on patients' mental health and their ability to manage pain (American Migraine Foundation, 2023).

A questionnaire survey was selected as the preferred method for investigating the influence of mental health on coping mechanisms due to its capacity to systematically gather data. This approach facilitated the collection of objective, quantitative data, enabling the examination of a representative sample from the study population. Population research through interviews focuses more on the opinions of individuals and provides subjective, qualitative information. By adding some additional questions to the questionnaire about coping barriers and effectiveness, some qualitative data was collected as well (the opinions of the patients). Another reason for a survey format was wanting to consider the medical condition of the participants. An interview format might have been too demanding for individuals

dealing with chronic migraine. Participants were given the opportunity to take breaks and manage their time as needed during the survey, allowing them to tailor the experience to their own needs (personal communications in Facebook groups). Another important motivation is that by conducting online surveys, you have allowed reach, which would likely be much smaller if you had to interview people; moreover, due to time constraints, you would also have been able to conduct far fewer interviews.

3.1.2 Sample size

The study required a sample size of 381 respondents to obtain a representative sample of the investigated population. This calculation was based on a confidence level of 95%, a margin of error of 5%, and a population size of 66.240, which represented the number of members in the Facebook groups surveyed. Ultimately, the study exceeded this requirement, with a sample size of 419 patients, thereby enhancing the representativeness and generalizability of the sample.

3.1.3 Data collection instruments

In this study, various factors that could influence the intricate relationship between chronic migraine patients' mental health and their coping strategies were carefully considered. Mental Health status was evaluated using the MHQol score from the Institute for Positive Health (2023), a validated tool for assessing mental health status. The questions within this assessment tool were presented on a Likert scale.

Coping strategies were categorized into passive and active coping, with questions adapted from the Vanderbilt Pain Management Inventory (VPMI) by Brown & Nicassion (1987). These questions aimed to discern whether participants predominantly used passive or active coping mechanisms in response to chronic migraine and were also presented on a Likert scale.

Neuroticism scores were calculated using the validated Eysenck Personality Questionnaire (EPQ) by *Meetinstrumenten in de zorg* (2023), capturing the extent of neuroticism experienced by respondents and its correlation with coping style. These questions were similarly presented on a Likert scale.

Barrier scores, indicating obstacles patients face before engaging in active coping, were derived from research conducted by Bair et al., (2009), and were also presented on a Likert scale, as were questions on effectiveness of coping mechanisms (Chiros & O'Brien (2011).

3.2 Statistical Design

3.2.1 Data cleaning

A total of 552 people were enrolled in the study. Participants who left any questions unanswered in the questionnaire were excluded (n=133). An exception was made for the last two questions which comprised barriers to coping and the effectiveness of active coping mechanisms. Respondents who answered all questions except these two were still included to adequately address the first two research questions. This resulted in 419 persons who responded to all questions up to the second-to-last question in the questionnaire to answer the first two research questions. To answer the third research question the persons who did not fill in the second-to-last question were excluded (n=12) resulting in 407 respondents. To answer the fourth research question the persons who did not fill in the last question of the questionnaire were excluded (n=5) resulting in 403 respondents.

The variables were transformed to align with the respective scoring systems of each validated questionnaire that the questions of the questionnaire used for this study were based on (appendix A). Specifically, the mental health questions were adjusted to encompass scores ranging from 0 – 3, while neuroticism questions were rescaled to 0-1. Additionally, passive and active coping responses were converted to scores spanning 0-4, barrier assessments were transformed to scores of 0-2, and effective

coping scores were adjusted to range from 0-3. Initially, neuroticism scores ranged from 0 to 4. To streamline analysis, responses were categorized into two groups instead of the original five, resulting in scores of 0-1. For each question an individual score was thus obtained.

To get the mean scores of each variable for all respondents combined, first sum scores and then mean scores were calculated. To calculate sum scores, individual question scores were summed up. These totals were then divided by the highest possible score in that category and multiplied by 10, resulting in mean scores on a standardized scale of 10. This process facilitated easier comparison of scores. Consequently, the following scores were derived: mental health score, neuroticism score, passive coping score, active coping score, and barrier score. Creating sum scores for effective coping was more challenging, as a score of 0 indicated that participants did not employ coping mechanisms, which differed in interpretation from scores of 1, 2, and 3. Consequently, no sum scores were collected.

The interpretation of scores across all utilized questionnaires suggests that higher scores generally correspond to better mental health, increased levels of neuroticism, and greater engagement in both active and passive coping strategies. However, without specific guidelines for score interpretation, a threshold of 5.5 is proposed as a criterion for sufficiency. Scores exceeding 5.5 are above average and those below 5.5 are below average.

3.2.2 Statistical methods

The program Statistical Package for the Social Sciences (SPSS) was used for statistical data-analysis. For the assessment of normality, a Shapiro-Wilkinson test was conducted. If the Shapiro-Wilkinson test yields a value greater than 0.05, it suggests normality, a value lower than 0.05 indicates non-normality. To assess linearity, deviations from linearity were examined. If the deviation from linearity exceeds 0.05, it suggests a linear dependence among the variables. If the p-value for the deviation from linearity is less than 0.05, it indicates a non-linear relationship between the variables. The tests for linearity and normality are presented in Appendix B. None of the variables included in the analysis were normally distributed and therefor the Spearman correlation test was used for further data-analysis. In this test -1 represents a perfect negative correlation between two variables, while 1 represents a perfect positive correlation between the two variables. A correlation coefficient of 0 indicates that there is no monotonic relationship between the variables.

Linear relationships were identified between passive coping and mental health, active coping and mental health, as well as neuroticism and both active and passive coping. Additionally, a linear relationship was observed between active and passive coping. However, no linear relationship was found between mental health and neuroticism.

Bivariate correlation analysis was employed to investigate research questions 1-3, exploring the relationships between neuroticism and mental health, mental health and coping strategies (both passive and active), and neuroticism and coping strategies, respectively. To address variations across demographic groups, the data was stratified, and correlations were calculated for each subgroup. Partial correlation analysis was then used to introduce covariates, such as age, gender, duration of dealing with chronic migraine, migraine frequency, occurrence of a migraine on the survey day, educational level, and financial security. These factors can influence patients' utilization of coping strategies, with economic status and education for example potentially affecting access to treatment resources (Chenube & Omumu, 2011). Partial correlation allowed for the examination of the additional effects of covariates on correlations, ensuring a comprehensive consideration of potential influencing factors. For research question four, a descriptive comparison was conducted to assess the effectiveness of individual variables in relation to mental health, passive coping, and active coping.

3.3 Ethical considerations

The study was conducted while taking into account ethical considerations. Participant privacy and confidentiality were prioritized, informed consent was obtained, and measures were implemented to minimize potential participant distress. Participants were also informed of their right to withdraw from the survey at any point without facing consequences.

3.4 Positionality

As an individual affected by chronic migraines, my personal perspective served as both a motivation and a potential challenge in conducting this research. My firsthand experience afforded valuable insights into the challenges faced by chronic migraine sufferers, facilitating the development of a nuanced survey instrument that effectively captured their experiences and provided appropriate support mechanisms. Moreover, my experiential knowledge guided the decision-making process regarding the inclusion of interview methodologies, with careful consideration given to the potential impact on participants with chronic migraines. Nonetheless, the subjectivity associated with personal experience necessitated a vigilant approach to mitigate potential biases in the research. These biases could have resulted in subjective results which would not have been useable. To ensure that the survey instrument remained inclusive and balanced, objectivity was maintained, to avoid unwarranted emphasis on topics that closely mirrored my encounters and perspectives. Recognizing and addressing this potential bias pre-emptively was crucial to safeguard the integrity and impartiality of the study.

4. Results

4.1 Descriptive data

4.1.1 General description of the study population

Table 2 contains a summary of the descriptive statistics of the data. Additional descriptive data can be found in Appendix C. This study contained 419 respondents. Of the 419 respondents, 407 were female (97.1%) and 12 (2.9%) were male. Most participants were aged between 36 and 45 (31.5%) and over one-third of the participants (34.6%) had chronic migraine for more than 20 years, and the largest group (36.8%) had migraine four to seven times in the two weeks previous to filling in the questionnaire, whereas 22.4% had daily migraine attacks during this period. In general, participants were highly educated with 61.9% having an academic degree. The vast majority of the study population (74.5 %) rated their financial security with three to five stars.

The average mental health score of the study population was 5.0 on a scale of zero to ten, implying below average mental health across the patients. The average neuroticism score was 7.7, which suggests relatively high levels of neuroticism. The average passive coping score was 6.8, which means that the average passive coping score was elevated. The average active coping score was 4.7 implying a below average active coping score. The self-rated psychological well-being of past the two weeks scored a 5.4 implying just average mental health. The Self-rated psychological well-being day of filling in the survey scored 5.7, implying a little above average mental health. The average barrier score was 5.8, implying barriers were sometimes experienced.

Table 2: Descriptive Statistics

Variable	N	Mean	Median	%/ SE
Mental Health Score (Likert scale) 0 = poor mental health 10 = perfect mental health	419	5.0	5.24	1.81
Neuroticism score (Likert scale) 0 = no neuroticism 10 = high neuroticism	419	7.7	8.33	2.39
Passive Coping Score (Likert scale) 0 = no use of passive coping 10 = a lot of use of passive coping	419	6.8	6.88	1.46
Active Coping Score (Likert scale) 0 = no use of active coping 10 = a lot of use of active coping	419	4.7	5.00	1.89
Age 18-25 26-35 36-45 46-55 56-65	 39 97 132 100 51			 9.3% 23.2% 31.5% 23.9% 12.2%
How long have you been dealing with chronic migraine? Less than a year Between 1 and 5 years Between 5 and 10 Years	 6 74 86			 1.4% 17.7% 20.5%

Between 10 and 20 years	108			25.8%
More than 20 years	145			34.6%
Gender				
Female	407			97.1%
Male	12			2.9%
Educational level				
Less than high school degree	10			2.4%
High school degree or equivalent	51			12.2%
Some college but no degree	71			16.9%
Associate degree	50			11.9%
Bachelor degree	138			33%
Master's degree	60			14.3%
PhD	11			2.6%
Other	28			6.7%
Self-rated financial security				
1 star	45			10.7%
2 stars	62			14.8%
3 stars	132			31.5%
4 stars	123			29.4%
5 stars	57			13.6%
How often did you have a migraine in the past two weeks?				
Never	6			1.4%
Once	22			5.3%
2-3 times	85			20.3%
4-7 times	154			36.8%
8-13 times	58			13.8%
Daily	94			22.4%
Do you/ did you have a migraine on the day of filling in the survey?				
Yes	252			60.1%
No	169			39.9%
Self-rated psychological well-being past two weeks	419	5.4		1.79
Self-rated psychological well-being day of filling in survey	419	5.7		2.03
Barrier Score (Likert scale) 0 = no barriers experienced in using active coping mechanisms 10 = a lot of barriers experienced in using active coping mechanisms	407	5.8	5.91	1.91
Effectiveness				
Seeking professional help				
Score 0 = never used	7			1.7%
Score 1 = No	31			7.7%
Score 2 = Sometimes	133			32.9%
Score 3 = Yes	233			57.7%
Talking to a psychologist				
Score 0 = never used	96			23.8%
Score 1 = No	92			22.8%
Score 2 = Sometimes	96			23.8%
Score 3 = Yes	120			29.7%

Having supportive friends and family				
Score 0 = never used	8			2.0%
Score 1 = No	18			4.5%
Score 2 = Sometimes	143			35.4%
Score 3 = Yes	235			58.2%
Having support groups with peers				
Score 0 = never used	82			20.3%
Score 1 = No	66			16.3%
Score 2 = Sometimes	143			35.4%
Score 3 = Yes	113			28.0%
Mindfulness				
Score 0 = never used	52			12.9%
Score 1 = No	82			20.3%
Score 2 = Sometimes	166			41.2%
Score 3 = Yes	103			25.6%
Cognitive behavioural therapy				
Score 0 = never used	160			39.6%
Score 1 = No	111			27.5%
Score 2 = Sometimes	83			20.5%
Score 3 = Yes	50			12.4%
Exercising				
Score 0 = never used	22			5.4%
Score 1 = No	143			35.4%
Score 2 = Sometimes	155			38.4%
Score 3 = Yes	84			20.8%
Improving sleep				
Score 0 = never used	28			6.9%
Score 1 = No	62			15.4%
Score 2 = Sometimes	148			36.7%
Score 3 = Yes	165			40.9%
Healthy diet				
Score 0 = never used	19			4.7%
Score 1 = No	97			24.0%
Score 2 = Sometimes	161			39.9%
Score 3 = Yes	127			31.4%
Avoidance of alcohol and drugs				
Score 0 = never used	69			17.1%
Score 1 = No	66			16.3%
Score 2 = Sometimes	107			26.5%
Score 3 = Yes	162			40.1%
Acceptance of the pain				
Score 0 = never used	21			5.2%
Score 1 = No	107			26.5%
Score 2 = Sometimes	171			42.3%
Score 3 = Yes	105			26.0%
Acceptance of your life with chronic pain				
Score 0 = never used	17			4.2%
Score 1 = No	108			26.7%
Score 2 = Sometimes	156			38.6%
Score 3 = Yes	123			30.4%

4.1.2 Mental health

This section shows the results of the participants' mental health scores and their satisfaction levels across the various mental health aspects. Participants on average scored a 5.0 for mental health on a scale of zero (very low mental health) to ten (very high mental health) which implies average mental health. Additional details are outlined in Appendix E1 and Figure 2. The mental health aspect that most patients were dissatisfied with is 'daily activities', as 72.3% of the respondents were (very) dissatisfied with the daily activities they could do on a day. The mental health aspect that most patients were satisfied with is 'relationships', with 69.2% of the participants being (very) satisfied with their relationships.

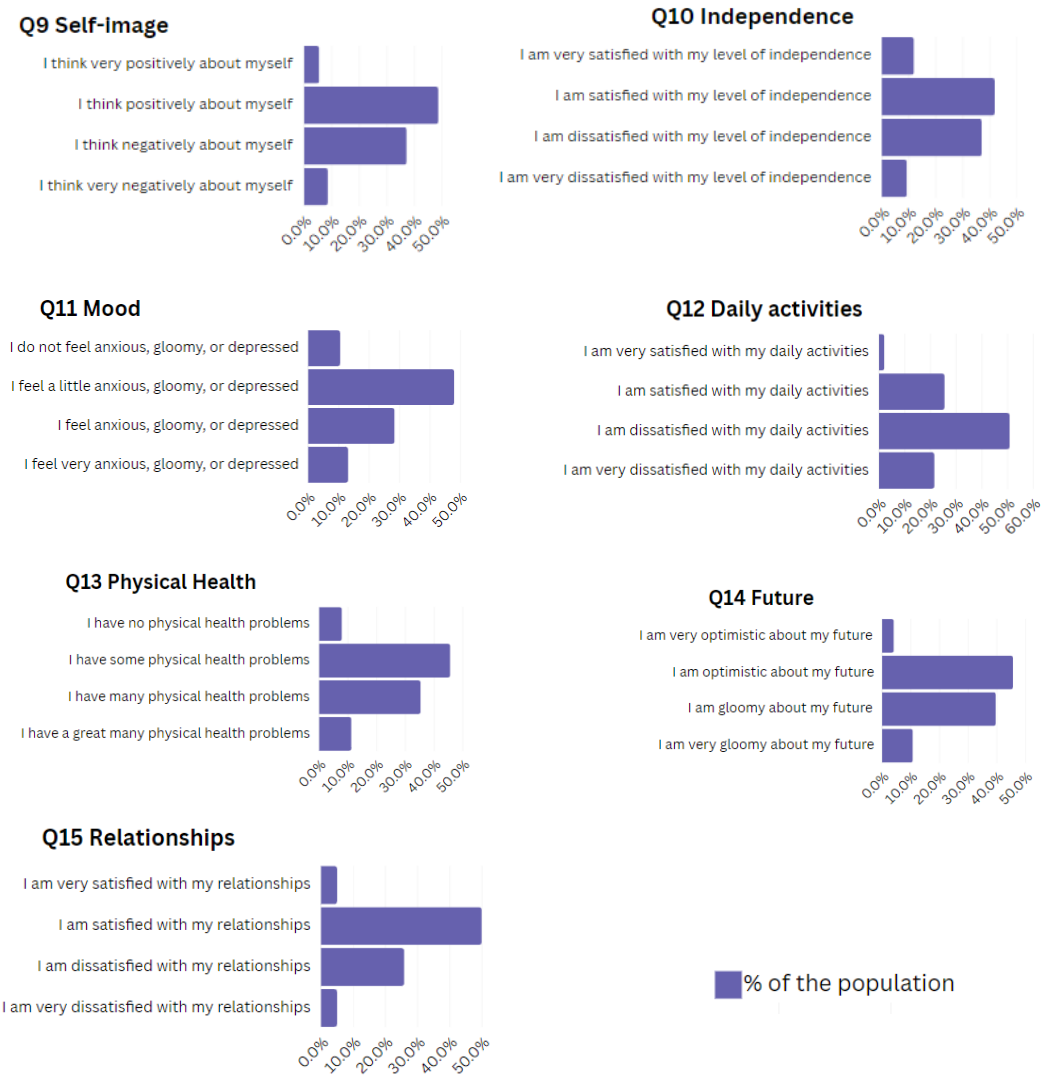


Figure 2: The distribution of respondent answers across different mental health aspects.

4.1.3 Passive coping

The mean score for passive coping was 6.8. On a scale of zero (do not use passive coping mechanisms) to ten (use passive coping mechanisms very often) this means that participants use passive coping mechanisms more often than than they do not. Further details are shown in Appendix E2 and Figure 3. The element that contributes the least to the passive coping score is 'I call a doctor or nurse'; 47% of the respondents strongly disagree with the statement that they call a doctor when they are in pain. The element that adds the most to the passive coping score is 'I reduce my social activities'; 67.1% of the respondents strongly agree with the statement that they reduce their social activities when they are in pain.

Figure 3: The distribution of respondent answers across the different passive coping questions.

4.1.4 Active coping

The mean active coping score is 4.7 on a scale of zero (no active coping mechanisms were used) to ten (active coping mechanisms were used very often). This means that there is a below-average use of active coping mechanisms. Further details are shown in Appendix E3 and Figure 4. The element that contributes the least to the active coping score is 'forgetting the pain' as 69.5% of the respondents disagree to some extent with the statement. The element that adds the most to the active coping score is 'distracting yourself from the pain' as 71.8% of the respondents agrees to some extent that they distract themselves when they are in pain.

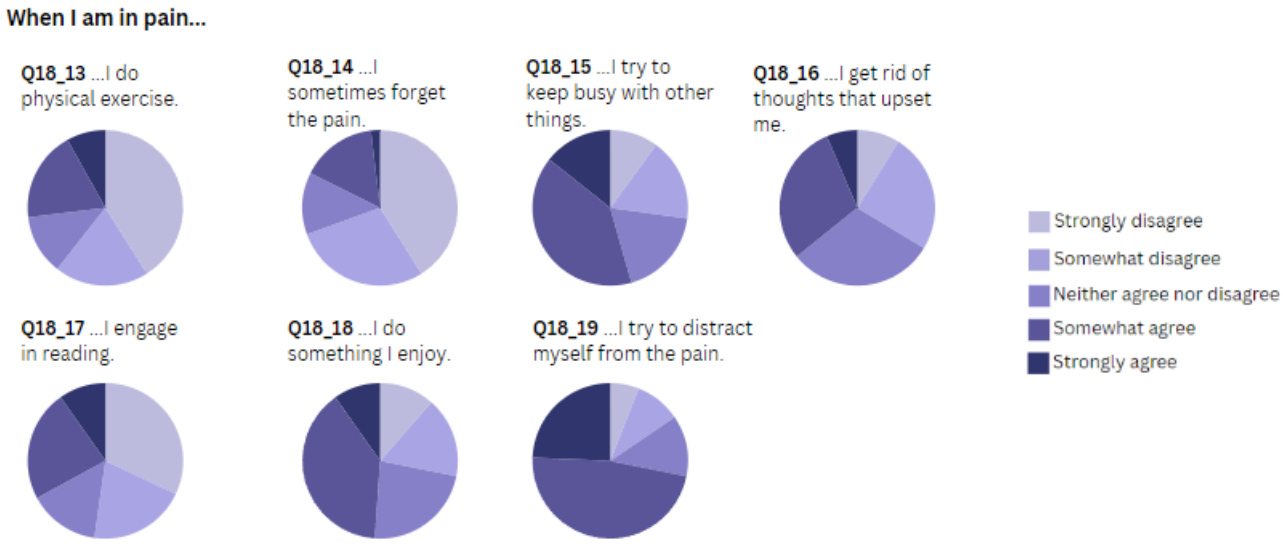


Figure 4: The distribution of respondent answers across the different active coping questions.

4.1.5 Neuroticism

The mean neuroticism score is 7.7 on a scale of zero to ten which implies that chronic migraine patients have above average neuroticism levels. Further details are shown in Appendix E4 and Figure 5. The patients scored highest on 'mood shifts' (88.3%) and 'being a worrier' (88.1%), reflecting the inclination of chronic migraine patients to experience fluctuating moods and persistent worrying. The aspect of neuroticism on which the respondents scored the lowest was 'feeling lonely (66.1%)', although this score still indicates that loneliness is prevalent among chronic migraine patients.

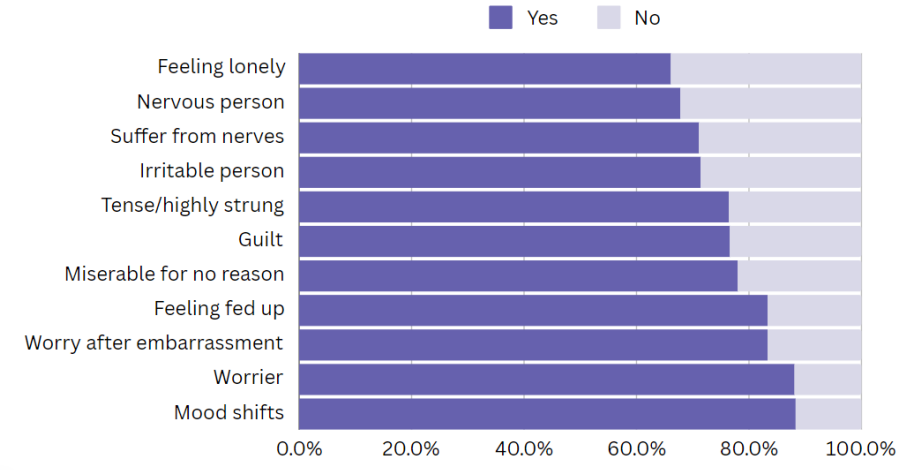


Figure 5: Percentage of respondents that scored yes on each specific neuroticism aspect.

4.1.6 Barrier scores

This section outlines the level of experience respondents had with the different barriers. These questions were answered by by 407 of the 419 participants. The mean barriers score of 5.8 shows, on a scale of zero (never experiencing barriers) to ten (experiencing barriers often), that respondents had above average experience with the barriers. More details are provided in Appendix E5 and Figure 6.

The barriers that participants deemed as most prominent were 'pain interfering with coping effectively' (45.3% often), 'fear of activity' (48.0% often), 'ineffective pain relief from some coping strategies' (47.3% often), and 'stressors' (45.9% often). The barriers participants experienced the least were 'lack of support from friends and family' (30.4% never) and 'limited resources' (33.3% never).

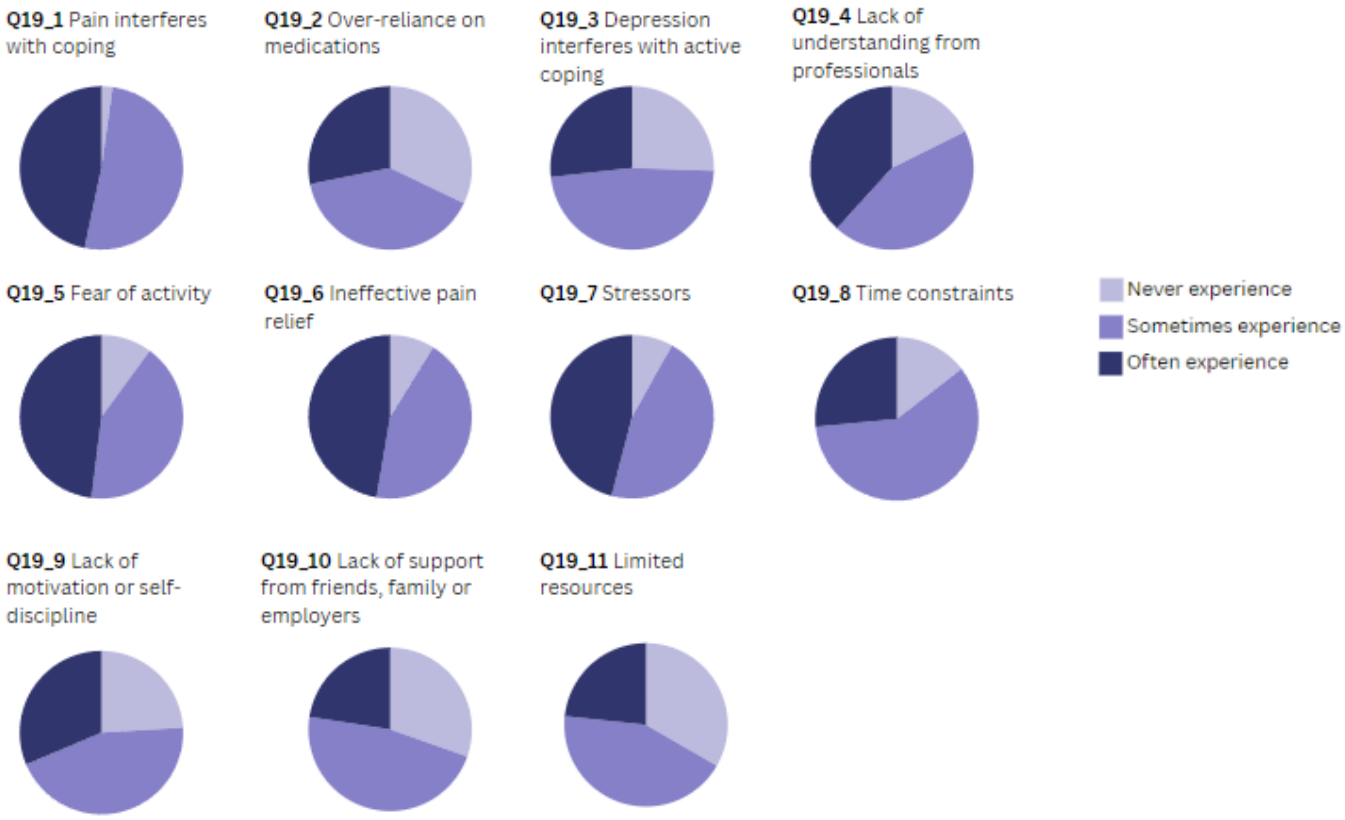


Figure 6: The number of respondents that have not, have sometimes or have often experienced a barrier.

4.1.7 Effective coping

This section shows the perceived effectiveness of the questioned active coping mechanisms. This question was answered by 404 of the 419 participants. More details are presented in Appendix E6 and E7 and Figure 7. The coping mechanism that participants considered most effective, only looking at the patients who tried the coping mechanism, was 'having supportive friends and family' (59.3%) and 'seeking professional help' (58.7%). The coping mechanism that is deemed least effective is 'cognitive behavioural therapy' (45.5%).

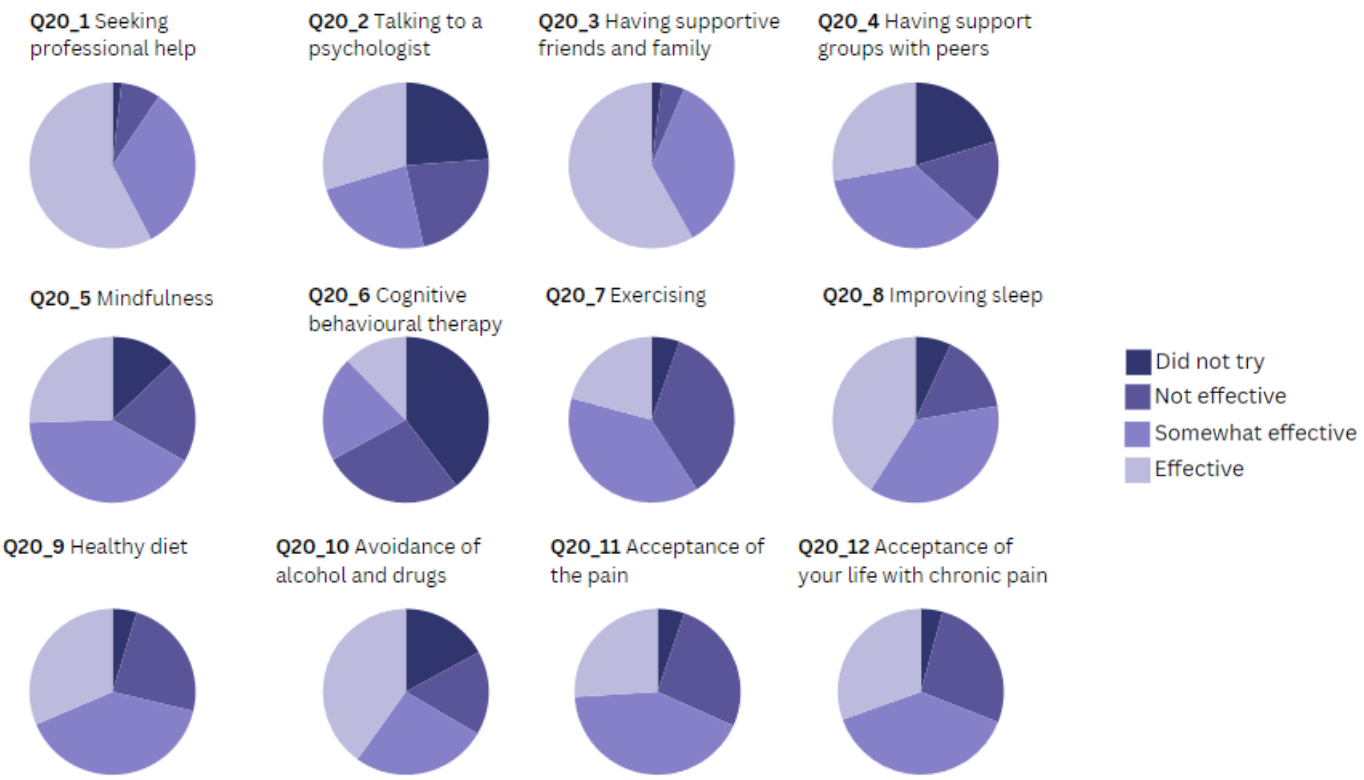


Figure 7: The distribution of respondent answers on effectiveness across the different active coping mechanisms.

Not all coping mechanisms have been tried by all patients. Cognitive behavioural therapy was tried the least (60%) and seeking professional help (98%) and having supportive friends and family (98%) were used by the largest part of the respondents (Figure 8).

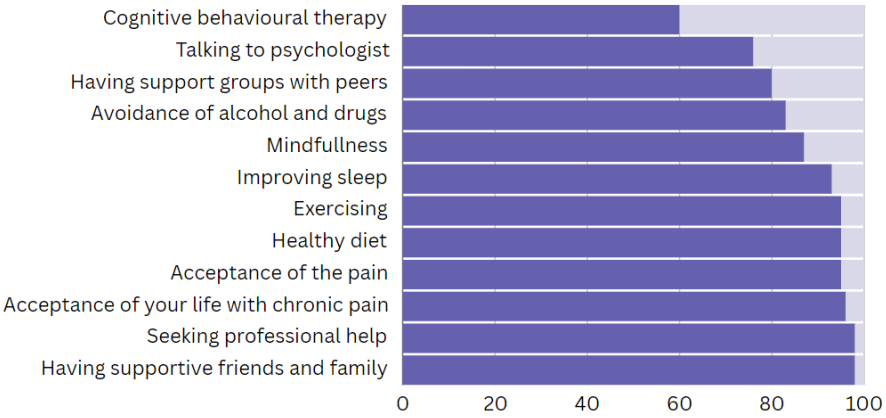


Figure 8: Percentage of respondents that have tried an active coping mechanism.

4.1.8 Relationships between variables

In Figure 9 neuroticism, passive and active coping scores and barrier scores are plotted against the mental health score. It shows that neuroticism, passive coping and barrier scores are lower and passive scoping scores are higher when mental health scores are higher.

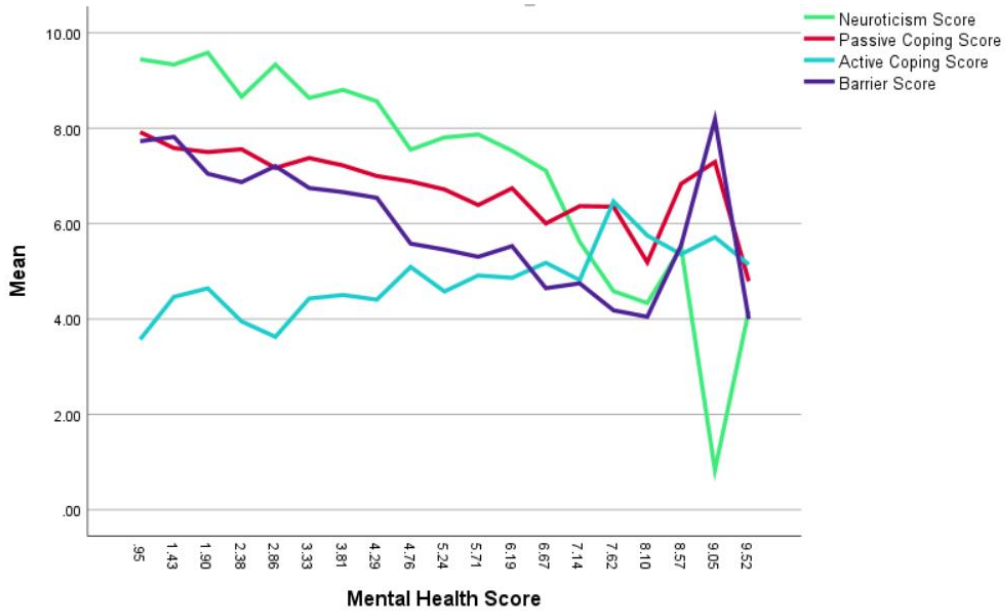


Figure 9: Neuroticism, passive and active coping and barriers scores related to mental health scores.

4.2 Correlation between mental health status and coping strategies

Research question 1: To what extent is the mental health status of chronic migraine patients correlated to the use of active or passive coping strategies for chronic migraine?

The uncorrected and corrected Spearman correlation coefficients between mental health and active and passive coping are presented in Table 3. The uncorrected correlation coefficient shows the relationship between two variables without considering other factors, while the corrected correlation coefficient adjusts for covariates and isolates the direct association between the variables being studied. Because the uncorrected and corrected correlation coefficients differ, it indicates that the covariates do affect the relationship between the variables.

There is a significant negative correlation (r -0.277, $p<0.001$) between mental health and passive coping. This shows that if the mental health score of a patient is higher, passive coping mechanisms are used less. There is a significant positive correlation (r 0.198, $p<0.001$) between mental health and active coping. This shows that if the mental health score of a patient is higher, active coping mechanisms are used more. There is a significant negative correlation (r -0.150, $p<0.001$) between passive and active coping. If the passive coping score is lower, the active coping score is higher, and the other way around.

Table 3: Uncorrected and corrected Spearman Correlation coefficients mental health.

	Mental Health & passive coping	**Mental health & active coping**	**Passive and active coping**
	Correlation coefficient – P-value	Correlation coefficient – P-value	Correlation coefficient – P-value
Uncorrected correlation coefficient	-0.350 (<0.001)	0.189 (<0.001)	-0.136 (0.005)
Corrected coefficient *	-0.277 (<0.001)	0.198 (<0.001)	-0.150 (0.002)

*corrected for age; how long people have been dealing with migraine; did people have a migraine on the day the filled in the questionnaire; how often did people have migraine in the two weeks preceding the filling in of the questionnaire; educational level; financial security and gender

The correlations between mental health and passive coping were examined across different groups with a specific characteristic revealing variations in strength. Appendix F1 presents these results. The strongest negative correlations between mental health and passive coping were found in the following groups: dealing with chronic migraine between 10 and 20 years (r -0.464, p<0.001), age group 56-65 (r -0.570, p<0.001), between 4 and 7 migraines in the past two weeks (r -0.469, p<0.001), migraine on the day of filling in the survey (r -0.315, p<0.001), master's degree (r -0.428, p<0.001), financial security of 4 stars (r -0.355, p<0.001) and females (r -0.824, p<0.001).

4.3 Correlation between neuroticism level and coping strategies

Research question 2: To what extent does the neuroticism level of chronic migraine patients correlate with and influence the utilization of active or passive coping strategies for managing

The uncorrected and corrected Spearman correlation coefficients for neuroticism and active and passive coping and neuroticism and mental health are presented in Table 6. Neuroticism and mental health have a significant negative correlation (r -0.448, p<0.001). High neuroticism levels correlate with low mental health. Neuroticism and passive coping have a significant positive correlation (r 0.238, p<0.001). High neuroticism levels and high use of passive coping mechanisms are correlated. Neuroticism and active coping have a significant negative correlation (r -0.099, p0.045), meaning that high neuroticism levels are related to low use of active coping mechanisms.

Table 5: correlations corrected for covariates.

	Neuroticism & Mental health	**Neuroticism & passive coping**	**Neuroticism and active coping**	**Passive and active coping**
	Correlation coefficient – P-value	Correlation coefficient – P-value	Correlation coefficient – P-value	Correlation coefficient – P-value
Uncorrected correlation coefficient	-0.517 (<0.001)	0.331 (<0.001)	-0.149 (0.002)	-0.136 (0.005)
Corrected coefficient *	-0.448 (<0.001)	0.238 (<0.001)	-0.099 (0.045)	-0.150 (0.002)

*corrected for age; how long people have been dealing with migraine; did people have a migraine on the day the filled in the questionnaire; how often did people have migraine in the two weeks preceding the filling in of the questionnaire; educational level; financial security and gender

The correlations between mental health and passive coping were examined across different groups with a specific characteristic revealing variations in strength. Appendix F2 presents these results. The strongest positive correlations between neuroticism and passive coping were found in the following groups: dealing with chronic migraine between 5 and 10 years (r 0.424, p<0.001), age group 36-45 (r 0.333, p<0.001), between 2 and 3 migraines in the past two weeks (r 0.402, p<0.001), no migraine on the day of filling in the survey (r 0.322, p<0.001), master's degree (r 0.394, p=0.002), financial security of 3 stars (r 0.386, p<0.001) and females (r 0.317, p<0.001).

The strongest negative correlations between neuroticism and mental health are found in the following groups: dealing with chronic migraine for over 20 years (r -0.596, p<0.001), age group 56-65 (r -0.551, p<0.001), no migraines in the past two weeks (r -0.851, p=0.032), no migraine on the day of filling in the survey (r -0.554, p<0.001), 'other' education (r -0.677, p<0.001), financial security of 4 stars (r -0.559, p<0.001), and females (r -0.515, p<0.001).

4.4 Correlations between coping barriers, mental health and neuroticism

Research question 3: To what extent do obstacles hindering active coping (barriers) exhibit correlations with mental health, neuroticism, and both active and passive coping strategies?

The uncorrected and corrected Spearman correlation coefficients for barriers hindering active coping and active and passive coping, mental health status, and neuroticism are presented in Table 7. The full results with all possible covariates are presented in Appendix D1. Passive coping and barrier score have a significant positive correlation (r 0.408, p<0.001). This means that passive coping mechanisms are used more if patients experience more barriers. Active coping and barrier score have a significant negative correlation (r -0.104, p= 0.038), which shows that if more barriers are experienced, there's slightly less use of active coping mechanisms. Mental health and barrier scores have a significant negative correlation (r -0.396, p< 0.001), meaning that if mental health is lower, more barriers are experienced. Neuroticism and barrier scores have a significant positive correlation (r 0.434, p<0.001), meaning that a higher neuroticism score is in line with more barriers being experienced.

Table 8: Correlation coefficients for relations between barriers and coping strategies, mental health and neuroticism

	Passive coping	**Active coping**	**Mental Health**	**Neuroticism**
Uncorrected barrier score correlation r	0.456 (<0.001)	-0.106 (0.033)	-0.485 (<0.001)	0.521(<0.001)
Barrier score Correlation r *	0.408 (<0.001)	-0.104 (0.038)	-0.396 (<0.001)	0.434 (<0.001)

*corrected for age; how long people have been dealing with migraine; did people have a migraine on the day the filled in the questionnaire; how often did people have migraine in the two weeks preceding the filling in of the questionnaire; educational level; financial security and gender

Table 8 shows the correlation coefficients for each separate barrier and passive and active coping, mental health and neuroticism, adjusted for all covariates. The unadjusted correlations are available in Appendix D2. Ineffective pain relief from coping mechanisms demonstrates the strongest positive correlation with passive coping. The correlation is 0.341 and has a p-value of less than 0.001, which means ineffective pain relief is experienced more as a barrier when there is more use of passive coping mechanisms. Fear of activity has the strongest negative correlation with active coping. The correlation

is -0.146 and had a p-value of 0.003, which means that the barrier of fear of activity is experienced more when there is less use of active coping mechanisms. Depression interfering with coping has the strongest negative correlation with mental health (-0.460 p<0.001) and the strongest positive correlation with neuroticism (0.446 p<0.001), meaning depression is experienced more as a barrier when the mental health is low and neuroticism levels are high.

Table 9: correlations per barrier corrected for covariates.

	Passive coping	Active coping	Mental Health	Neuroticism
Pain interferes with coping	0.272 (<0.001)	-0.082 (0.103)	-0.264 (<0.001)	0.204 (<0.001)
Over-reliance on medications	0.270 (<0.001)	-0.091 (0.070)	-0.028 (0.576)	0.170 (<0.001)
Depression interferes with coping	0.212 (<0.001)	-0.099 (0.048)	-0.460 (<0.001)	0.446 (<0.001)
Lack of understanding from professionals	0.116 (0.020)	-0.009 (0.852)	-0.245 (<0.001)	0.113 (0.024)
Fear of activity	0.299 (<0.001)	-0.146 (0.003)	-0.192 (<0.001)	0.232 (<0.001)
Ineffective pain relief	0.341 (<0.001)	0.033 (0.514)	-0.224 (<0.001)	0.276 (<0.001)
Stressors	0.253 (<0.001)	0.056 (0.263)	-0.196 (<0.001)	0.341 (<0.001)
Time constraints	0.209 (<0.001)	0.042 (0.397)	-0.116 (0.020)	0.259 (<0.001)
Lack of motivation or self-discipline	0.209 (<0.001)	-0.085 (0.089)	-0.206 (<0.001)	0.327 (<0.001)
Lack of support from friends, family or employers	0.127 (0.011)	-0.145 (0.004)	-0.273 (<0.001)	0.175 (<0.001)
Limited resources	0.145 (0.004)	-0.058 (0.247)	-0.173 (<0.001)	0.040 (0.422)

4.5 Relation between mental health status and effectiveness of coping strategies

Research question 4: To what extent is the mental health status of chronic migraine patients related to the effectiveness of coping strategies for chronic migraine?

The mental health scores for each type of active coping mechanism and each level of effectiveness are presented in Appendix B6 and illustrated in Figure 10. For most coping mechanisms better mental health is related to greater effectiveness of the active coping mechanism and worse mental health is related to greater ineffectiveness of the active coping mechanism. The active coping mechanisms that stand out the most in this, are 'acceptance of the pain' (no=4.29, yes = 5.72) and 'Acceptance of your life with chronic pain' (no = 4.23, yes – 5.68). They show the biggest positive change in mental health score from not finding the coping mechanism effective to finding it effective (1.43;1.45). For these active coping mechanisms, mental health has the biggest effect on the effectiveness of the active coping mechanism.

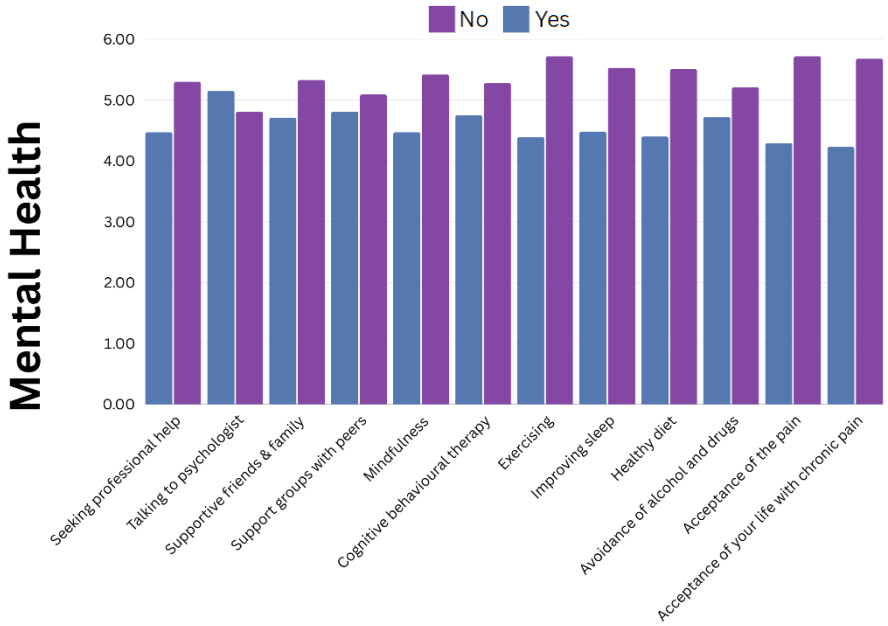


Figure 10: Mental health score for effectiveness active coping mechanisms

The passive coping scores for each type of active coping mechanism and each level of effectiveness are presented in Appendix B6 and shown in Figure 11. For most coping mechanisms less use of passive coping is related to greater effectiveness of the active coping mechanism and more use of passive coping is related to greater ineffectiveness of the active coping mechanism. The active coping mechanisms that stand out the most in this, are again 'acceptance of the pain' (no=7.09, yes = 6.42), and 'Acceptance of your life with chronic pain' (no = 7.12, yes = 6.48). They show the biggest negative change in passive coping score from not finding the coping mechanism effective to finding it effective (0.67;0.64). For these active coping mechanisms, using passive coping has the biggest effect on the effectiveness of the active coping mechanism.

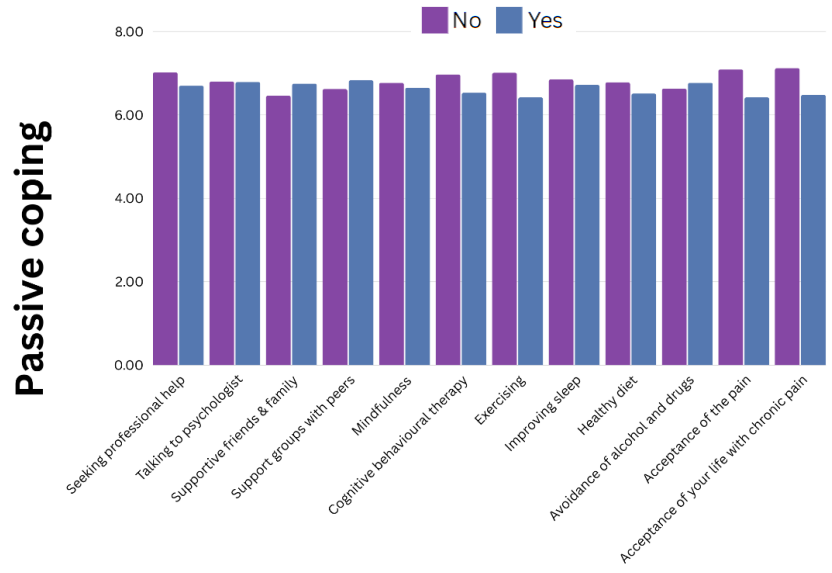


Figure 11: Passive coping scores for effectiveness active coping mechanisms

The active coping scores for each type of active coping mechanism and each level of effectiveness are presented in Appendix B6 and illustrated in Figure 12. For most coping mechanisms less use of active coping mental health is related to greater ineffectiveness of the active coping mechanism and more use of active coping is related to greater effectiveness of the active coping mechanism. The active coping mechanisms that stand out the most in this, are again 'acceptance of the pain' (no=3.79, yes = 5.44), and 'Having supportive friends and family' (No= 3.45, yes = 5.04). They show the biggest positive change in active coping scores from not finding the coping mechanism effective to finding it effective (1.65;1.59). For these active coping mechanisms, the overall use of active coping has the biggest positive effect on the effectiveness of the specific active coping mechanism.

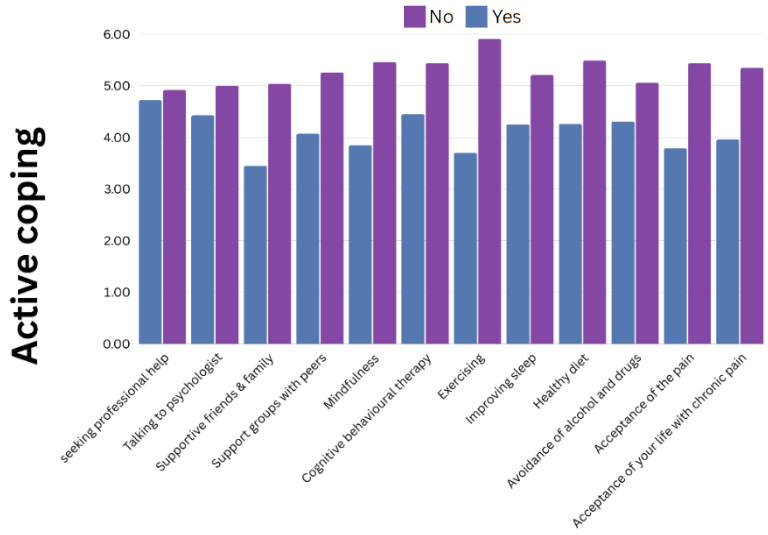


Figure 12: Active coping scores for effectiveness active coping mechanisms

4.6 Summarizing the key results

Research question one, which addressed the correlation between mental health and active or passive coping, resulted in a a significant negative correlation between mental health and passive coping (r -0.277, p<0.001), and a significant positive correlation between mental health and active coping (r 0.198, p<0.001).

Research question two addressed the relation between neuroticism, mental health and coping and showed that neuroticism was negatively correlated with mental health (r -0.448, p< 0.001) and active coping (r -0.099, p0.045), whereas it was positively correlated with passive coping (r 0.238, p<0.001).

Research question three focussed on barriers and found significant positive correlations between passive coping and barrier scores (r 0.408, p<0.001) and neuroticism and barrier scores (r 0.434, p<0.001). The strongest positive correlation was found for ineffective pain relief and passive coping (r = 0.341, p < 0.001). Significant negative correlations were found for barrier scores and active coping (r -0.104, p= 0.038), and barrier scores and mental health (r -0.396, p< 0.001). The strongest negative correlation was found for fear of activity and active coping (r = -0.146, p = 0.003).

Research question four resulted in the observations that mental health scores impact the effectiveness of active coping mechanisms. The most profound changes in mental health scores occur due to coping strategies such as 'acceptance of the pain' and 'acceptance of your life with chronic pain'. Strategies such as 'acceptance of the pain', 'acceptance of your life with chronic pain' and 'having supportive friends and family' are more effective when active coping is used more.

5. Discussion

Chronic migraine is a debilitating condition that significantly impacts individuals' quality of life, often leading to psychological distress and impaired coping abilities (e.g., Holroyd et al, 2007; Antonaci et al., 2011; Taşkapilioğlu & Karli, 2013; Murinoca & Krashin, 2015; Palacios-Ceña et al., 2017; Buse et al, 2019). There is a notable knowledge gap in understanding how mental health status influences coping strategies among affected individuals. Other studies focussed on for example other chronic diseases or on migraine management without taking into account mental health (Bair et al., 2009; Rome, 2018; Prell et al., 2021; Tomé-Pires et al., 2023). The primary goal of this study was to address this critical need of knowledge for chronic migraine management. Insight into the impact of mental health status on coping strategies was acquired through conducting a survey among a large group of chronic migraine patients.

This study revealed a below average mental health score among chronic migraine patients (research question 1). Numerous studies are in line with this finding as they also demonstrated the profound effect of chronic migraine on the mental health of the patients, highlighting prevalent issues such as depression, anxiety, feelings of shame, and even suicidal ideation (Amoozegar, 2017; Battista et al., 2023; Tang et al., 2015; Pompili et al., 2010). When analysing what aspects of mental health chronic migraine patients scored highest and lowest on, it was found that patients appeared least satisfied with the daily activities they were able to do. Aligned with this concept is the understanding that patients often resort to reducing their social activities, a passive coping mechanism, which may lead to dissatisfaction with their daily accomplishments. It is crucial to assist patients in finding a balance in their activities to prevent the need for drastic reductions in social engagement. A clear negative relationship between mental health and passive coping was observed. This implies that individuals with poor mental health tend to use more passive than active coping strategies, which can negatively impact their overall well-being.

Additionally, this study supports previous claims regarding the high levels of neuroticism among chronic migraine patients (research question 2) (Galvez-Sánchez & Montoro Aguilar, 2022). Why migraine patients have higher levels of neuroticism than non-migraineurs remains uncertain. However, because of the strong correlations between mental health and neuroticism, it can be theorized that because chronic migraine pain can lead to increased stress, anxiety, and negative emotions over time, this ongoing pain and its impact on daily life can worsen neurotic tendencies. Moreover, the psychological distress caused by chronic migraines, such as feelings of frustration, helplessness, and fear of future attacks, can further contribute to the development or worsening of neurotic traits (Huber & Henrich, 2003; Galvez-Sánchez & Montoro Aguilar, 2022). When analysing what aspects of neuroticism chronic migraine patients scored highest and lowest on, it was found that patients frequently experienced worry and mood fluctuations, which significantly contributed to their neuroticism levels. A positive relationship was found between neuroticism and passive coping, and a negative relationship between mental health and neuroticism. This means that, when mental health is low, neuroticism levels are high, and more passive coping mechanisms are used. This suggests that a high level of neuroticism is a trait that many chronic migraine patients have, and that it has an influence on the mental health of the patients as well as their use of coping mechanisms (Huber & Henrich, 2003; Galvez-Sánchez & Montoro Aguilar, 2022).

While mental health impacts coping mechanisms, it is important to note the presence of various contributing factors to these complex dynamics. The inclusion of covariates strengthened the observed correlations, suggesting the presence of numerous unexplored variables outside the study's scope that also influence these relationships. Individual differences in personality traits beyond neuroticism, such

as extraversion and conscientiousness, may impact coping mechanisms and mental health responses to chronic migraines (Pérez-Chacón et al., 2023). The presence of comorbidities can be of influence (Capobianco, 2013), as having other medical or psychological conditions alongside chronic migraines can complicate coping strategies and influence mental health outcomes. Additionally, cultural beliefs, values, and norms play a role in how individuals perceive and cope with chronic migraines (Tweed & Conway, 2006; Putul et al., 2018), affecting help-seeking behaviours and coping strategies related to mental health and illness.

This study identified a diverse range of barriers experienced by individuals with chronic migraines, supporting the findings of Bair et al. (2009) (research question 3). Notably, just like depression was commonly cited as a barrier in previous studies (e.g. Jin, Bratzke & Baumann 2021), its prominence was also indicated in this study through the barrier 'depression interfering with coping' having a relatively strong negative correlation with mental health, a strong positive correlation with neuroticism and a negative relation with active coping. This data was also supported by a different study that theorizes that psychological factors, such as depression and anxiety, and cognitive impairments, also presented significant barriers to effective self-management (Jin, Bratzke & Baumann 2021). It shows that depression seems to be linked to low mental health and high neuroticism, but also to less active coping.

Certain barriers, such as pain interference, fear of engaging in activities, and perceived ineffectiveness of coping strategies, were particularly prominent. Logically, experiencing ineffective pain relief from coping mechanisms diminishes motivation to persist in using those strategies. The finding that pain itself poses a barrier to using effective coping mechanisms adds a layer of complexity to managing this chronic condition as pain plays a central role in having chronic migraine. Methods need to be discovered to engage in active coping despite the unavoidable pain associated with chronic migraine. . In this study, participants considered lack of support from friends and family, as well as limited resources, to be less prominent barriers. In contrast to this study, other studies related to other chronic diseases found different barriers, ranging from lack of awareness and physical symptoms to socio-demographic characteristics and medication adherence challenges (Jarent, von Friederichs-Fitzwater & Moore, 2005; Lindsay, Kingsnorth & Hamdani, 2011); Collein et al. 2021). These disparities underscore the variability in barriers across different respondent groups. It shows that barriers may be perceived differently possibly related to different conditions or disorders, or even that individuals experience different barriers and have many different reasons for not engaging in active coping mechanisms. This emphasizes the need for tailored interventions that address physical, psychological, cognitive, and social factors in order to optimize self-management outcomes.

Additionally, the study demonstrated that barriers to active coping were influenced by mental health status. Individuals with lower mental health were more likely to encounter obstacles hindering their adoption of healthy coping mechanisms, thereby increasing reliance on passive coping strategies. This aligns with existing research highlighting the role of psychological factors as barriers to engaging in active coping mechanisms (Jin, Bratzke & Baumann, 2021).

If patients do engage in active coping mechanisms, these active coping mechanisms may not always be effective for the patients (research question 4). In this study, participants highlighted certain coping mechanisms as particularly effective, with supportive friends and family and seeking professional help standing out as the most effective. This is in line with a study by Roohafa et al (2014) showing that a good support system is an important coping mechanism. It is therefore important to focus on making sure patients have a good support system. In contrast, cognitive behavioural therapy (CBT) was identified as the least helpful coping mechanism. This is in line with other studies also suggesting weak effects of cognitive behavioural therapy (e.g., Eccleston, 2009; Meise et al, 2022). However, CBT and also mindfulness and relaxation strategies, are often suggested in literature reviews as potential ways

to improve chronic migraine management and coping for patients with chronic pain (e.g., Kwekkeboom et al, 2006; Nicholson, 2010; Morley & Williams, 2015; Han, 2023; Sturgeon et al., 2023).

An active coping mechanism that patients said they used was trying to distract themselves from the pain. But at the same time, they indicate that they have most trouble with actually forgetting the pain. This shows how an active coping mechanism can be used but can still be ineffective because the pain is too persistent, which illustrates the beforementioned complexity of the barrier 'pain interfering with coping'. These findings correlate with specific research examining the effectiveness of distraction as a coping mechanism for pain. Research indicates that certain tasks can divert attention away from pain; however, for a task to effectively diminish a pain stimulus, it must serve as a central attentional focus. Yet, these tasks demand effort and can be draining to sustain (Kahneman, 1973; Logan, 1988). While engaging in distracting coping strategies may yield short-term benefits, these tasks gradually lose their efficacy in diverting attention (Shiffrin, 1988). Completely ignoring the presence of pain is therefore challenging, which explains why individuals may struggle to forget about their pain despite attempts to distract themselves. Despite these insights, there is a lack of recent literature on how simple tasks can sustain distraction long enough to alleviate chronic pain.

Evaluating the effectiveness of active coping mechanisms in relation to mental health scores, showed that perceiving an active coping mechanism as effective correlates with a higher mental health score. At the same time, deeming a coping mechanism ineffective was associated with a lower mental health score. In specific cases, the passive coping score was lower when an active coping mechanism was perceived as more effective—a logical outcome as a patient would be less likely to need passive coping mechanisms if an active coping mechanism works for them. A comparison of active coping scores to the perception of effectiveness revealed consistently higher active coping scores when the coping mechanism was deemed effective.

This study showed that coping strategies deemed effective in literature did not universally benefit all individuals and that the effectiveness of active coping was influenced by mental health. Acceptance of the pain and acceptance of a life with chronic pain showed the most significant positive change in mental health score (from finding the coping mechanism ineffective to effective), suggesting that acceptance could play an important role in dealing with chronic migraine. This is supported by a study by McCracken & Eccleston (2005).

Based on the findings of this study, a model was created which shows the observed interactions between mental health, neuroticism, barriers, effectiveness and coping strategies (Figure 13). This model adds the results from this study to the theoretical model in Figure 1.

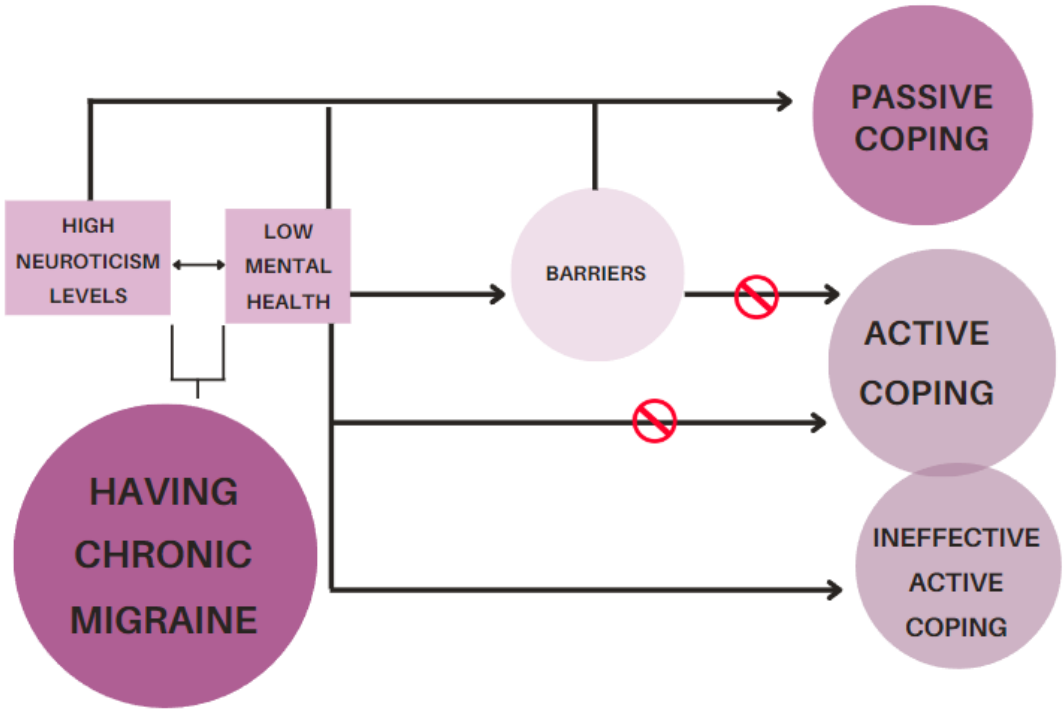


Figure 13: Model showing the interactions between mental health, neuroticism, barriers, effectiveness and coping strategies.

6. Strengths and limitations of the study

This study has several strengths that contribute to its significance in the field of chronic migraine research. Firstly, the intricate relationship between mental health status and coping strategies among individuals with chronic migraines was studied, shedding light on a crucial yet understudied aspect of their experiences. In doing so, not only existing findings are supported, but this study also delved deeper into uncharted territory, uncovering a nuanced understanding of how mental well-being influences coping mechanisms.

The study benefits from a sample size that is larger than the initial needed sample size for representative results. The high number of respondents enhanced the generalizability of the findings to the broader population. Additionally, it reduced sampling error, resulting in more accurate estimates of population parameters. Lastly, studies with larger sample sizes are considered more reliable and reproducible, contributing to the robustness of research findings.

The incorporation of validated assessment tools, such as the MHQol score for mental health status and the EPQ for measuring neuroticism, ensured the accuracy and reliability of the measurements, further strengthening the credibility of the research outcomes. Even with the addition of covariates to explain part of the correlations found, the correlations across all variables were still significant and noteworthy.

Added to the valuable insights of this study into the complex dynamics of mental health, neuroticism, coping strategies, and barriers among chronic migraine patients, it is important to also acknowledge its inherent limitations. By identifying and addressing these limitations, a more accurate understanding of the study's implications and areas for future research can be ensured.

The research adopted a cross-sectional design, capturing a snapshot of the participants' experiences at a specific point in time. This limits the ability to see how the studied correlations change over time and the direction of the relationship. Longitudinal studies would be necessary to better understand the dynamics over time (Wang & Cheng, 2020).

Even though the sample size was representative of the population of chronic migraine patients, there may have been some response bias. Certain patients may be more prone to fill in an online survey than other patients, and not all chronic migraine patients are members of the Facebook groups that were approached. Those who chose to participate may have distinct characteristics and give different answers compared to non-participants, affecting the generalizability of the findings (Hill et al., 1997). This issue could be resolved by employing diverse approaches to engage chronic migraine patients beyond solely relying on an online survey. Incorporating additional methods such as interviews, focus groups, or administrative records could aid in bridging any gaps or biases observed in survey responses.

Recall bias may also have influenced the study outcomes. The study fully relied on self-reported data, including participants' recollections of how they felt the past two weeks before filling in the questionnaire and coping mechanisms they have tried in the past. Participants may not always have recalled situations or feelings accurately. Alternatively, a study could be organized where patients use electronic diaries, mobile apps, or wearable devices, so that experiences are captured as they occur.

The study delved into the intricate dynamics of the role of mental health and coping strategies within the context of chronic migraine, yet the complexity of these factors suggests the need for a more comprehensive exploration. While mental health and neuroticism were examined, the multifaceted nature of these relationships may not have been fully captured, highlighting the necessity for studying other variables such as cultural aspects, other personality traits and comorbidities as well as repeated investigations.

7. Recommendations

Longitudinal studies could offer valuable insights into the long-term effects of mental health, neuroticism, and coping strategies on chronic migraine management. Tracking patients over time can reveal the effectiveness of interventions and the progression of the condition. Combining quantitative data with qualitative research can also enhance understanding by delving into patients' experiences and perceptions of coping strategies and barriers. Qualitative insights may uncover nuanced factors missed by quantitative measures. Once quantitative and qualitative studies are conducted, designing intervention studies to improve coping strategies and reduce barriers among chronic migraine patients becomes crucial. Reevaluating existing interventions like cognitive-behavioural therapy and mindfulness-based techniques, can provide valuable insights into enhancing patient outcomes.

This study underscores the significance of recognizing the interplay between mental health and coping strategies, highlighting the necessity of integrating mental health considerations into healthcare practices. Therefor, adopting an integrated care model that attends to the holistic needs of chronic migraine patients, encompassing both physical and mental health aspects, is important. This could be accomplished through collaboration among healthcare providers. By fostering partnerships between neurologists, primary care physicians, and psychologists, a comprehensive approach can be implemented to address both the physical side of chronic migraine and the associated mental health challenges. Such collaborative efforts could enhance patient outcomes and their overall well-being.

8. Conclusions

In conclusion, chronic migraine profoundly impacts individuals' quality of life, leading to psychological distress and hindered coping abilities (research question 1). This study addressed a critical gap in understanding how mental health influences coping strategies among affected individuals. The findings revealed a below average mental health score among chronic migraine patients, with prevalent issues such as depression and anxiety significantly affecting their well-being. Patients' dissatisfaction with daily activities suggests a need for balancing social engagement to prevent passive coping mechanisms.

Furthermore, this study finds high levels of neuroticism among chronic migraine patients, with worry and mood fluctuations contributing significantly (research question 2). High levels of neuroticism are associated with lower mental health, greater reliance on passive coping, and reduced engagement in active coping, highlighting that coping cannot be seen separately from the mental health issues patients have.

Depression emerged as a prominent barrier to adopting active coping strategies, negatively correlating with mental health and positively with neuroticism, which is in line with the findings that low mental health results in less use of active coping mechanisms (research question 3). Lower mental health was overall associated with encountering more obstacles to adopting healthy coping mechanisms, leading to increased reliance on passive coping strategies.

The effectiveness of coping mechanisms varied among individuals and was influenced by their mental health status (research question 4). Overall, the results implied that coping strategies deemed effective in literature did not universally benefit all individuals and the effectiveness was influenced by the mental health status. Acceptance of the pain and acceptance of a life with chronic pain showed the most significant positive changes in mental health scores, both from finding the coping mechanism ineffective to finding it effective. This could mean that people who have been able to accept their life with chronic migraine and their pain, have better mental health.

Overall, this study contributes valuable insights into the complex interplay between mental health and coping strategies in chronic migraine patients. It's crucial to understand that mental health is not isolated; it significantly influences the abilities and behaviours of patients concerning coping. Therefore, it should be given considerable consideration when treating chronic migraine patients.

References

Afshar, H., Roohafza, H. R., Keshteli, A. H., Mazaheri, M., Feizi, A., & Adibi, P. (2015). The association of personality traits and coping styles according to stress level. Journal of research in medical sciences, 20(4), 353-358.

Al Ghadeer, H. A., Al Salman, S. A., Alshakhs, Z. M., Alghanim, J. H., Alneamah, A. A., Almazyadi, H. S., Alalawi, H. H., AlHassan, M. I., Alsuwailem, B. S., Albonasser, A. A., ALjohar, H. I., ALhammadi, Y. M., ALmoaibed, F. M., AL ALI, Y. A., & Alali, A. I. (2022). Migraine headache and the risk of depression. Cureus, 14(11). doi:10.7759/cureus.24629

American Migraine Foundation. (2023). The Relationship between migraine and Mental health | American Migraine Foundation. Retrieved from https://americanmigrainefoundation.org/resource-library/the-relationship-between-migraine-and-mental-health/

Amiri, P., Kazeminasab, S., Nejadghaderi, S. A., Mohammadinasab, R., Pourfathi, H., Araj-Khodaei, M., Sharifi, F., Haghparast, H., Jafari, H., & Safiri, S. (2022). Migraine: A review on its history, global epidemiology, risk factors, and comorbidities. *Frontiers in Neurology, 25,* 53. doi:10.3389/fneur.2021.800605

Amoozegar, F. (2017). Depression comorbidity in migraine. *International Review of Psychiatry*, *29*(5), 504-515. doi:10.1080/09540261.2017.1326882

Antonaci, F., Nappi, G., Galli, F., Manzoni, G. C., Calabresi, P., & Costa, A. (2011). Migraine and psychiatric comorbidity: A review of clinical findings. The Journal of Headache and Pain, 12, 115-125.

Ashina, S., Bendtsen, L., Buse, D. C., Lyngberg, A. C., Lipton, R. B., & Jensen, R. (2017). Neuroticism, depression and pain perception in migraine and tension-type headache. Acta Neurologica Scandinavica, 136(5), 470-476. doi:10.1111/ane.12751

Bair, M. J., Matthias, M. S., Nyland, K. A., Huffman, M. A., Stubbs, D. L., Kroenke, K., & Damush, T. M. (2009). Barriers and facilitators to chronic pain self-management: a qualitative study of primary care patients with comorbid musculoskeletal pain and depression. *Pain Medicine*, *10*(7), 1280-1290. doi:10.1111/j.1526-4637.2009.00707.x

Battista, S., Lazzaretti, A., Coppola, I., Falsiroli Maistrello, L., Rania, N., & Testa, M. (2023). Living with migraine: A meta-synthesis of qualitative studies. *Frontiers in Psychology*, *14*, 1129926. doi:10.3389/fpsyg.2023.1129926

Brown, G. K., Nicassio, P. M., & Wallston, K. A. (1989). Pain coping strategies and depression in rheumatoid arthritis. *Journal of Consulting and Clinical Psychology,* 57(5), 652-657. doi:10.1037//0022-006x.57.5.652

Buse, D. C., Fanning, K. M., Reed, M. L., Murray, S., Dumas, P. K., Adams, A. M., & Lipton, R. B. (2019). Life with migraine: Effects on relationships, career, and finances from the Chronic Migraine Epidemiology and Outcomes (CaMEO) study. *Headache: The Journal of Head and Face Pain*, 59(8), 1286-1299. doi: 10.1111/head.13613

Capobianco, E. (2013). Comorbidity: a multidimensional approach. Trends in molecular medicine, 19(9), 515-521. doi:10.1016/j.molmed.2013.07.004

Cerea, S., Ghisi, M., Pitteri, M., Guandalini, M., Strober, L. B., Scozzari, S., Crescenzo, F., Calabrese, M. (2021). Coping strategies and their impact on quality of life and physical disability of people with multiple sclerosis. Journal of clinical medicine, 10(23), 5607. doi:10.3390/jcm10235607

Chenube, O. O., & Omumu, F. C. (2011). The influence of socio-economic status and education in grief experienced and coping strategies employed among widows. Gender and behaviour, 9(1), 3612-3623.

Chiros, C., & O'Brien, W. H. (2011). Acceptance, appraisals, and coping in relation to migraine headache: an evaluation of interrelationships using daily diary methods. *Journal of behavioral medicine*, *34*, 307-320.

Choi, N. G., Hegel, M. T., Sirrianni, L., Marinucci, M. L., & Bruce, M. L. (2012). Passive coping response to depressive symptoms among low-income homebound older adults: Does it affect depression severity and treatment outcome?. Behaviour research and therapy, 50(11), 668-674. doi:10.1016/j.brat.2012.07.003

Collein, I., Sitorus, R., Yetti, K., & Hastono, S. P. (2021). Facilitators and barriers to self-management of patients chronic kidney disease. Enfermería Clínica, 31, S37-S40. doi:10.1016/j.enfcli.2020.10.014

Estave, P. M., Beeghly, S., Anderson, R., Margol, C., Shakir, M., George, G., Berger, A., O'Connell, N., Burch, R., Haas, N., Powers, S. W., Seng, E., Buse, D. C., Lipton, R. B., Wells, R. E. (2021). Learning the full impact of migraine through patient voices: a qualitative study. *Headache: The Journal of Head and Face Pain*, *61*(7), 1004-1020. doi:10.1111/head.14151

Francis, L. J., Lewis, C. A., & Ziebertz, H. (2006). The short-form revised Eysenck personality Questionnaire (EPQ-S): A German edition.

Fusar-Poli, P., de Pablo, G. S., De Micheli, A., Nieman, D. H., Correll, C. U., Kessing, L. V., Pfennig, A., Bechdolf, A., Borgwardt, S., Arango, C., & van Amelsvoort, T. (2020). What is good mental health? A scoping review. *European neuropsychopharmacology*, *31*, 33-46. doi:10.1016/j.euroneuro.2019.12.105

Galvez-Sánchez, C. M., & Montoro Aguilar, C. I. (2022). Migraine and neuroticism: A scoping review. *Behavioral Sciences*, *12*(2), 30. doi:10.3390/bs12020030

Gautam, S., Jain, A., Chaudhary, J., Gautam, M., Gaur, M., & Grover, S. (2024). Concept of mental health and mental well-being, it's determinants and coping strategies. Indian Journal of Psychiatry, 66(Suppl 2), S231-S244. doi:10.4103/indianjpsychiatry.indianjpsychiatry_707_23

Goadsby, P. J. (2018). Chapter 422: Migraine and other primary headache disorders. In Harrison's Principles of Internal Medicine (20th ed.).

Higgins, N. C., Bailey, S. J., LaChapelle, D. L., Harman, K., & Hadjistavropoulos, T. (2015). Coping styles, pain expressiveness, and implicit theories of chronic pain. *The Journal of psychology*, *149*(7), 737-750. doi:10.1080/00223980.2014.977759

Hill, A., Roberts, J., Ewings, P., & Gunnell, D. (1997). Non-response bias in a lifestyle survey. Journal of Public Health, 19(2), 203-207. doi: 10.1093/oxfordjournals.pubmed.a024610

Huber, D., & Henrich, G. (2003). Personality traits and stress sensitivity in migraine patients. Behavioral medicine, 29(1), 4-13. doi:10.1080/08964280309596169

Jerant, A. F., von Friederichs-Fitzwater, M. M., & Moore, M. (2005). Patients' perceived barriers to active self-management of chronic conditions. Patient education and counseling, 57(3), 300-307. doi:10.1016/j.pec.2004.08.004

Jin, Y., Bratzke, L., & Baumann, L. C. (2021). Helping persons with multiple chronic conditions overcome barriers to self-management. The Nurse Practitioner, 46(3), 20-28. doi:10.1097/01.NPR.0000733676.28520.db

Karimi, M., & Brazier, J. (2016). Health, health-related quality of life, and quality of life: what is the difference? *Pharmacoeconomics*, *34*, 645-649. doi: 10.1007/s40273-016-0389-9

Kwekkeboom, K. L., & Gretarsdottir, E. (2006). Systematic review of relaxation interventions for pain. Journal of nursing scholarship, 38(3), 269-277. doi: 10.1111/j.1547-5069.2006.00113.x

Lindsay, S., Kingsnorth, S., & Hamdani, Y. (2011). Barriers and facilitators of chronic illness self-management among adolescents: a review and future directions. Journal of Nursing and Healthcare of Chronic Illness, 3(3), 186-208. doi: 10.1111/j.1752-9824.2011.01090.x

Maguire, R., Hanly, P., & Maguire, P. (2021). Living well with chronic illness: How social support, loneliness and psychological appraisals relate to well-being in a population-based European sample. Journal of health psychology, 26(10), 1494-1507. doi: 10.1177/1359105319883923

McCracken, L. M., & Eccleston, C. (2005). A prospective study of acceptance of pain and patient functioning with chronic pain. Pain, 118(1-2), 164-169. doi: 10.1016/j.pain.2005.08.015

Meise, R., Schwarz, A., & Luedtke, K. (2022). Effectiveness of Patient Education and Cognitive Behavioural Treatment as a Non-Pharmacological Intervention for Migraine in Adults–A Systematic Review. *SN Comprehensive Clinical Medicine*, *4*(1), 197.

Nicholson, R. A. (2010). Chronic headache: the role of the psychologist. *Current pain and headache reports*, *14*, 47-54. doi: 10.1007/s11916-009-0087-9

Palacios-Ceña, D., Neira-Martín, B., Silva-Hernández, L., Mayo-Canalejo, D., Florencio, L. L., Fernández-de-Las-Peñas, C., García-Moreno, H., García-Azorín, D., & Cuadrado, M. L. (2017). Living with chronic migraine: a qualitative study on female patients' perspectives from a specialised headache clinic in Spain. BMJ open, 7(8), e017851. doi: 10.1136/bmjopen-2017-017851

Parikh, S. K., & Young, W. B. (2019). Migraine: stigma in society. *Current Pain and Headache Reports*, *23*, 1-6. doi: 10.1007/s11916-019-0743-7

Peres, M. F., & Lucchetti, G. (2010). Coping strategies in chronic pain. *Current pain and headache reports*, *14*, 331-338. doi: 10.1007/s11916-010-0137-3

Pérez-Chacón, M., Borda-Mas, M., Chacón, A., & Avargues-Navarro, M. L. (2023). Personality traits and coping strategies as psychological factors associated with health-related quality of life in highly sensitive persons. International Journal of Environmental Research and Public Health, 20(9), 5644. doi: 10.3390/ijerph20095644

Pompili, M., Serafini, G., Di Cosimo, D., Dominici, G., Innamorati, M., Lester, D., Forte, A., Girardi, N., De Filippis, S., Tatarelli, R., & Martelletti, P. (2010). Psychiatric comorbidity and suicide risk in patients with chronic migraine. *Neuropsychiatric disease and treatment*, 81-91. doi: 10.2147/ndt.s8467

Prell, T., Liebermann, J. D., Mendorf, S., Lehmann, T., & Zipprich, H. M. (2021). Pain coping strategies and their association with quality of life in people with Parkinson's disease: A cross-sectional study. Plos one, 16(11), e0257966. doi:10.1371/journal.pone.0257966

Putul, M., Kahua, T. D., Choudhury, M. K., & Shobhana, M. (2018). The Influence of Culture and Society on Mental Health. Medico-Legal Update, 18(2). doi: 10.5958/0974-1283.2018.00156.1

Roohafza, H. R., Afshar, H., Keshteli, A. H., Mohammadi, N., Feizi, A., Taslimi, M., & Adibi, P. (2014). What's the role of perceived social support and coping styles in depression and anxiety?. Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences, 19(10), 944.

Rotman, M., Andela, C. D., Majoor, B. C. J., Dijkstra, P. D. S., Hamdy, N. A. T., Kaptein, A. A., & Appelman-Dijkstra, N. M. (2018). Passive coping strategies are associated with more impairment in quality of life in patients with fibrous dysplasia. Calcified tissue international, 103, 469-475. doi:10.1007/s00223-018-0441-1

Suzuki, K., Suzuki, S., Shiina, T., Kobayashi, S., & Hirata, K. (2022). Central sensitization in migraine: a narrative review. *Journal of Pain Research*, 2673-2682. doi:10.2147/JPR.S329280

Tang, N. K., Salkovskis, P. M., & Hanna, M. (2007). Mental defeat in chronic pain: initial exploration of the concept. The Clinical journal of pain, 23(3), 222-232. doi:10.1097/AJP.0b013e31802ec8c6

Tang, Y. Y., Hölzel, B. K., & Posner, M. I. (2015). The neuroscience of mindfulness meditation. Nature reviews neuroscience, 16(4), 213-225.

Taşkapilioğlu, Ö., & Karli, N. (2013). Assessment of quality of life in migraine. *Nöro Psikiyatri Arşivi*, *50*(Suppl 1), S60. doi:10.4274/Npa.y7310

The Migraine Trust. (2021). Chronic migraine. Retrieved from https://migrainetrust.org/understand-migraine/types-of-migraine/chronic-migraine/#:~:text=Impact%20of%20chronic%20migraine,-If%20you%20have&text=Chronic%20migraine%20is%20related%20to,than%20people%20with%20episodic%20migraine.

Tomé-Pires, C., Aragonès, E., Rambla, C., López-Cortacans, G., Sánchez-Rodríguez, E., Caballero, A., & Miró, J. (2023). Perceived barriers, facilitators and usefulness of a psychoeducational intervention for individuals with chronic musculoskeletal pain and depression in primary care. *Frontiers in Psychology*, *14*, 1099419. doi:10.3389/fpsyg.2023.1099419

Tweed, R. G., & Conway III, L. G. (2006). Coping strategies and culturally influenced beliefs about the world. In Handbook of multicultural perspectives on stress and coping (pp. 133-153). Boston, MA: Springer US.

Victor, T. W., Hu, X., Campbell, J. C., Buse, D. C., & Lipton, R. B. (2010). Migraine prevalence by age and sex in the United States: a life-span study. Cephalalgia, 30(9), 1065-1072. doi:10.1177/0333102409355601

Vowles, K. E., & McCracken, L. M. (2010). Comparing the role of psychological flexibility and traditional pain management coping strategies in chronic pain treatment outcomes. *Behaviour research and therapy*, *48*(2), 141-146. doi:10.1016/j.brat.2009.09.011

Wang, X., & Cheng, Z. (2020). Cross-sectional studies: strengths, weaknesses, and recommendations. Chest, 158(1), S65-S71. doi:10.1016/j.chest.2020.03.012

World Health Organization. (2022). Mental health. Retrieved from https://www.who.int/health-topics/mental-health#tab=tab_1

World Health Organization. (2012). WHOQOL: Measuring Quality of Life. Retrieved from https://www.who.int/tools/whoqol

Widiger, T. A., & Oltmanns, J. R. (2017). Neuroticism is a fundamental domain of personality with enormous public health implications. *World psychiatry*, *16*(2), 144. doi:10.1002/wps.20411

Appendices

Appendix A: The survey

Introduction

For my master thesis I am trying to get insights into how the mental problems that chronic migraine patients battle with are of influence on the way in which they cope with their pain. This topic speaks to me as I have chronic migraine myself and experience the immense impact of the disease on my life. I hope you are willing to take a few moments to fill in this survey and add valuable insights to research and possibly help yourself and your peers. Participation is voluntary and you are allowed to withdraw from the survey at any point without any consequences. Your data will remain anonymous and will be used in a report on chronic migraine. If you have any questions related to this survey you can send an email to: chronicmigrainesurvey@gmail.com.

Do you give your consent to participate in this survey? Yes/No

Thank you for participating in this survey! The survey contains 20 multiple choice questions divided over 4 topics. The topics are: personal information, mental health, personality and coping. Please take your own health into consideration when filling in the survey. The survey will take around 8 minutes to fill in.

General questions

- Do you have chronic migraine (headache occurring on 15 or more days per month for more than three months) Yes/No
- What is your age? Under 18 (exclude), 18-25, 26-35, 36-45, 46-55, 56-65, 65+ (exclude)
- How long have you been dealing with chronic migraine? Less than a year, between 1 and 5 years, between 5 and 10 years, between 10 and 20 years, more than 20 years.
- What is your gender? Male, female, other/non-binary/third gender, prefer not to say.
- What is your highest level of education completed? Less than high school degree, high school degree or equivalent, some college but no degree, associate degree, bachelor degree, master's degree, PhD, other.
- How would you rate your level of financial security? 1-5 stars.
- How often did you have a migraine in the past two weeks. Never, once, 2-3 times, 4-7 times, 8-13 times, daily.
- Did you have a migraine today? Yes/No

General mental health status questions (MHQol)

Please indicate below which statements best describe your situation THE PAST TWO WEEK by ticking ONE box in each of the seven subjects.

Table A1: Mental health status.

Self-image	**Answer**		**Daily activities,** (work, study, household, leisure activities)	**Answer**
I think very positively about myself	3		I am very satisfied with my daily activities	
I think positively about myself	2		I am satisfied with my daily activities	

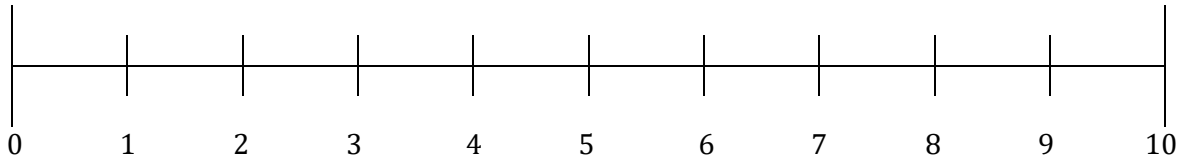
I think negatively about myself	1		I am dissatisfied with my daily activities	
I think very negatively about myself	0		I am very dissatisfied with my daily activities	
Independence, (freedom of choice, financial, co-decision making)	**Answer**		**Physical health**	**Answer**
I am very satisfied with my level of independence	3		I have no physical health problems	3
I am satisfied with my level of independence	2		I have some physical health problems	2
I am dissatisfied with my level of independence	1		I have many physical health problems	1
I am very dissatisfied with my level of independence	0		I have a great many physical health problems	0
Mood	**Answer**		**Future**	**Answer**
I do not feel anxious, gloomy, or depressed	3		I am very optimistic about my future	3
I feel a little anxious, gloomy, or depressed	2		I am optimistic about my future	2
I feel anxious, gloomy, or depressed	1		I am gloomy about my future	1
I feel very anxious, gloomy, or depressed	0		I am very gloomy about my future	0
Relationships *For example: partner, children, family, friends*	**Answer**			
I am very satisfied with my relationships	3			
I am satisfied with my relationships	2			
I am dissatisfied with my relationships	1			
I am very dissatisfied with my relationships	0			

PSYCHOLOGICAL WELL-BEING

On the scale below, please indicate with an X how you rate your psychological well-being. 0 represents the worst imaginable psychological well-being, while 10 represents the best imaginable psychological well-being.

Worst imaginable psychological well-being

Best imaginable psychological well-being



Neuroticism questions

Ensenck Personality Questionnaire (Francis, Lewis & Ziebertz, 2006)

Neuroticism level

Yes- answer to the questions indicates neuroticism.

Table A2: Neuroticism level

Question	**Answer**
1 Does your mood often go up and down?	Yes/No (0/1)
2 Do you ever feel 'just miserable' for no reason?	Yes/No (0/1)
3 Are you an irritable person?	Yes/No (0/1)
4 Are your feelings easily hurt?	Yes/No (0/1)
5 Do you often feel fed up?	Yes/No (0/1)
6 Would you call yourself a nervous person?	Yes/No (0/1)
7 Are you a worrier?	Yes/No (0/1)
8 Would you call yourself tense or highly strung?	Yes/No (0/1)
9 Do you worry too long after embarrassing experiences?	Yes/No (0/1)
10 Do you suffer from nerves?	Yes/No (0/1)
11 Do you often feel lonely?	Yes/No (0/1)
12 Are you often troubled about feelings of guilt?	Yes/No (0/1)

Coping style questions

VanderBilt Pain management Inventory (Brown & Nicassio, 1987), passive or active coping.

Coping means: your thoughts and behaviours regarding how you deal with your pain.

Please fill in whether you agree or disagree with the following statements. The pain described in the statements is the pain related to your chronic condition.

Table A3: passive and active coping.

When I am in pain...

Passive strategies					
Question	**Answer**				
1. ...I wish that the doctor had prescribed me stronger medicine.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
2. ... I think about how tired I am and how fed up I am with the pain.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)

3. ... I feel like the pain is too much to handle.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
4. ... I tell others that it hurts a lot.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
5. ... I am desperately wishing for it not to hurt so much.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
6. ... I reduce my social activities (going out less, doing fewer things with people, etc.).	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
7. ... I depend more on others for help with everyday tasks.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
8. ... I feel like I can't do anything to relieve the pain.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
9. ... I take medicine to see whether the pain goes away.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
10. ... I call a doctor or nurse.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
11. ... I think about how much it hurts and where it hurts.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
12. ... I try not to feel angry, nor depressed, nor anxious.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
Active strategies					
Question	**Answer**				
13. ... I do physical exercise.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
14. ... I sometimes forget the pain.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)

15. ... I try to keep busy with other things.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
16. ... I get rid of thoughts that upset me.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
17. ... I engage in reading.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
18. ... I do something I enjoy.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)
19. ... I try to distract myself from the pain.	Strongly disagree (0)	Somewhat disagree (1)	Neither agree nor disagree (2)	Somewhat agree (3)	Strongly agree (4)

Barriers to coping strategies questions

Article: Barriers to using self-management strategies (Bair et al., 2009)

Have you experienced any of the following factors that could keep you from using effective ways to deal with (coping) the pain you have related to your chronic condition?

Table A4: barriers.

Options	**Answer**		
The pain itself interferes with coping adequately	Often (2)	Sometimes (1)	Never (0)
Over-reliance on medication	Often (2)	Sometimes (1)	Never (0)
Depression interferes with coping adequately	Often (2)	Sometimes (1)	Never (0)
A lack of understanding from professionals	Often (2)	Sometimes (1)	Never (0)
Fear of activity	Often (2)	Sometimes (1)	Never (0)
Ineffective pain relief from some coping strategies	Often (2)	Sometimes (1)	Never (0)
Stressors	Often (2)	Sometimes (1)	Never (0)
Time constraints	Often (2)	Sometimes (1)	Never (0)
Lack of motivation or self-discipline	Often (2)	Sometimes (1)	Never (0)
Lack of support from friends, family or employers	Often (2)	Sometimes (1)	Never (0)
Limited resources (e.g. transportation, financial)	Often (2)	Sometimes (1)	Never (0)

Have any of the following coping strategies ever helped you in improving your quality of life?

Quality of life means the standard of health, comfort and happiness you experience in your life.

Table A5: Active coping mechanisms effectiveness.

Option	**Answer**			
Seeking professional help (e.g. neurologist)	Not at all (1)	Somewhat (2)	Yes (3)	Does not apply (0)
Talking to a psychologist	Not at all (1)	Somewhat (2)	Yes (3)	Does not apply (0)
Having supportive friends and family	Not at all (1)	Somewhat (2)	Yes (3)	Does not apply (0)
Having support groups with peers	Not at all (1)	Somewhat (2)	Yes (3)	Does not apply (0)
Mindfulness	Not at all (1)	Somewhat (2)	Yes (3)	Does not apply (0)
Cognitive behavioural therapy	Not at all (1)	Somewhat (2)	Yes (3)	Does not apply (0)
Exercising	Not at all (1)	Somewhat (2)	Yes (3)	Does not apply (0)
Improving sleep	Not at all (1)	Somewhat (2)	Yes (3)	Does not apply (0)
Healthy diet	Not at all (1)	Somewhat (2)	Yes (3)	Does not apply (0)
Avoidance of alcohol and drugs	Not at all (1)	Somewhat (2)	Yes (3)	Does not apply (0)
Acceptance of the pain	Not at all (1)	Somewhat (2)	Yes (3)	Does not apply (0)
Acceptance of your life with chronic pain	Not at all (1)	Somewhat (2)	Yes (3)	Does not apply (0)

Appendix B: Normality and linearity

Table B1: check for normality.

Shapiro-Wilkinson	
Mental Health	<0.001
Neuroticism	<0.001
Passive coping	<0.001
Active coping	0.006
Barriers to coping	0.006

Table B2: check for linearity.

	Mental Health	**Neuroticism**	**Passive coping**	**Active coping**
Mental Health	-	0.011	0.518	0.546
Neuroticism	0.003	-	0.084	0.031
Passive coping	0.866	0.167	-	<0.001
Active coping	0.928	0.848	0.064	-

Appendix C: Descriptive statistics

Table C1: Descriptive statistics.

Variable	Categories / Continuous	Freq./ Mean	%/ SE
Age	18-25	39	9.3
	26-35	97	23.2
	36-45	132	31.5
	46-55	100	23.9
	56-65	51	12.2
How long they had chronic migraine	Less than a year	6	1.4
	Between 1 and 5 years	74	17.7
	Between 5 and 10 Years	86	20.5
	Between 10 and 20 years	108	25.8
	More than 20 years	145	34.6
Gender	Female	407	97.1
	Male	12	2.9
Education level	Less than high school degree	10	2.4
	High school degree or equivalent	51	12.2
	Some college but no degree	71	16.9
	Associate degree	50	11.9
	Bachelor degree	138	33
	Master's degree	60	14.3
	PhD	11	2.6
	Other	28	6.7
Self-rated financial security	1 star	45	10.7
	2 stars	62	14.8
	3 stars	132	31.5
	4 stars	123	29.4
	5 stars	57	13.6
How often migraine in past two weeks	Never	6	1.4
	Once	22	5.3
	2-3 times	85	20.3
	4-7 times	154	36.8
	8-13 times	58	13.8
	Daily	94	22.4
Had a migraine on the day of filling in the survey	Yes	252	60.1
	No	169	39.9
Mental Health			
Self- image	I think very positively about myself	23	5.5
	I think positively about myself	204	48.7
	I think negatively about myself	156	37.2
	I think very negatively about myself	36	8.6

Independence	I am very satisfied with my level of independence	39	11.9
	I am satisfied with my level of independence	175	41.8
	I am dissatisfied with my level of independence	155	37.0
	I am very dissatisfied with my level of independence	39	9.3
Mood	I do not feel anxious, gloomy, or depressed	44	10.5
	I feel a little anxious, gloomy, or depressed	201	48.0
	I feel anxious, gloomy, or depressed	119	28.4
	I feel very anxious, gloomy, or depressed	55	13.1
Daily activities	I am very satisfied with my daily activities	9	2.1
	I am satisfied with my daily activities	107	25.5
	I am dissatisfied with my daily activities	213	50.8
	I am very dissatisfied with my daily activities	90	21.5
Physical Health	I have no physical health problems	33	7.9
	I have some physical health problems	191	45.6
	I have many physical health problems	148	35.3
	I have a great may physical health problems	47	11.2
Future	I am very optimistic about my future	17	4.1
	I am optimistic about my future	191	45.6
	I am gloomy about my future	166	39.6
	I am very gloomy about my future	45	10.7
Relationships	I am very satisfied with my relationships	81	19.3
	I am satisfied with my relationships	209	49.9
	I am dissatisfied with my relationships	108	25.8
	I am very dissatisfied with my relationships	21	5.0
Personality			
Does your mood often go up and down?	Never	2	0.5
	Rarely	47	11.2
	Sometimes	143	34.1
		183	43.7

	Often	44	10.5
	Always	370	88.3
	Yes	49	11.7
	No		
Do you ever feel 'just miserable' for no reason?		16	3.8
	Never	76	18.1
	Rarely	162	38.7
	Sometimes	150	35.8
	Often	15	3.6
	Always	327	78.1
	Yes	92	21.9
	No		
Are you an irritable person?		18	4.3
	Never	102	24.3
	Rarely	196	46.8
	Sometimes	81	19.3
	Often	22	5.3
	Always	299	71.4
	Yes	120	28.6
	No		
Are your feelings easily hurt?		15	3.6
	Never	91	21.7
	Rarely	158	37.7
	Sometimes	116	27.7
	Often	39	9.3
	Always	313	74.7
	Yes	106	25.3
	No		
Do you often feel fed up?		8	1.9
	Never	62	14.8
	Rarely	175	41.8
	Sometimes	146	34.8
	Often	28	6.7
	Always	349	83.3
	Yes	70	16.7
	No		
Would you call yourself a nervous person?		42	10.0
	Never	93	22.2
	Rarely	155	37.0
	Sometimes	88	21.0
	Often	41	9.8
	Always	284	67.8
	Yes	135	32.2
	No		
Are you a worrier?		6	1.4
	Never	44	10.5
	Rarely	125	29.8
	Sometimes	137	32.7
	Often	107	25.6
	Always	369	88.1
	Yes	50	11.9
	No		

Would you call yourself tense or highly strung?		12	2.9
	Never	87	20.8
	Rarely	171	40.8
	Sometimes	118	28.2
	Often	31	7.4
	Always	320	76.3
	Yes	99	23.7
	No		
Do you worry too long after embarrassing experiences?		17	4.1
	Never	53	12.6
	Rarely	131	31.3
	Sometimes	124	29.6
	Often	94	22.4
	Always	349	83.3
	Yes	70	16.7
	No		
Do you suffer from nerves?		26	6.2
	Never	95	22.7
	Rarely	148	35.3
	Sometimes	96	22.9
	Often	54	12.9
	Always	298	71.1
	Yes	121	28.9
	No		
Do you often feel lonely?		45	10.7
	Never	97	23.2
	Rarely	149	35.6
	Sometimes	85	20.3
	Often	43	10.3
	Always	277	33.9
	Yes	142	66.1
	No		
Are you often troubled about feelings of guilt?		22	5.3
	Never	76	18.1
	Rarely	148	35.3
	Sometimes	119	28.4
	Often	54	12.9
	Always	321	76.6
	Yes	98	23.4
	No		
Coping mechanisms			
When I am in pain I wish the doctor had prescribed me stronger medicine	Strongly disagree	38	9.1
	Somewhat disagree	62	14.8
	Neither agree nor disagree	113	27.0
	Somewhat agree	124	29.6
	Strongly Agree	82	19.6
	Strongly disagree	14	3.3
	Somewhat disagree	17	4.1
	Neither agree nor disagree	23	5.5
		128	30.5

When I am in pain, I think about how tired I am and how fed up I am with the pain.	Somewhat agree	237	56.6
	Strongly Agree	12	2.9
When I am in pain I feel like the pain is too much to handle.	Strongly disagree	35	8.4
	Somewhat disagree	59	14.1
	Neither agree nor disagree	181	43.2
	Somewhat agree	132	31.5
	Strongly Agree	65	15.5
When I am in pain, I tell others that it hurts a lot.	Strongly disagree	101	24.1
	Somewhat disagree	75	17.9
	Neither agree nor disagree	125	29.8
	Somewhat agree	53	12.6
	Strongly Agree	18	4.3
When I am in pain, I am desperately wishing for it not to hurt so much.	Strongly disagree	15	3.6
	Somewhat disagree	26	6.2
	Neither agree nor disagree	107	25.5
	Somewhat agree	253	60.4
	Strongly Agree	11	2.6
When I am in pain, I reduce my social activities (going out less, doing fewer things with people, etc.).	Strongly disagree	8	1.9
	Somewhat disagree	12	2.9
	Neither agree nor disagree	107	25.5
	Somewhat agree	281	67.1
	Strongly Agree	64	15.3
When I am in pain, I depend more on others for help with everyday tasks.	Strongly disagree	67	16.0
	Somewhat disagree	68	16.2
	Neither agree nor disagree	127	30.3
	Somewhat agree	93	2.2
	Strongly Agree	17	4.1
When I am in pain, I feel like I can't do anything to relieve the pain.	Strongly disagree	34	8.1
	Somewhat disagree	43	10.3
	Neither agree nor disagree	177	42.2
	Somewhat agree	148	35.3
	Strongly Agree	11	2.6
When I am in pain, I take medicine to see whether the pain goes away.	Strongly disagree	22	5.3
	Somewhat disagree	31	7.4
	Neither agree nor disagree	136	32.5
	Somewhat agree	219	52.3
	Strongly Agree	197	47.0
When I am in pain, I call a doctor or nurse.	Strongly disagree	103	24.6
	Somewhat disagree	61	14.6
	Neither agree nor disagree	39	9.3
	Somewhat agree	19	4.5
	Strongly Agree	19	4.5
		52	12.4

	Strongly disagree	74	17.7
When I am in pain, I think about how much it hurts and where it hurts.	Somewhat disagree	168	40.1
	Neither agree nor disagree	106	25.3
	Somewhat agree		
	Strongly Agree	11	2.6
		41	9.8
	Strongly disagree	95	22.7
	Somewhat disagree	174	41.5
	Neither agree nor disagree	98	23.4
When I am in pain, I try not to feel angry, nor depressed, nor anxious.	Somewhat agree		
	Strongly Agree	172	41.1
		82	19.6
	Strongly disagree	52	12.4
	Somewhat disagree	79	18.9
	Neither agree nor disagree	34	8.1
When I am in pain, I do physical exercise.	Somewhat agree		
	Strongly Agree	172	41.1
		119	28.4
	Strongly disagree	54	12.9
	Somewhat disagree	66	15.8
	Neither agree nor disagree	8	1.9
When I am in pain, I sometimes forget the pain.	Somewhat agree		
	Strongly Agree	42	10.0
		72	17.2
	Strongly disagree	77	18.4
	Somewhat disagree	168	40.1
	Neither agree nor disagree	60	14.3
When I am in pain, I try to keep busy with other things.	Somewhat agree		
	Strongly Agree	37	8.8
		104	24.8
	Strongly disagree	128	30.5
	Somewhat disagree	123	29.4
When I am in pain, I get rid of thoughts that upset me.	Neither agree nor disagree	27	6.4
	Somewhat agree		
	Strongly Agree	134	32.0
		85	20.3
	Strongly disagree	62	14.8
When I am in pain, I engage in reading.	Somewhat disagree	97	23.2
	Neither agree nor disagree	41	9.8
	Somewhat agree		
	Strongly Agree	48	11.5
		70	16.7
	Strongly disagree	96	22.9
	Somewhat disagree	164	39.1
When I am in pain, I do something I enjoy.	Neither agree nor disagree	41	9.8
	Somewhat agree		
	Strongly Agree	25	6.0
		40	9.5
	Strongly disagree	53	12.6
	Somewhat disagree	199	47.5
	Neither agree nor disagree	102	24.3

When I am in pain, I try to distract myself from the pain.	Somewhat agree Strongly Agree		
Coping Barriers			
The pain itself interferes with coping adequately	Never	9	2.1
	Sometimes	208	49.6
	Often	190	45.3
	Unknown	12	2.9
Over-reliance on medication	Never	131	31.3
	Sometimes	162	38.7
	Often	115	27.4
	Unknown	11	2.6
Depression interferes with coping adequately	Never	104	24.8
	Sometimes	194	46.3
	Often	109	26.0
	Unknown	12	2.9
A lack of understanding from professionals	Never	72	17.2
	Sometimes	180	43.0
	Often	156	37.2
	Unknown	11	2.6
Fear of activity	Never	41	9.8
	Sometimes	171	40.8
	Often	198	46.8
	Unknown	11	2.6
Ineffective pain relief from some coping strategies	Never	36	8.6
	Sometimes	179	42.7
	Often	193	46.1
	Unknown	11	2.6
Stressors	Never	33	7.9
	Sometimes	187	44.6
	Often	187	44.6
	Unknown	12	2.9
Time constraints	Never	59	14.1
	Sometimes	240	57.3
	Often	108	25.8
	Unknown	12	2.9
Lack of motivation or self-discipline	Never	98	23.4
	Sometimes	182	43.4
	Often	128	30.5
	Unknown	11	2.6
Lack of support from friends, family or employers	Never	124	29.6
	Sometimes	192	45.8
	Often	92	22.0
	Unknown	11	2.6

Limited resources (e.g. transportation, financial)	Never	136	32.5
	Sometimes	177	42.2
	Often	95	22.7
	Unknown	11	2.6
Coping effectiveness			
Seeking professional help (e.g. neurologist)	Does not apply	7	1.7
	Not at all	31	7.4
	Somewhat	133	31.7
	Yes	233	55.6
	Unknown	15	3.6
Talking to a psychologist	Does not apply	96	22.9
	Not at all	92	22.0
	Somewhat	96	22.9
	Yes	120	28.6
	Unknown	15	3.6
Having supportive friends and family	Does not apply	8	1.9
	Not at all	18	4.3
	Somewhat	143	34.1
	Yes	235	56.1
	Unknown	15	3.6
Having support groups with peers	Does not apply	82	19.6
	Not at all	66	15.8
	Somewhat	143	34.1
	Yes	113	27.0
	Unknown	15	3.6
Mindfullness	Does not apply	52	12.4
	Not at all	82	19.6
	Somewhat	166	39.6
	Yes	103	24.6
	Unknown	16	3.8
Cognitive behavioural therapy	Does not apply	160	38.2
	Not at all	111	26.5
	Somewhat	83	19.8
	Yes	50	11.9
	Unknown	15	3.6
Exercising	Does not apply	22	5.3
	Not at all	143	34.1
	Somewhat	155	37.0
	Yes	84	20.0
	Unknown	15	3.6
Improving sleep	Does not apply	28	6.7
	Not at all	62	14.8
		148	35.3

	Somewhat	165	39.4
	Yes	16	3.8
	Unknown		
Healthy diet		19	4.5
	Does not apply	97	23.2
	Not at all	161	38.4
	Somewhat	127	30.3
	Yes	15	3.6
	Unknown		
Avoidance of alcohol and drugs		69	16.5
	Does not apply	66	15.8
	Not at all	107	25.5
	Somewhat	162	38.7
	Yes	15	3.6
	Unknown		
Acceptance of the pain		21	5.0
	Does not apply	107	25.5
	Not at all	171	40.8
	Somewhat	105	25.1
	Yes	15	3.6
	Unknown		
Acceptance of your life with chronic pain		17	4.1
	Does not apply	108	25.8
	Not at all	156	37.2
	Somewhat	123	29.4
	Yes	15	3.6
	Unknown		

	N	**Mean**	**SD**
Mental Health Score	419	10.48	3.79
Self-rated psychological well-being past two weeks	419	5.44	1.79
Self-rated psychological well-being day of filling in survey	419	5.68	2.03
Neuroticism Score	419	26.88	7.96
Neuroticism yes/ no score	419	9.25	2.87
Passive Coping Score	419	32.41	7.00
Active Coping Score	419	13.26	5.30
Barrier Score	407	12.78	4.19
Effective Coping Score	403	22.73	5.84

Appendix D: Self-rated Mental Health graphs

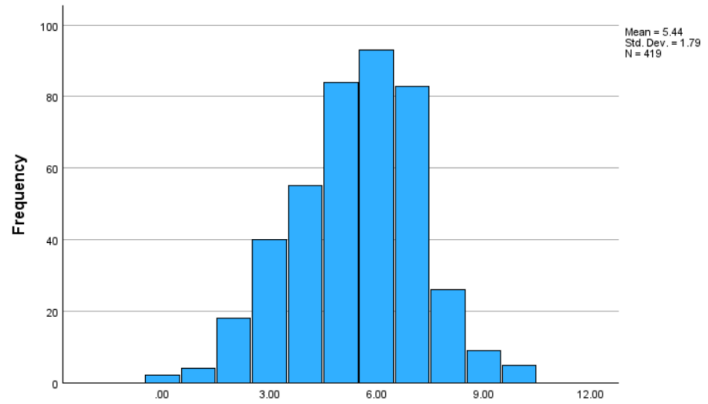


Figure D1: Self-rated mental health of the past two weeks

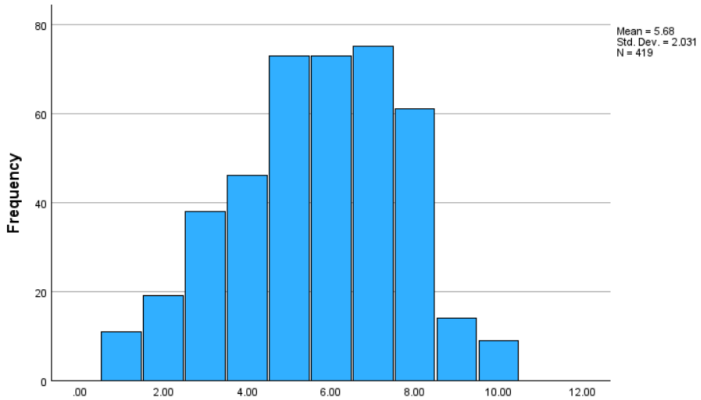


Figure D2: Self-rated mental health on the day of filling in the survey

Appendix E: Mental health, coping and neuroticism, barrier and effectiveness scores per question

Table E1: Mental Health score per question minimal score 0, maximum score 3.

Mental health score per question	N/%	Mental health score per question	N/%
Q9 Self-image		**Q13 Physical Health**	
score 0	**36**/8.6	score 0	**47**/11.2
score 1	**156**/37.2	score 1	**148**/35.3
score 2	**204**/48.7	score 2	**191**/45.6
score 3	**23**/5.5	score 3	**33**/7.9
Q10 Independence		**Q14 Future**	
score 0	**39**/9.3	score 0	**45**/10.7
score 1	**155**/37.0	score 1	**166**/39.6
score 2	**175**/41.8	score 2	**191**/45.6
score 3	**50**/11.9	score 3	**17**/4.1
Q11 Mood		**Q15 Relationships**	
score 0	**55**/13.1	score 0	**21**/5.0
score 1	**119**/28.4	score 1	**108**/25.8
score 2	**201**/48.0	score 2	**209**/49.9
score 3	**44**/10.5	score 3	**81**/19.3
Q12 Daily activities			
score 0	**90**/21.5		
score 1	**213**/50.8		
score 2	**107**/25.5		
score 3	**9**/2.1		

Table E2: Passive coping distribution per question, minimum score 0, maximum score 4.

Passive coping score per question	N/%	Passive coping score per question	N/%
Q18_1 Stronger medication		**Q18_7 Depend more on others**	
score 0: Strongly disagree	**38**/9.1	score 0: Strongly disagree	**64**/15.3
score 1 Somewhat disagree	**62**/14.8	score 1 Somewhat disagree	**67**/16.0
score 2: Neither agree nor disagree	**113**/27.0	score 2: Neither agree nor disagree	**68**/16.2
score 3: Somewhat agree	**124**/29.6	score 3: Somewhat agree	**127**/30.3
Score 4: Strongly Agree	**82**/19.6	Score 4: Strongly Agree	**93**/22.2
Q18_2 Tired and fed up		**Q18_8 Can't find relieve**	
score 0: Strongly disagree	**14**/3.3	score 0: Strongly disagree	**17**/4.1
score 1 Somewhat disagree	**17**/4.1	score 1 Somewhat disagree	**34**/8.1
score 2: Neither agree nor disagree	**23**/5.5	score 2: Neither agree nor disagree	**43**/10.3
score 3: Somewhat agree	**128**/30.5	score 3: Somewhat agree	**177**/42.2
Score 4: Strongly Agree	**237**/56.6	Score 4: Strongly Agree	**148**/35.3
Q18_3 Too much to handle		**Q18_9 Take medicine**	
score 0: Strongly disagree	**12**/2.9	score 0: Strongly disagree	**11**/2.6
score 1 Somewhat disagree	**35**/8.4	score 1 Somewhat disagree	**22**/5.3
score 2: Neither agree nor disagree	**59**/14.1	score 2: Neither agree nor disagree	**31**/7.4
	181/43.2		**136**/32.5

score 3: Somewhat agree Score 4: Strongly Agree	**132**/31.5	score 3: Somewhat agree Score 4: Strongly Agree	**219**/52.3
Q18_4 Tell others that it hurts		**Q18_10 Call a doctor**	
score 0: Strongly disagree	**65**/15.5	score 0: Strongly disagree	**197**/47.0
score 1 Somewhat disagree	**101**/24.1	score 1 Somewhat disagree	**103**/24.6
score 2: Neither agree nor disagree	**75**/17.9	score 2: Neither agree nor disagree	**61**/14.6
score 3: Somewhat agree	**125**/29.8	score 3: Somewhat agree	**39**/9.3
Score 4: Strongly Agree	**53**/12.6	Score 4: Strongly Agree	19/4.5
Q18_5 Wishing for it to hurt less		**Q18_11 Think about how and where it hurts**	
score 0: Strongly disagree	**18**/4.3	score 0: Strongly disagree	**19**/4.5
score 1 Somewhat disagree	**15**/3.6	score 1 Somewhat disagree	**52**/12.4
score 2: Neither agree nor disagree	**26**/6.2	score 2: Neither agree nor disagree	**74**/17.7
score 3: Somewhat agree	**107**/25.5	score 3: Somewhat agree	**168**/40.1
Score 4: Strongly Agree	**253**/60.4	Score 4: Strongly Agree	**106**/25.3
Q18_6 Reduce social activities		**Q18_12 Try not to feel anything**	
score 0: Strongly disagree	**11**/2.6	score 0: Strongly disagree	**11**/2.6
score 1 Somewhat disagree	**8**/1.9	score 1 Somewhat disagree	**41**/9.8
score 2: Neither agree nor disagree	**12**/2.9	score 2: Neither agree nor disagree	**95**/22.7
score 3: Somewhat agree	**107**/25.5	score 3: Somewhat agree	**174**/41.5
Score 4: Strongly Agree	**281**/67.1	Score 4: Strongly Agree	**98**/23.4

Table E3: Active coping score per question, minimum score 0, maximum score 4.

Active coping score per question	N/%	Active coping score per question	N/%
Q18_13 Physical exercise		**Q18_17 Engage in reading**	
score 0: Strongly disagree	**172/**41.1	score 0: Strongly disagree	**134**/32.0
score 1 Somewhat disagree	**82/**19.6	score 1 Somewhat disagree	**85**/20.3
score 2: Neither agree nor disagree	**52/**12.4	score 2: Neither agree nor	**62**/14.8
score 3: Somewhat agree	**79/**18.9	disagree	**97**/23.2
Score 4: Strongly Agree	**34/**8.1	score 3: Somewhat agree	**41**/9.8
		Score 4: Strongly Agree	
Q18_14 Forget the pain		**Q18_18 Do something I enjoy**	
score 0: Strongly disagree	**172**/41.1	score 0: Strongly disagree	**48**/11.5
score 1: Somewhat disagree	**119**/28.4	score 1: Somewhat disagree	**70**/16.7
score 2: Neither agree nor disagree	**54**/12.9	score 2: Neither agree nor	**96**/22.9
score 3: Somewhat agree	**66**/15.8	disagree	**164**/39.1
Score 4: Strongly Agree	**8**/1.9	score 3: Somewhat agree	**41**/9.8
		Score 4: Strongly Agree	
Q18_15 Keep busy		**Q18_19 Distract myself**	
score 0: Strongly disagree	**42**/10.0	score 0: Strongly disagree	**25**/6.0
score 1: Somewhat disagree	**72**/17.2	score 1: Somewhat disagree	**40**/9.5
score 2: Neither agree nor disagree	**77**/18.4	score 2: Neither agree nor	**53**/12.6
score 3: Somewhat agree	**168**/40.1	disagree	**199**/47.5
Score 4: Strongly Agree	**60**/14.3	score 3: Somewhat agree	**102**/24.3
		Score 4: Strongly Agree	

Q18_16 Get rid of upsetting thoughts score 0: Strongly disagree score 1: Somewhat disagree score 2: Neither agree nor disagree score 3: Somewhat agree Score 4: Strongly Agree	 **37**/8.8 **104**/24.8 **128**/30.5 **123**/29.4 **27**/6.4		

Table E4: Neuroticism distribution per question, minimum score 0, maximum score 4.

Neuroticism score per question	**N**/%	**Neuroticism score per question**	**N**/%
Q17_1 Mood shifts score 0: No score 1: Yes	 **49**/11.7 **370**/88.3	**Q17_7 Worrier** score 0: No score 1: Yes	 **50**/11.9 **369**/88.1
Q17_2 Miserable for no reason score 0: No score 1: Yes	 **92**/22.0 **327**/78.0	**Q17_8 Tense/highly strung** score 0: No score 1: Yes	 **99**/23.6 **320**/76.4
Q17_3 Irritable person score 0: No score 1: Yes	 **120**/28.6 **299**/71.4	**Q17_9 Worry after embarrassment** score 0: No score 1: Yes	 **70**/16.7 **349**/83.3
Q17_4 Feelings easily hurt score 0: No score 1: Yes	 **106**/25.3 **313**/74.7	**Q17_10 Suffer from nerves** score 0: No score 1: Yes	 **121**/28.9 **298**/71.1
Q17_5 Feel fed up score 0: No score 1: Yes	 **70**/16.7 **349**/83.3	**Q17_11 Feel lonely** score 0: No score 1: Yes	 **142**/33.9 **277**/66.1
Q17_6 Nervous person score 0: No score 1: Yes	 **135**/32.2 **284**/67.8	**Q17_12 Guilt** score 0: No score 1: Yes	 **98**/23.4 **321**/76.6

Table E5*: Barrier scores, minimum 0, maximum 2.*

Barriers	**N**/%	**Barriers**	**N**/%
Q19_1 Pain interferes with coping adequately score 0: Never score 1: Sometimes score 2: Often	 **9**/2.2 **208**/51.1 **190**/46.7	**Q19_7 Stressors** score 0: Never score 1: Sometimes score 2: Often	 **33**/8.1 **187**/45.9 **187**/45.9
Q19_2 Over-reliance on medications score 0: Never	 **131**/32.1 **162**/39.7	**Q19_8 Time constraints** score 0: Never	 **59**/14.5 **240**/59.0

score 1: Sometimes score 2: Often	**115**/28.2	score 1: Sometimes score 2: Often	**108**/26.5
Q19_3 Depression interferes with coping adequately score 0: Never score 1: Sometimes score 2: Often	 **104**/25.6 **194**/47.7 **109**/26.8	**Q19_9 Lack of motivation or self-discipline** score 0: Never score 1: Sometimes score 2: Often	 **98**/24.0 **182**/44.6 **128**/31.4
Q19_4 A lack of understanding from professionals score 0: Never score 1: Sometimes score 2: Often	 **72**/17.6 **180**/44.1 **156**/38.2	**Q19_10 Lack of support from friends, family or employers** score 0: Never score 1: Sometimes score 2: Often	 **124**/30.4 **192**/47.1 **92**/22.6
Q19_5 Fear of activity score 0: Never score 1: Sometimes score 2: Often	 **41**/10.0 **171**/41.9 **196**/48.0	**Q19_11 Limited resources** score 0: Never score 1: Sometimes score 2: Often	 **136**/33.3 **177**/43.4 **95**/23.0
Q19_6 Ineffective pain relief from some coping strategies score 0: Never score 1: Sometimes score 2: Often	 **36**/8.8 **179**/43.9 **193**/47.3		

Table E6: effectiveness of coping mean scores, minimum 0, maximum 3.

Options	N/%	Options	N/%
Q20_1 Seeking professional help score 0: Did not try score 1: Not at all score 2: Somewhat score 3: Yes	 **7**/1.7 **31**/7.7 **133**/32.9 **233**/57.7	**Q20_7 Exercising** score 0: Did not try score 1: Not at all score 2: Somewhat score 3: Yes	 **22**/5.4 **143**/35.4 **155**/38.4 84/20.8
Q20_2 Talking to a psychologist score 0: Did not try score 1: Not at all score 2: Somewhat score 3: Yes	 **96**/32.8 **92**/22.8 **96**/23.8 **120**/29.7	**Q20_8 Improving sleep** score 0: Did not try score 1: Not at all score 2: Somewhat score 3: Yes	 **28**/6.9 **62**/15.4 **148**/36.7 **165**/40.9
Q20_3 Having supportive friends and family score 0: Did not try score 1: Not at all score 2: Somewhat score 3: Yes	 **8**/2.0 **18**/4.5 **143**/35.4 **235**/58.2	**Q20_9 Healthy diet** score 0: Did not try score 1: Not at all score 2: Somewhat score 3: Yes	 **19**/4.7 **97**/24.0 **161**/39.9 **127**/31.4
Q20_4 Having support groups with peers score 0: Did not try score 1: Not at all score 2: Somewhat score 3: Yes	 **82**/20.3 **66**/16.3 **143**/35.4 **113**/28.0	**Q20_10 Avoidance of alcohol and drugs** Score 0: Did not try score 1: Not at all score 2: Somewhat score 3: Yes	 **69**/17.1 **66**/16.3 **107**/26.5 **162**/40.1
Q20_5 Mindfulness score 0: Did not try score 1: Not at all	 **52**/12.9 **82**/20.3	**Q20_11 Acceptance of the pain** score 0: Did not try score 1: Not at all	 **21**/5.2 **107**/26.5

score 2: Somewhat	**166**/41.2	score 2: Somewhat	**171**/42.3
score 3: Yes	**103**/25.6	score 3: Yes	**105**/26.0
Q20_6 Cognitive behavioural therapy		**Q20_12 Acceptance of your life with chronic pain**	
score 0: Did not try	**160**/39.6	score 0: Did not try	**17**/4.2
score 1: Not at all	**111**/27.5	score 1**:** Not at all	**108**/26.7
score 2: Somewhat	**83**/20.5	score 2: Somewhat	**156**/38.6
score 3: Yes	**50**/12.4	score 3: Yes	**123**/30.4

Table E7: effectiveness looking excluseviely at the people who tried this coping mechanism.

Active coping mechanism	**N (people who tried the coping mechanism)**	**% of people who found it ineffective**	**% of people who found it effective**
Seeking professional help	397	7.8%	58.7%
Psychologist	308	29.9%	39.0%
Supportive friend and family	396	4.5%	59.3%
Peer support groups	322	20.5%	35.1%
Mindfullness	351	23.4%	29.3%
CBT	244	45.5%	20.5%
Exercising	382	37.4%	22.0%
Sleep	375	16.5%	44.0%
Diet	385	25.2%	33.0%
No alcohol/drugs	335	19.7%	48.4%
Acceptance of pain	383	28.0%	27.4%
Acceptance of life with chronic migraine	387	27.9%	31.8%

Appendix F: Correlation coefficients within groups

Table F1: Correlation coefficients mental health stratified for demographic groups. The red numbers are the strongest correlations.

		Mental Health & passive coping	**Mental health & active coping**	**Passive & active coping**
Moderators	**N**	Correlation coefficient – P-value	Correlation coefficient – P-value	Correlation coefficient – P-value
How long have you been dealing with chronic migraine?				
Less than a year	6	0.403 (0.428)	-0.894 (0.016)	-0.254 (0.628)
Between 1 and 5 years	74	- 0.205 (0.079)	0.247 (0.034)	-0.035 (0.766)
Between 5 and 10 years	86	- 0.243 (0.024)	0.240 (0.026)	-0.073 (0.507)
Between 10 and 20 years	108	- 0.464 (<0.001)	0.136 (0.160)	-0.303 (0.001)
More than 20 years	145	- 0.396 (<0.001)	0.206 (0.013)	-0.121 (0.147)
Age				
18-25	39	-0.236 (0.148)	0.204 (0.213)	0.014 (0.931)
26-35	97	-0.203 (0.046)	0.118 (0.251)	-0.047 (0.651)
36-45	132	-0.367 (<0.001)	0.203 (0.020)	-0.175 (0.044)
46-55	100	-0.296 (0.003)	0.210 (0.036)	-0.192 (0.056)
56-65	51	-0.570 (<0.001)	0.199 (0.162)	-0.0139 (0.330)
How often did you have a migraine in the past two weeks?				
Once	22	-0.360 (0.099)	0.439 (0.041)	-0.590 (0.004)
Never	6	-0.232 (0.658)	0.618 (0.191)	-0.406 (0.425)
2-3 times	85	-0.298 (0.006)	0.081 (0.462)	-0.229 (0.035)
4-7 times	154	-0.469 (<0.001)	0.204 (0.011)	-0.045 (0.579)
8-13 times	58	-0.219 (0.099)	0.188 (0.157)	-0.148 (0.269)
Daily	94	-0.288 (0.005)	0.271 (0.008	-0.122 (0.243)
Did you/do you have a migraine today?				
Yes	252	-0.315 (<0.001)	0.208 (<0.001)	0.020 (0.754)
No	167	-0.299 (<0.001)	0.167 (0.031)	-0.360 (<0.001)
What is your highest level of education?				
Less than high school degree	10	-0.529 (0.116)	0.615 (0.058)	-0.374 (0.287)
Master's degree	60	-0.428 (<0.001)	0.031 (0.813)	-0.140 (0.285)
Other	28	-0.368 (0.054)	0.548 (0.003)	-0.242 (0.214)
High school degree or equivalent	51	-0.150 (0.293)	0.132 (0.356)	-0.076 (0.595)
Some college but no degree	71	-0.397 (<0.001)	0.212 (0.075)	-0.302 (0.011)
Associate degree	50	-0.258 (0.071)	0.267 (0.061)	0.021 (0.887)
Bachelor degree	138	-0.330 (<0.001)	0.141 (0.100)	-0.096 (0.263)
PhD	11	-0.362 (0.275)	-0.110 (0.747)	0.472 (0.142)
How would you rate your financial security?				
1 star	45	-0.228 (0.132)	0.398 (0.007)	-0.066 (0.667)
2 stars	62	-0.348 (0.006)	0.207 (0.106)	-0.257 (0.044)
3 stars	132	-0.284 (<0.001)	0.180 (0.039)	-0.110 (0.208)
4 stars	123	-0.355 (<0.001)	0.084 (0.357)	-0.096 (0.292)
5 stars	57	-0.317 (0.016)	0.157 (0.245)	-0.078 (0.566)
What is your gender?				
Male	12	-0.824 (<0.001)	0.044 (0.892)	-0.087 (0.788)
Female	407	-0.329 (<0.001)	0.189 (<0.001)	-0.139 (0.005)

Table F2: Correlation coefficients neuroticism stratified for demographic groups. The red numbers are the strongest correlations.

		Neuroticism & Mental health	**Neuroticism & passive coping**	**Neuroticism & active coping**	**Passive & active coping**
Moderators	**N**	Correlation coefficient – P-value	Correlation coefficient – P-value	Correlation coefficient – P-value	Correlation coefficient – P-value
How long have you been dealing with chronic migraine?					
Less than a year	6	-0.667 (0.148)	0.194 (0.713)	0.621 (0.188)	-0.254 (0.628)
Between 1 and 5 years	74	-0.461 (<0.001)	0.172 (0.142)	-0.260 (0.025)	-0.035 (0.766)
Between 5 and 10 years	86	-0.405 (<0.001)	0.424 (<0.001)	-0.120 (0.272)	-0.073 (0.507)
Between 10 and 20 years	108	-0.507 (<0.001)	0.392 (<0.001)	-0.126 (0.193)	-0.303 (0.001)
More than 20 years	145	-0.596 (<0.001)	0.305 (<0.001)	-0.158 (0.058)	-0.121 (0.147)
Age					
18-25	39	-0.287 (0.076)	0.219 (0.181)	-0.024 (0.883)	0.014 (0.931)
26-35	97	-0.540 (<0.001)	0.297 (0.003)	-0.222 (0.029)	-0.047 (0.651)
36-45	132	-0.490 (<0.001)	0.333 (<0.001)	-0.185 (0.034)	-0.175 (0.044)
46-55	100	-0.542 (<0.001)	0.314 (0.001)	-0.024 (0.816)	-0.192 (0.056)
56-65	51	-0.551 (<0.001)	0.203 (0.154)	-0.163 (0.253)	-0.0139 (0.330)
How often did you have a migraine in the past two weeks?					
Once	22	-0.389 (0.074)	0.172 (0.445)	-0.017 (0.941)	-0.590 (0.004)
Never	6	-0.851 (0.032)	0.530 (0.280)	-0.851 (0.032)	-0.406 (0.425)
2-3 times	85	-0.529 (<0.001)	0.402 (<0.001)	-0.089 (0.420)	-0.229 (0.035)
4-7 times	154	-0.547 (<0.001)	0.388 (<0.001)	-0.141 (0.081)	-0.045 (0.579)
8-13 times	58	-0.440 (<0.001)	0.104 (0.439)	-0.216 (0.104)	-0.148 (0.269)
Daily	94	-0.606 (<0.001)	0.371 (<0.001)	-0.195 (0.060)	-0.122 (0.243)
Did you/do you have a migraine today?					
Yes	252	-0.488 (<0.001)	0.313 (<0.001)	-0.170 (0.007)	0.020 (0.754)
No	167	-0.554 (<0.001)	0.322 (<0.001)	-0.104 (0.182)	-0.360 (<0.001)
What is your highest level of education?					
Less than high school degree	10	-0.454 (0.188)	0.282 (0.430)	-0.073 (0.841)	-0.374 (0.287)
Master's degree	60	-0.484 (<0.001)	0.394 (0.002)	-0.173 (0.186)	-0.140 (0.285)
Other	28	-0.677 (<0.001)	0.326 (0.091)	-0.419 (0.026)	-0.242 (0.214)
High school degree or equivalent	51	-0.374 (0.007)	0.223 (0.116)	0.065 (0.651)	-0.076 (0.595)
Some college but no degree	71	-0.434 (<0.001)	0.367 (0.002)	-0.245 (0.039)	-0.302 (0.011)
Associate degree	50	-0.597 (<0.001)	0.255 (0.074)	0.102 (0.481)	0.021 (0.887)
Bachelor degree	138	-0.564 (<0.001)	0.301 (<0.001)	-0.237 (0.005)	-0.096 (0.263)
PhD	11	-0.589 (0.057)	0.581 (0.061)	0.066 (0.848)	0.472 (0.142)
How would you rate your financial security?					
1 star	45	-0.487 (<0.001)	0.255 (0.091)	-0.370 (0.012)	-0.066 (0.667)
2 stars	62	-0.440 (<0.001)	0.215 (0.094)	-0.049 (0.708)	-0.257 (0.044)
3 stars	132	-0.392 (<0.001)	0.386 (<0.001)	-0.099 (0.261)	-0.110 (0.208)
4 stars	123	-0.559 (<0.001)	0.370 (<0.001)	-0.146 (0.107)	-0.096 (0.292)
5 stars	57	-0.498 (<0.001)	0.107 (0.428)	-0.111 (0.410)	-0.078 (0.566)
What is your gender?					
Male	12	-0.337 (0.283)	0.347 (0.269)	-0.141 (0.662)	-0.087 (0.788)
Female	407	-0.515 (<0.001)	0.317 (<0.001)	-0.153 (0.002)	-0.139 (0.005)

Appendix G: Barriers for covariates

Table G1 Correlation coefficients relations with barriers corrected for covariates.

	Passive coping	Active coping	Mental Health	Neuroticism
Barrier score Correlation r	0.456 (<0.001)	-0.106 (0.033)	-0.485 (<0.001)	0.521(<0.001)
Corrected for: Age	0.425 (<0.001)	-0.117 (0.018)	-0.446 (<0.001)	0.464 (<0.001)
Corrected for: How long you've been dealing with migraine.	0.445 (<0.001)	-0.125 (0.012)	-0.466 (<0.001)	0.488 (<0.001)
Corrected for: How often did you have a migraine in the past two weeks	0.443 (<0.001)	-0.125 (0.012	-0.466 (<0.001)	0.487 (<0.001)
Corrected for: Did you have a migraine today?	0.435 (<0.001)	-0.122 (0.014)	-0.451 (<0.001)	0.482 (<0.001)
Corrected for: Highest education level.	0.444 (<0.001)	-0.124 (0.012)	-0.462 (<0.001)	0.485 (<0.001)
Corrected for: Financial security.	0.424 (<0.001)	-0.107 (0.031)	-0.398 (<0.001)	0.446 (<0.001)
Corrected for: Gender.	0.448 (<0.001)	-0.124 (0.013)	-0.464 (<0.001)	0.493 (<0.001)

Table G2: Uncorrected barrier correlations for separate barriers. The red numbers are the strongest correlations.

	Passive coping	Active coping	Mental Health	Neuroticism
Pain interferes with coping	0.294 (<0.001)	-0.091 (0.066)	-0.318 (<0.001)	0.235 (<0.001)
Over-reliance on medications	0.227 (<0.001)	-0.074 (0.134)	-0.002 (0.964)	0.141 (0.004)
Depression interferes with coping	0.267 (<0.001)	-0.113 (0.022)	-0.489 (<0.001)	0.486 (<0.001)
Lack of understanding from professionals	0.205 (<0.001)	-0.041 (0.407)	-0.328 (<0.001)	0.228 (<0.001)
Fear of activity	0.308 (<0.001)	-0.178 (<0.001)	-0.241 (<0.001)	0.287 (<0.001)
Ineffective pain relief	0.368 (<0.001)	0.017 (0.734)	-0.296 (<0.001)	0.282 (<0.001)
Stressors	0.266 (<0.001)	0.032 (0.523)	-0.229 (<0.001)	0.324 (<0.001)
Time constraints	0.234 (<0.001)	0.046 (0.356)	-0.108 (0.029)	0.293 (<0.001)
Lack of motivation or self-discipline	0.237 (<0.001)	-0.084 (0.092)	-0.245 (<0.001)	0.375 (<0.001)
Lack of support from friends, family or employers	0.149 (0.003)	-0.146 (0.003)	-0.331 (<0.001)	0.254 (<0.001)
Limited resources	0.233 (<0.001)	-0.085 (0.086)	-0.316 (<0.001)	0.202 (<0.001)

Appendix H: Effectiveness of active coping mechanisms

Table H1: corrected correlations effectiveness of active coping mechanisms with mental health.

		Mental health score	Passive coping	Active coping	Barriers
Seeking professional help					
Score 0	Never used	5.78	6.37	4.64	5.39
Score 1	No	4.47	7.02	4.72	6.54
Score 2	Sometimes	4.50	6.83	4.46	5.94
Score 3	Yes	5.30	6.70	4.92	5.63
Talking to a psychologist					
Score 0	Never used	5.29	6.57	4.77	5.48
Score 1	No	5.15	6.80	4.43	5.53
Score 2	Sometimes	4.72	6.88	4.74	6.13
Score 3	Yes	4.81	6.79	5.00	5.99
Having supportive friends and family					
Score 0	Never used	3.81	5.44	4.24	6.13
Score 1	No	4.71	6.46	3.45	6.64
Score 2	Sometimes	4.50	6.89	4.48	6.12
Score 3	Yes	5.33	6.75	5.04	5.53
Having support groups with peers					
Score 0	Never used	5.23	6.63	4.66	5.39
Score 1	No	4.81	6.62	4.07	6.08
Score 2	Sometimes	4.82	6.85	4.72	5.96
Score 3	Yes	5.09	6.83	5.26	5.73
Mindfulness					
Score 0	Never used	5.25	6.37	4.34	5.54
Score 1	No	4.47	6.77	3.85	5.88
Score 2	Sometimes	4.87	6.96	4.91	5.99
Score 3	Yes	5.42	6.65	5.46	5.55
Cognitive behavioural therapy					
Score 0	Never used	5.18	6.55	4.69	5.42
Score 1	No	4.75	6.97	4.45	6.10
Score 2	Sometimes	4.72	7.03	4.86	6.12
Score 3	Yes	5.28	6.53	5.44	5.82
Exercising					
Score 0	Never used	5.30	6.43	4.16	5.25
Score 1	No	4.39	7.01	3.70	6.30
Score 2	Sometimes	5.08	6.76	5.18	5.60
Score 3	Yes	5.72	6.42	5.91	5.47
Improving sleep					
Score 0	Never used	4.71	6.47	4.42	5.52
Score 1	No	4.48	6.85	4.25	6.01
Score 2	Sometimes	4.62	6.82	4.54	5.88
Score 3	Yes	5.53	6.72	5.21	5.70

Healthy diet					
Score 0	Never used	5.11	6.22	3.83	5.78
Score 1	No	4.40	6.78	4.26	5.85
Score 2	Sometimes	4.90	7.01	4.57	6.00
Score 3	Yes	5.51	6.51	5.49	5.51
Avoidance of alcohol and drugs					
Score 0	Never used	5.00	6.57	4.45	5.51
Score 1	No	4.72	6.63	4.31	5.94
Score 2	Sometimes	4.78	6.96	4.76	5.92
Score 3	Yes	5.21	6.77	5.06	5.78
Acceptance of the pain					
Score 0	Never used	4.92	6.36	4.81	5.70
Score 1	No	4.29	7.09	3.79	6.38
Score 2	Sometimes	4.96	6.81	4.93	5.81
Score 3	Yes	5.72	6.42	5.44	5.20
Acceptance of your life with chronic pain					
Score 0	Never used	4.82	6.51	5.04	5.68
Score 1	No	4.23	7.12	3.96	6.56
Score 2	Sometimes	4.96	6.76	4.79	5.70
Score 3	Yes	5.68	6.48	5.35	5.28

Appendix I: Covariates effect on correlations

Table I1: Covariates effect on correlations.

	Mental Health & passive coping	**Neuroticism & Mental health**	**Neuroticism & passive coping**	**Mental health & active coping**	**Neuroticism and active coping**	**Passive and active coping**
	Correlation coefficient – P-value	Correlation coefficient – P-value	Correlation coefficient – P-value	Correlation coefficient – P-value	Correlation coefficient – P-value	Correlation coefficient – P-value
Uncorrected correlation coefficient	-0.350 (<0.001)	-0.517 (<0.001)	0.331 (<0.001)	0.189 (<0.001)	-0.149 (0.002)	-0.136 (0.005)
Corrected for: How long have you been dealing with chronic migraine?	-0.351 (<0.001)	-0.495 (<0.001)	0.311 (<0.001)	0.199 (<0.001)	-0.118 (0.016)	-0.160 (0.001)
Corrected for: Age	-0.331 (<0.001)	-0.477 (<0.001)	0.280 (<0.001)	0.195 (<0.001)	-0.110 (0.024)	-0.154 (0.002)
Corrected for: How often did you have a migraine in the past two weeks?	-0.341 (<0.001)	-0.511 (<0.001)	0.311 (<0.001)	0.213 (<0.001)	-0.118 (0.015)	-0.162 (<0.001)
Corrected for: Did you/do you have a migraine today?	-0.322 (<0.001)	-0.497 (<0.001)	0.303 (<0.001)	0.203 (<0.001)	-0.117 (0.017)	-0.158 (0.001)
Corrected for: What is your highest level of education?	-0.350 (<0.001)	-0.495 (<0.001)	0.309 (<0.001)	0.200 (<0.001)	-0.119 (0.015)	-0.161 (<0.001)
Corrected for? How would you rate you financial security	-0.320 (<0.001)	-0.448 (<0.001)	0.285 (<0.001)	0.188 (<0.001)	-0.104 (0.034)	-0.151 (0.002)
Corrected for: What is you gender?	-0.342 (<0.001)	-0.488 (<0.001)	0.294 (<0.001)	0.199 (<0.001)	-0.116 (0.017)	-0.158 (0.001)