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Development and Psychometric Evaluation of the Migraine Perceptions and Lived Experience Questionnaire: Evidence for Face, Content, and Construct Validity and Reliability

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A B S T R A C T

This study aimed to develop the Migraine Perceptions and Lived Experience Questionnaire (MPLEQ) and evaluate its face validity, content validity, construct validity, internal consistency, composite reliability, and convergent validity among patients with migraine. This instrument-development study constituted the psychometric phase of an exploratory sequential mixed-methods project. Questionnaire items were generated from a preceding phenomenological study and relevant literature, producing an initial 72-item pool. Qualitative and quantitative face validity, expert-based content validity, and pilot testing were conducted sequentially. The main psychometric sample comprised 300 patients with migraine attending Mehraram Clinic in Tehran, Iran. The dataset was divided into two independent subsamples of 150 participants for exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). EFA was performed using principal components extraction with Varimax rotation. CFA used maximum likelihood estimation. Reliability was assessed using Cronbach's alpha, McDonald's omega, composite reliability (CR), and average variance extracted (AVE). The Kaiser–Meyer–Olkin coefficient was .91, and Bartlett's test of sphericity was significant, $\chi^2(1540) = 5874.32$, $p < .001$. EFA supported a six-factor, 48-item structure explaining 64.38% of total variance, with factor loadings ranging from .62 to .83. CFA supported the six-factor model, $\chi^2/df = 2.13$, CFI = .92, IFI = .92, TLI = .91, GFI = .88, AGFI = .85, RMSEA = .062, and SRMR = .054. Standardized CFA loadings ranged from .53 to .80 and were all significant at $p < .001$. Cronbach's alpha ranged from .81 to .90 across subscales and was .94 for the total scale; McDonald's omega ranged from .82 to .91 and was .95 overall. CR ranged from .83 to .91, and AVE ranged from .50 to .54. The 48-item MPLEQ demonstrated satisfactory multidimensional construct validity, internal consistency, composite reliability, and convergent validity and may serve as a patient-centered measure of migraine perceptions and lived experience.

Keywords: *Migraine; Lived Experience; Illness Perception; Questionnaire Development; Psychometric Evaluation; Construct Validity; Reliability*

1. Introduction

Migraine is a recurrent neurological disorder characterized not only by episodes of moderate-to-severe headache but also by a complex constellation of sensory, cognitive, emotional, and functional disturbances that can extend beyond the period of acute pain. Its episodic and unpredictable nature often transforms migraine from an isolated pain condition into a persistent lived burden that affects how individuals perceive their bodies, organize daily activities, anticipate future events, maintain interpersonal relationships, and evaluate their own health and functioning. Global epidemiological evidence indicates that migraine is among the most prevalent and disabling neurological disorders worldwide and constitutes an important public-health problem because of its high frequency, substantial years lived with disability, and broad implications for healthcare systems, workplaces, families, and communities (Steiner et al., 2023). Accordingly, contemporary approaches to migraine increasingly recognize that assessing only attack frequency, headache intensity, or medication use provides an incomplete representation of the disorder and that the patient's subjective perceptions and lived experience constitute essential components of comprehensive assessment.

The burden associated with migraine is inherently multidimensional. Individuals may experience disabling head pain, nausea, fatigue, sensory hypersensitivity, impaired concentration, anticipatory fear of subsequent attacks, interruption of occupational and academic activities, withdrawal from social participation, and limitations in family roles. Qualitative research has demonstrated that the impact of migraine on functioning extends across physical, cognitive, emotional, social, and role-related domains, with affected individuals frequently reporting that the unpredictability of attacks complicates planning and creates an enduring sense of vulnerability even during periods without pain (R. Mangrum et al., 2024). Related qualitative evidence has similarly indicated that migraine may restrict work performance, social engagement, household responsibilities, and the capacity to maintain ordinary routines, reinforcing the view that migraine-related disability cannot be adequately conceptualized solely in terms of symptom severity (L. F. Mangrum et al., 2024). The subjective quality-of-life burden associated with migraine also reflects the interaction between symptoms, treatment experiences, limitations in everyday functioning, and the person's psychological response to recurrent attacks (Mendak et al., 2025).

One particularly important aspect of migraine experience concerns altered bodily perception and the unpredictability of attacks. Recurrent episodes can foster a heightened awareness of bodily sensations and an expectation that apparently ordinary sensations may signal the beginning of another disabling attack. This form of vigilance may influence activity selection, travel, work planning, sleep routines, eating behavior, and willingness to participate in social activities. Individuals may consequently experience their bodies as unreliable or difficult to control, particularly when attacks occur despite preventive efforts. Such experiences are clinically relevant because contemporary migraine management increasingly incorporates nonpharmacological approaches, behavioral modifications, and lifestyle interventions in addition to conventional medication. A comprehensive review of migraine management has emphasized the growing role of lifestyle modification, complementary interventions, behavioral strategies, and integrative approaches alongside standard pharmacological treatments (Abo-Elghiet et al., 2025). The development of conservative strategies such as structured fascia exercises further reflects the expanding recognition that migraine management involves multiple domains of functioning and self-management rather than medication alone (Tekin et al., 2025).

Sensory sensitivity represents another defining dimension of the migraine experience. Photophobia, phonophobia, sensitivity to odors, and heightened vulnerability to environmental stimuli may occur during attacks and, for some individuals, extend into interictal periods. Such sensitivity can lead patients to continuously monitor environmental conditions and avoid crowded, bright, noisy, or otherwise stimulating settings. Empirical findings have shown that sensory sensitivity in patients with migraine without aura is associated with disease duration and comorbid anxiety, suggesting that sensitivity to environmental stimuli may be both a neurological and psychologically meaningful component of the illness experience (İnce et al., 2023). More broadly, research on anxiety sensitivity and environmental sensitivity indicates that individual differences in responsiveness to internal and external stimuli may intersect with emotional vulnerability and perceived environmental demands (Peel et al., 2023). In migraine, these processes may contribute to a pattern in which patients do not merely react to attacks but reorganize

parts of their daily lives around anticipated exposure to potential triggers.

The psychological consequences of migraine are similarly substantial. Repeated episodes of severe pain and functional disruption may contribute to anxiety, helplessness, irritability, sadness, frustration, perceived loss of control, and emotional exhaustion. A qualitative investigation of the lived emotional experiences of patients with migraine identified a broad range of affective consequences associated with the disorder, highlighting the importance of understanding migraine through the patient's own psychological and experiential framework (Esmaeili et al., 2023). Psychological distress may be especially pronounced when patients perceive attacks as unpredictable, uncontrollable, or inadequately understood by others. These appraisals can influence coping behavior, treatment adherence, expectations of recovery, and willingness to engage in activities that might be associated with attack onset.

The relevance of cognitive appraisal is supported by research examining psychological interventions for migraine. Changes in appraisal processes have been observed in trials of mindfulness-based cognitive therapy, indicating that the way individuals interpret and cognitively respond to migraine may itself represent an important therapeutic mechanism (Kruse & Seng, 2023). Mindfulness-based interventions have received particular attention because they may modify patients' relationships with pain, distress, anticipatory worry, and difficult internal experiences. A randomized controlled trial demonstrated the applicability of mindfulness-based cognitive therapy as an intervention for migraine (Simshauser et al., 2022), while qualitative work examining mechanisms of mindfulness among patients with migraine highlighted processes such as altered awareness, acceptance, self-regulation, and changes in responses to symptoms (Estave et al., 2023). Such findings suggest that migraine-related perceptions are not peripheral psychological phenomena but may form part of the processes through which patients experience, interpret, and manage the illness.

Evidence from Iranian studies further supports the importance of psychological and behavioral dimensions of migraine. Mindfulness training has been associated with changes in pain intensity and quality of life among patients with migraine (Rostamnejad & Ahmadi, 2021). Mindfulness-based cognitive therapy has also been investigated in relation to sleep quality and pain intensity among women with migraine (Bagherzadeh Hamamchi et al., 2023), and mindfulness-based interventions have been examined for their effects on quality of life and pain intensity among men with migraine (Motaghizadeh et al., 2023). Similarly, mindfulness-based therapeutic training has been studied in relation to quality of life, sleep quality, and pain among individuals with migraine (Mohammadi Sahlabadi, 2023). Research comparing mindfulness-based cognitive-behavioral therapy with conventional cognitive-behavioral therapy has further demonstrated the relevance of psychological distress as an important clinical outcome in migraine populations (Sezagli Shahkhasse et al., 2022). The effects of mindfulness-based resilience training on perceived stress, quality of life, and migraine attacks also underscore the role of psychological adaptation and self-regulation in understanding migraine-related functioning (Sohi, 2023).

The broader literature on mindfulness provides additional theoretical support for examining patients' subjective relationship with illness. Mindfulness-based cognitive therapy has been applied across different clinical populations, including major depression, where feasibility work has shown that individualized forms of the intervention can be implemented to address persistent psychological symptoms (Paterniti et al., 2022). Mindfulness-based interventions have also been examined in populations experiencing anxiety and other forms of emotional distress, demonstrating the wider relevance of attention regulation, nonjudgmental awareness, and cognitive-emotional adaptation across health conditions (Surbhi, 2024). Neurobiological studies of mindfulness-based cognitive therapy in treatment-resistant psychiatric conditions additionally suggest that mindfulness interventions may influence functional neural networks associated with clinically relevant cognitive and emotional domains (De la Peña-Arteaga et al., 2024). Although these findings do not directly establish equivalent mechanisms in migraine, they reinforce the conceptual importance of assessing how individuals attend to, interpret, regulate, and adapt to distressing bodily and psychological experiences.

Migraine can also interfere substantially with cognitive functioning and everyday performance. During or after attacks, individuals may report difficulty concentrating, slowed thinking, reduced memory efficiency, impaired decision-making, and inability to complete cognitively demanding tasks. These impairments may be particularly consequential in educational and occupational contexts, where recurrent periods of reduced cognitive efficiency can accumulate into missed deadlines, reduced productivity, absenteeism, and concerns about professional evaluation.

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Functional consequences are therefore not merely secondary inconveniences but central components of the lived migraine experience (L. F. Mangrum et al., 2024; R. Mangrum et al., 2024). From a measurement perspective, failure to assess these dimensions may underestimate the true burden experienced by patients whose headache intensity alone does not adequately explain disruption in their daily lives.

The interpersonal consequences of migraine are equally important. Because migraine is frequently invisible to others, patients may encounter skepticism, minimization, misunderstanding, or pressure to continue functioning despite significant symptoms. Repeated cancellation of social plans, reduced participation in family activities, difficulties fulfilling expected roles, and withdrawal from overstimulating environments can adversely affect relationships and contribute to isolation. The mismatch between the severity of the patient's subjective experience and the degree to which others recognize that burden may further intensify frustration and emotional distress. Qualitative research on migraine-related functioning has demonstrated that disruptions often extend to social relationships, household tasks, parenting, and participation in meaningful activities (R. Mangrum et al., 2024). Consequently, an instrument intended to assess migraine perceptions and lived experience should capture not only symptoms experienced within the individual but also the relational and role-based consequences through which migraine affects everyday life.

Treatment advances further emphasize the necessity of multidimensional patient-centered assessment. Migraine management now encompasses pharmacological therapy, lifestyle modification, behavioral interventions, neuromodulation, complementary approaches, and psychological treatment (Abo-Elghiet et al., 2025). Neuromodulatory therapies have been evaluated for their potential to reduce migraine frequency and pain severity in adults with chronic migraine (Saramadis & Nagarajan, 2024), while biofeedback has been systematically examined as a nonpharmacological intervention targeting physiological self-regulation in migraine (Paudel & Sah, 2025). Hormonal considerations are also clinically important in migraine, particularly because hormonal fluctuations and therapeutic decisions may interact with migraine patterns and treatment planning (van Lohuizen et al., 2024). These varied therapeutic approaches reinforce the heterogeneity of migraine and the need to understand patients' experiences across biological, behavioral, psychological, and contextual dimensions.

Pain-management research outside migraine also highlights the importance of subjective interpretation and psychologically mediated coping. Clinical hypnosis, for example, has an established evidence base in chronic pain management and seeks in part to influence pain perception, attentional processes, affective responses, and coping (Jensen, 2024). Contemporary guidance on evidence-based clinical hypnosis further emphasizes the relevance of carefully integrating psychological processes into the management of clinical symptoms and distress (Milling, 2023). Randomized evidence in surgical populations has demonstrated that clinical hypnosis can function as an adjunctive strategy for pain relief and opioid-sparing care (Rosenbloom et al., 2024), while systematic review evidence has documented effects of hypnotherapy on fear, pain, and subjective experience in other high-intensity pain contexts (Fernández-Gamero et al., 2024). Cognitive-behavioral hypnotherapy has likewise been investigated for pain reduction in other recurrent pain-related conditions (Amin Sorkhi et al., 2022). Although these interventions address clinical contexts beyond migraine, collectively they illustrate a broader principle: pain experience is shaped not only by nociceptive or physiological processes but also by cognitive, emotional, perceptual, and contextual mechanisms.

Emerging creative and integrative psychological approaches provide further evidence that emotional experience and adaptation deserve explicit attention in migraine assessment. Mindfulness-based art therapy has been reported to influence psychological symptoms and happiness among patients with migraine, indicating that intervention targets may include emotional well-being in addition to pain outcomes (Demir et al., 2024). The expanding use of such interventions suggests a gradual shift away from viewing migraine exclusively as a headache disorder toward conceptualizing it as a condition with extensive psychosocial and experiential consequences. When treatment aims extend to psychological distress, quality of life, coping, emotional regulation, and adaptation, corresponding assessment instruments must be capable of measuring these dimensions with sufficient conceptual specificity.

Despite this growing body of evidence, existing migraine assessment practices often emphasize particular domains rather than integrating patients' perceptions and lived experiences within a unified multidimensional framework. Headache diaries and symptom measures are indispensable for determining frequency, duration, severity, and treatment

response, while disability and quality-of-life instruments provide essential information about functional burden. Nevertheless, such measures do not necessarily capture how patients experience unpredictability in their bodies, remain vigilant toward possible triggers, interpret recurrent attacks, feel misunderstood in interpersonal settings, experience cognitive slowing, or reconstruct everyday routines and coping strategies around migraine. The growing literature on mindfulness, behavioral self-regulation, biofeedback, conservative treatment, and other psychologically informed approaches makes these subjective processes increasingly relevant to both research and clinical practice (Paudel & Sah, 2025; Simshauser et al., 2022; Tekin et al., 2025).

A further methodological consideration is that instruments designed primarily from professional or theoretical assumptions may inadequately represent experiences that patients themselves regard as central. Patient-centered instrument development therefore benefits from an approach in which qualitative findings establish the initial content domain and quantitative psychometric procedures subsequently determine which items and dimensions can be reliably measured. The exploratory sequential mixed-methods framework is particularly suited to constructs such as lived experience because it enables questionnaire content to emerge from participants' accounts before being subjected to systematic evaluation of face, content, and construct validity. In the context of migraine, this approach is especially important given evidence that patients' experiences encompass bodily, emotional, cognitive, interpersonal, sensory, and adaptive domains (Esmaeili et al., 2023; Estave et al., 2023; L. F. Mangrum et al., 2024).

A psychometrically sound measure of migraine perceptions and lived experience could have several applications. In research, it could permit quantitative investigation of relationships between lived burden and variables such as disease duration, attack frequency, anxiety, sensory sensitivity, quality of life, psychological distress, treatment adherence, coping, and response to psychological or behavioral interventions. In clinical settings, it could help practitioners identify areas of burden that may not become apparent through conventional symptom assessment, including fear of future attacks, perceived bodily unpredictability, social misunderstanding, cognitive disruption, environmental vigilance, or difficulty adapting to the illness. It could also provide a patient-centered outcome measure for evaluating whether interventions produce changes not simply in pain or attack frequency but also in the individual's broader experience of living with migraine. This is particularly relevant as interventions increasingly address quality of life, psychological adaptation, sensory regulation, lifestyle modification, and coping alongside conventional medical management (Demir et al., 2024; Mendak et al., 2025; Motaghizadeh et al., 2023).

The need for such an instrument is also reinforced by heterogeneity within migraine populations. Patients differ in symptom patterns, environmental triggers, emotional responses, social circumstances, treatment histories, coping strategies, and levels of adaptation. Some individuals may experience pronounced sensory vulnerability, whereas others may report predominant psychological distress, cognitive dysfunction, social consequences, or fear of attacks. Treatment context may further alter the lived experience, as patients navigate medication regimens, behavioral recommendations, complementary approaches, hormonal factors, and changing expectations regarding symptom control (Abo-Elghiet et al., 2025; van Lohuizen et al., 2024). A multidimensional questionnaire therefore has the potential to describe clinically meaningful variation that may be obscured when migraine burden is represented by a single symptom or disability score.

Furthermore, psychological responses to migraine should not automatically be interpreted as secondary or incidental phenomena. Anticipatory anxiety, perceived helplessness, reduced control, avoidance, and adaptive coping may interact dynamically with symptoms and daily functioning. Evidence that cognitive appraisal changes during mindfulness-based treatment for migraine (Kruse & Seng, 2023), that sensory sensitivity is related to comorbid anxiety (İnce et al., 2023), and that psychological interventions can influence distress, pain, sleep, or quality of life (Bagherzadeh Hamamchi et al., 2023; Mohammadi Sahlabadi, 2023; Sezagli Shahkhasse et al., 2022) supports the inclusion of these domains within a comprehensive migraine measure. Likewise, research on mindfulness mechanisms indicates that acceptance and changing one's relationship with symptoms can be meaningful components of adaptation (Estave et al., 2023). Accordingly, coping and adaptation should be treated as substantive dimensions of lived experience rather than merely as external predictors of migraine outcomes.

Taken together, the literature indicates that migraine is best understood as a multidimensional condition involving recurrent pain, sensory vulnerability, emotional distress, cognitive disruption, impaired everyday functioning, interpersonal and occupational consequences, and

continuing efforts to cope with and adapt to illness. Existing therapeutic research increasingly addresses these broader processes through mindfulness-based approaches, behavioral regulation, biofeedback, hypnosis, lifestyle intervention, neuromodulation, and other multimodal strategies (Milling, 2023; Rosenbloom et al., 2024; Saramadis & Nagarajan, 2024). However, systematic measurement of patients' integrated perceptions and lived experiences remains important for connecting qualitative understanding with quantitative assessment and for generating patient-centered evidence that can be applied across research and clinical contexts.

Therefore, the aim of the present study was to develop the Migraine Perceptions and Lived Experience Questionnaire (MPLEQ) from qualitative evidence and to evaluate its face validity, content validity, construct validity, internal consistency, composite reliability, and convergent validity among patients with migraine.

2. Methods and Materials

2.1. Study Design and Participants

The present study constituted the instrument-development and psychometric evaluation phase of an exploratory sequential mixed-methods project designed to develop and validate the Migraine Perceptions and Lived Experience Questionnaire (MPLEQ). The development of the instrument was grounded in the findings of a preceding qualitative phenomenological investigation of the perceptions and lived experiences of patients with migraine. The qualitative codes, subthemes, and overarching themes identified in that phase were integrated with relevant theoretical and empirical literature on migraine, chronic pain, illness perceptions, coping, psychological adaptation, sensory sensitivity, pain-related cognitions, and migraine-related quality of life to define the initial content domain of the instrument. The psychometric phase employed a descriptive methodological design and focused on item generation and refinement, qualitative and quantitative face validity, content validity, pilot testing, construct validity through exploratory and confirmatory factor analyses, and reliability assessment. Although the broader doctoral project included a subsequent intervention phase, that phase was not considered in the present article because the objective of this study was specifically to report the development and psychometric properties of the newly constructed questionnaire.

The qualitative foundation for questionnaire development was established through a phenomenological study conducted among patients with migraine attending Mehraram Clinic in Tehran, Iran. Participants were recruited using purposive sampling to ensure inclusion of individuals capable of providing detailed and information-rich accounts of their experiences with migraine. Eligibility for the qualitative phase required a diagnosis of migraine documented in the patient's medical record or confirmed by a neurologist. The qualitative sample consisted of 18 patients with migraine, including 13 women and 5 men, with ages ranging from 22 to 49 years. Data collection continued until conceptual saturation was achieved. No substantively new themes emerged after the 16th interview; however, two additional interviews were conducted to confirm that thematic saturation had been reached. Data were collected through individual semi-structured interviews lasting approximately 30 to 80 minutes, depending on the participant's circumstances and the depth of the discussion. With participants' permission, interviews were audio-recorded and transcribed verbatim. When permission for audio recording was not granted, detailed written notes were taken during and immediately after the interview. The interview guide focused on patients' perceptions and lived experiences of migraine, the physical, psychological, cognitive, family, social, and occupational consequences of the disorder, and the strategies patients employed to manage migraine attacks and their broader consequences.

The qualitative data were analyzed using van Manen's hermeneutic phenomenological approach. Analysis proceeded concurrently with data collection and involved repeated immersion in the interview transcripts, identification of significant statements and meaning units, generation of initial codes, organization of related codes into subthemes, development of overarching themes, and interpretive writing aimed at capturing the meaning of the migraine experience. Six broad experiential domains emerged and subsequently served as the preliminary conceptual framework for questionnaire construction: painful and unpredictable bodily experience; sensory sensitivity and vulnerability to environmental stimuli; psychological distress and emotional exhaustion; cognitive dysfunction and disruption of everyday functioning; family, social, and occupational consequences of migraine; and coping, adaptation, and reconstruction of the individual's relationship with the illness. These domains were not treated as a predetermined final factor structure; rather, they provided a theoretically and phenomenologically informed

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starting framework from which questionnaire items were generated and subsequently subjected to empirical psychometric testing.

The target population for the quantitative psychometric phase consisted of adult patients with migraine attending Mehraram Clinic in Tehran. Because identification and recruitment of the entire population of patients with migraine were not feasible, convenience sampling was used to recruit eligible clinic attendees. Efforts were nevertheless made during recruitment to obtain reasonable heterogeneity in demographic and clinical characteristics, particularly age, sex, duration of migraine, and social background. A total of 300 patients participated in the main psychometric evaluation. The sample comprised 224 women and 76 men between 18 and 50 years of age, with a mean age of 35.74 years and a standard deviation of 8.21 years. To reduce the risk of capitalization on chance and to permit cross-validation of the latent structure, the total sample was divided into two independent subsamples. Data from 150 participants were used for exploratory factor analysis, whereas data from the remaining 150 participants were used for confirmatory factor analysis. This separation ensured that the factor structure identified during the exploratory stage was subsequently evaluated using observations that had not contributed to its initial extraction.

Participants were eligible for the psychometric phase when they had a diagnosis of migraine confirmed by a neurologist or documented in their medical records, had experienced migraine for at least one year, were between 18 and 50 years of age, possessed at least middle-school education or otherwise demonstrated sufficient literacy to understand and respond to the questionnaire items, provided informed consent to participate, and were physically and psychologically capable of completing the assessment without substantial burden. Participants were excluded from the final analyses when they returned questionnaires with substantial amounts of missing information, displayed random or otherwise invalid response patterns, withdrew voluntarily from the study, developed a physical or psychological condition that substantially interfered with continued participation, or withdrew permission for the use of their data.

Questionnaire development proceeded through several sequential stages. Initially, all codes, subthemes, and overarching themes obtained from the phenomenological phase were systematically reviewed to identify concepts capable of being operationalized as self-report items. Particular emphasis was placed on perceptions of migraine pain, unpredictability of attacks, sensory hypersensitivity, emotional responses, fear and anticipation of future attacks, cognitive difficulties, perceived loss of control, limitations in daily activities, family and interpersonal consequences, occupational disruption, experiences of misunderstanding or insufficient social support, avoidance behaviors, acceptance, coping responses, and psychological adaptation. These qualitative findings were supplemented by a review of theoretical and empirical literature relating to migraine, chronic pain, illness perceptions, pain catastrophizing, sensory vulnerability, coping, mindfulness, acceptance, psychological adjustment, and migraine-related quality of life. The integration of phenomenological evidence and relevant literature initially yielded 72 items distributed across the six preliminary conceptual domains. During item writing, attempts were made to ensure that each item represented a single concept, used straightforward and patient-accessible language, remained close to the experiences reported by patients, and avoided unnecessarily technical terminology, ambiguity, double-barreled statements, excessive length, and judgmental or leading wording.

The preliminary questionnaire employed a five-point Likert response format ranging from 1, strongly disagree, to 5, strongly agree, with the intermediate options representing disagree, neither agree nor disagree, and agree. Items reflecting positive adaptation or more constructive adjustment to migraine were reverse-scored so that all items were aligned in a common scoring direction. Accordingly, higher scores indicated more pronounced negative perceptions of migraine, greater subjective burden associated with the illness, stronger involvement with its physical and psychosocial consequences, and poorer adaptation to migraine. Following completion of the successive validity, pilot-testing, and factor-analytic refinement procedures, the final MPLEQ consisted of 48 items distributed across six subscales. The possible total score therefore ranged from 48 to 240, with higher total scores representing a greater adverse migraine-related lived burden and less adaptive perception of the condition. In addition to the total score, separate scores could be calculated for each of the six dimensions established during construct validation.

Face validity was evaluated both qualitatively and quantitatively. For qualitative face validity, the original 72-item questionnaire was reviewed by 10 patients with migraine and 10 specialists with backgrounds in psychology, psychometrics, and research methodology. Reviewers were

asked to comment on the clarity and comprehensibility of the wording, sentence length, ease of responding, apparent relevance of each statement to the migraine experience, and any ambiguities or difficulties encountered while reading the items. All comments were considered at the item level. Nine items were linguistically simplified because their wording was considered difficult, overly formal, or unnecessarily lengthy. Statements containing more than one concept were reformulated, and five items displaying substantial conceptual overlap were merged. After these revisions, the questionnaire contained 67 items. Quantitative face validity was then assessed in a separate group of 30 eligible patients with migraine. Each participant rated the importance of every item on a five-point scale ranging from not important at all to very important. An item impact score was calculated by multiplying the proportion of respondents assigning an importance rating of 4 or 5 by the mean importance score of the item. An impact score greater than 1.5 was considered evidence that an item had sufficient perceived importance to be retained. Items that failed to reach this threshold were removed, resulting in a 63-item version for content-validity evaluation.

Content validity was examined by a multidisciplinary panel of 12 experts with expertise in health psychology, psychometrics, research methodology, neurology, and pain management. The experts independently assessed the 63-item questionnaire in terms of necessity, relevance, clarity, and simplicity. Item necessity was quantified using the Content Validity Ratio based on Lawshe's method. Given the 12-member expert panel, a CVR value of .56 or greater was adopted as the criterion for retaining an item. Five items that did not meet this requirement were removed. Relevance, clarity, and simplicity were evaluated through the Content Validity Index. The prespecified retention criterion for the item-level CVI was .79 or greater. Three items that initially demonstrated inadequate CVI values were rewritten in accordance with the experts' qualitative recommendations and subsequently submitted to the panel for reassessment. Completion of the content-validity process resulted in a 58-item version of the questionnaire.

The 58-item version was then administered in a pilot study involving 50 patients with migraine. Pilot testing was intended to assess the practical feasibility of questionnaire administration, final comprehensibility of the wording, approximate completion time, distribution of responses, potential ceiling or floor patterns, and any remaining problems encountered by participants. The mean questionnaire completion time was approximately 14 minutes, indicating that the instrument could be administered within a clinically feasible period. Item distributions and inter-item relationships were subsequently inspected. Two items were removed because they demonstrated substantial conceptual redundancy and very high correlations with closely corresponding items, suggesting that they contributed little unique information. The resulting 56-item version was carried forward to the exploratory factor-analytic stage.

2.2. Measures

The primary data collection instrument in the psychometric phase was the newly developed Migraine Perceptions and Lived Experience Questionnaire. Its content was derived directly from the preceding phenomenological study and supplemented by relevant theoretical and empirical evidence. The version entering exploratory factor analysis contained 56 items rated on a five-point Likert scale. The questionnaire was designed to capture multidimensional aspects of migraine that extend beyond symptom frequency or headache intensity, including the subjective bodily experience of attacks, sensory vulnerability, emotional and psychological consequences, cognitive and functional disruption, interpersonal and occupational consequences, and patterns of coping and adaptation. This approach was intended to provide a patient-centered assessment of how migraine is perceived, experienced, interpreted, and managed in everyday life. During the course of construct validation, eight additional items were removed on empirical or conceptual grounds, yielding the final 48-item instrument with six correlated dimensions.

Data collection for the psychometric evaluation was conducted among eligible patients attending Mehraram Clinic. After participants received information about the purpose and procedures of the study and provided informed consent, they completed the questionnaire individually. Standardized instructions were used to minimize variations in administration. Participants were asked to respond to all items according to their own experiences and perceptions of migraine rather than according to what they believed constituted a medically desirable or socially acceptable response. Completed questionnaires were checked for substantial missingness and obvious response irregularities before entry into the statistical database. In addition to questionnaire responses, basic demographic information required to characterize the psychometric sample, including

age and sex, was collected. Information on migraine diagnosis was verified through the participants' medical records or neurologist confirmation in accordance with the eligibility criteria.

Construct validity was evaluated sequentially using exploratory and confirmatory factor-analytic methods. Exploratory factor analysis was conducted using the first subsample of 150 participants. Before factor extraction, the suitability of the data for factor analysis was evaluated through the Kaiser–Meyer–Olkin measure of sampling adequacy and Bartlett's test of sphericity. The exploratory procedure specified in the study protocol employed principal components extraction with Varimax rotation. Decisions concerning the number and composition of factors were based on multiple criteria, including eigenvalues greater than 1.0, visual inspection of the scree plot, conceptual interpretability of the extracted dimensions, and the magnitude and pattern of item loadings. A standardized loading of .40 was considered the minimum acceptable value for retaining an item. Items were considered candidates for deletion when they demonstrated loadings below .40, substantial cross-loadings on more than one factor, weak conceptual correspondence with the factor on which they loaded, or redundancy with stronger items. Statistical evidence was therefore interpreted jointly with the conceptual meaning of the items rather than being used as the sole basis for scale refinement. Eight items were removed during this stage, producing a 48-item, six-factor solution for confirmatory evaluation.

Confirmatory factor analysis was subsequently conducted using the second independent subsample of 150 participants. The 48 retained items were specified as observed indicators of six correlated latent factors identified during the exploratory stage. Parameters were estimated using the maximum likelihood method. Evaluation of the measurement model was based on several complementary goodness-of-fit indices because no single fit statistic provides an adequate assessment of overall model fit. The indices examined included the chi-square-to-degrees-of-freedom ratio, Comparative Fit Index, Incremental Fit Index, Tucker–Lewis Index, Goodness-of-Fit Index, Root Mean Square Error of Approximation, and Standardized Root Mean Square Residual. Standardized factor loadings and their statistical significance were also examined to assess the strength of the relationships between individual items and their corresponding latent constructs. Modification indices were reviewed to identify localized sources of model misspecification; however, modifications were considered only when there was a defensible theoretical or item-content rationale. Correlated residuals or other model changes were therefore not introduced merely to improve statistical fit. The final model-fit indices and any theoretically justified modifications are reported in the Findings section.

Reliability assessment involved several complementary indicators in order to provide a comprehensive evaluation of score consistency. Cronbach's alpha and McDonald's omega were calculated for the total MPLEQ and for each individual subscale. McDonald's omega was examined in addition to coefficient alpha because it is less dependent on the assumption that all items contribute equally to the underlying construct. Split-half reliability was also evaluated, together with the Spearman–Brown coefficient and the Guttman split-half coefficient. Corrected item–total correlations were calculated to determine the consistency of individual items with the overall score of their corresponding scale and to identify items that might demonstrate weak relationships with the construct being measured. At the latent-factor level, composite reliability was calculated for each factor identified through CFA, and average variance extracted was computed as an indicator of convergent validity. Composite reliability values greater than .70 were interpreted as evidence of satisfactory construct reliability, whereas AVE values of .50 or greater were considered indicative of acceptable convergent validity. These indices were interpreted alongside conventional internal-consistency coefficients rather than as replacements for them.

2.3. Data Analysis

Before conducting the primary psychometric analyses, the quantitative dataset was screened for completeness, data-entry errors, outliers, invalid or implausible response patterns, and distributional characteristics. Questionnaires with substantial missing information or evidence of random responding were excluded in accordance with the predefined exclusion criteria. Descriptive statistics were calculated to summarize the demographic characteristics of the participants and the distributions of questionnaire responses. Depending on the measurement level of the variables, these statistics included frequencies, percentages, means, standard deviations, minimum values, and maximum values. Item-level analyses were also conducted to identify problematic response distributions, substantial redundancy among items, and weak corrected item–total relationships.

The psychometric evaluation followed a sequential analytic framework corresponding to the stages of instrument development. Quantitative face validity was examined through item impact scores, while content validity was evaluated using the Content Validity Ratio and Content Validity Index. Construct validity was first investigated through exploratory factor analysis in the first subsample of 150 participants. The Kaiser–Meyer–Olkin statistic and Bartlett's test of sphericity were used to establish the adequacy of the correlation matrix for factor analysis. Principal components extraction with Varimax rotation was then applied in accordance with the prespecified analytic protocol. Factor retention was guided by eigenvalues, the scree plot, theoretical interpretability, and item-loading patterns, with .40 used as the minimum acceptable factor-loading criterion. Cross-loading, weakly loading, redundant, or conceptually inconsistent items were removed when supported by both empirical and substantive considerations.

The factor solution identified in the exploratory analysis was cross-validated through confirmatory factor analysis in the second subsample of 150 patients. Maximum likelihood estimation was used to estimate the six-factor measurement model. Model adequacy was evaluated using the chi-square-to-degrees-of-freedom ratio, CFI, IFI, TLI, GFI, RMSEA, and SRMR. Standardized regression weights were inspected to evaluate the contribution of each item to its designated latent factor. Where modification indices indicated potentially meaningful sources of localized misfit, modifications were accepted only when they were theoretically defensible and consistent with similarities in item content. Reliability analyses subsequently included Cronbach's alpha, McDonald's omega, split-half reliability, Spearman–Brown and Guttman coefficients, and corrected item–total correlations for the questionnaire and its subscales. Composite reliability and average variance extracted were also calculated from the confirmatory factor model to examine latent construct reliability and convergent validity. A composite reliability value above .70 and an AVE of at least .50 were regarded as satisfactory.

IBM SPSS Statistics version 26 was used for data screening, descriptive statistics, item analysis, quantitative face-validity calculations, exploratory factor analysis, and conventional reliability analyses. IBM SPSS AMOS version 24 was used for confirmatory factor analysis and evaluation of the latent measurement model. The complete analytic sequence therefore progressed from qualitative and theoretical item generation to face-validity assessment, expert-based content validation, pilot testing and preliminary item refinement, exploratory identification of the questionnaire's latent structure, confirmatory cross-validation of that structure in an independent subsample, and evaluation of internal consistency, construct reliability, and convergent validity. This multistage procedure was intended to provide complementary evidence regarding the content representation, factorial structure, and reliability of scores obtained from the final 48-item Migraine Perceptions and Lived Experience Questionnaire.

3. Findings and Results

The development and psychometric evaluation of the Migraine Perceptions and Lived Experience Questionnaire (MPLEQ) proceeded through successive stages of item generation, face-validity assessment, content-validity evaluation, pilot testing, exploratory factor analysis, confirmatory factor analysis, and reliability and convergent-validity assessment. The initial item pool was derived from the six major domains identified in the preceding qualitative phase. Of the 72 initial items, 13 represented painful and unpredictable bodily experience, 12 represented sensory sensitivity and vulnerability to stimuli, 14 addressed psychological distress and emotional exhaustion, 11 represented cognitive dysfunction and impaired daily functioning, 12 addressed family, social, and occupational consequences of migraine, and 10 represented coping strategies, adaptation, and reconstruction of the relationship with the illness. Responses were rated on a five-point Likert scale ranging from 1, strongly disagree, to 5, strongly agree. Positively worded items reflecting adaptive responses to migraine were reverse-scored so that higher total scores consistently represented more negative migraine-related perceptions, greater involvement with the adverse consequences of migraine, and poorer adaptation to the illness.

A total of 300 patients with migraine attending Mehraram Clinic in Tehran participated in the psychometric phase. Participants were recruited through convenience sampling from patients who met the eligibility criteria. The sample consisted of 224 women and 76 men. Participants ranged from 18 to 50 years of age, with a mean age of 35.74 years (SD = 8.21). Regarding marital status, 177 participants were married and 123 were single. Duration of migraine ranged from 1 to 24 years, with a mean duration of 8.96 years (SD = 5.74). The sample also demonstrated diversity in educational attainment and employment status. For factor-analytic cross-validation, 150 participants were assigned to

the exploratory factor analysis dataset and the other 150 to the confirmatory factor analysis dataset.

Table 1

Demographic and Clinical Characteristics of the Psychometric Sample

Variable	Category/Statistic	n	% or Value
Sex	Female	224	74.67
	Male	76	25.33
Marital status	Single	123	41.00
	Married	177	59.00
Education	High-school diploma or lower	65	21.67
	Bachelor's degree	163	54.33
	Master's degree or higher	72	24.00
Employment status	Employed	168	56.00
	Homemaker	62	20.67
	Student	44	14.67
	Unemployed	26	8.66
Age, years	Mean ± SD	—	35.74 ± 8.21
	Range	—	18–50
Migraine duration, years	Mean ± SD	—	8.96 ± 5.74
	Range	—	1–24

The demographic and clinical profile indicated relative heterogeneity in sex, age, marital status, education, occupational status, and migraine duration, providing a reasonably varied sample for the initial psychometric evaluation of the instrument.

Qualitative face validity was examined using the original 72-item questionnaire. Ten patients with migraine and 10 specialists in psychology, psychometrics, and research methodology evaluated the items in relation to wording clarity, comprehensibility, sentence length, appropriateness of terminology, relevance to migraine experience, and ease of responding. Most items were considered conceptually understandable, although several required linguistic refinement. Nine items were simplified because patients regarded the wording as unnecessarily difficult or lengthy. Five conceptually overlapping items were merged, and items containing more than one distinct concept were reformulated.

For example, the original statement, “When I have migraine, I become physically incapacitated and psychologically feel helpless and worthless,” was separated into two more focused statements: “During a migraine attack, I become physically incapacitated” and “During a migraine attack, I feel helpless.” Similarly, the relatively lengthy statement, “Migraine has caused my life always to be accompanied by worry, fear, restriction, and lack of planning,” was simplified to “Migraine has made planning my daily life difficult.” Another item stating that participants were unable to perform simple daily activities during migraine was merged with the conceptually similar statement that their usual activities were disrupted during an attack. The statement “Migraine has made me always afraid of and worried about my body” was reformulated into the more specific item “Even on pain-free days, I worry about the onset of the next attack.” Following qualitative face-validity refinement, the instrument was reduced from 72 to 67 items.

Quantitative face validity was subsequently assessed in 30 eligible patients using the item impact score. Participants rated each item's importance on a five-point scale from not important at all to very important. Item impact scores ranged from 1.38 to 4.82. The prespecified retention criterion was an impact score greater than 1.50. Of the 67 items, 63 exceeded this criterion, whereas four items were removed. Examples of deleted items included statements concerning changes in appetite following a migraine attack and having to explain migraine to unfamiliar individuals, because these experiences were judged by patients as relatively infrequent or insufficiently important. The remaining items were therefore considered important, understandable, and relevant from the perspective of patients with migraine.

The resulting 63-item questionnaire was evaluated by a multidisciplinary panel of 12 experts in health psychology, psychometrics, research methodology, neurology, and pain management. The experts assessed necessity, relevance, clarity, and simplicity. Content Validity Ratio values ranged

from .42 to 1.00. With 12 experts, the retention threshold was established at CVR ≥ .56. Five items failed to meet this criterion and were removed. Content Validity Index values ranged from .73 to 1.00, with CVI ≥ .79 defined as acceptable. Three items initially falling below this criterion were rewritten for clarity and simplicity and were subsequently approved after reassessment.

Illustrative item-level results supported the content representation of the instrument. The item "During a migraine attack, I feel that my body is out of my control" obtained a CVR of .83 and a CVI of .92; "Even on pain-free days, I worry about the onset of the next attack" obtained .92 and .95, respectively; "Bright light can intensify my migraine symptoms" obtained 1.00 for both indices; "Loud sounds become intolerable to me during migraine" obtained a CVR of .92 and CVI of .97; and "Migraine has made me feel that my previous abilities have diminished" obtained .75 and .88. The item concerning difficulty in decision-making during migraine obtained CVR = .83 and CVI = .91; the statement that other people did not adequately understand the severity of migraine pain obtained CVR = 1.00 and CVI = .98; avoidance of gatherings and social events obtained .83 and .90; lifestyle modification to manage migraine obtained .75 and .86; and acceptance of the illness as facilitating coping obtained .67 and .84.

In contrast, the item "Migraine is always caused by my own carelessness" showed CVR = .42 and CVI = .76 and was removed, while the statement "Anyone can ignore migraine with a little tolerance" showed CVR = .42 and CVI = .73 and was likewise deleted. An initially general item stating that migraine had changed the participant's relationship with the body was reformulated as "Because of migraine, I have become excessively vigilant toward bodily symptoms." Another broadly worded item stating that migraine had made life "abnormal" was removed because of inadequate necessity and excessive generality. At the completion of content-validity assessment, 58 items remained.

The sequence of item reduction was documented to establish transparency in scale construction. The original 72 items were not reduced through a single statistical procedure; rather, deletions, mergers, and revisions occurred progressively on the basis of patient judgments, expert evaluation, pilot evidence, and factor-analytic performance.

Table 2

Item Reduction and Refinement Across Instrument-Development Stages

Stage	Items at Start	Main Action	Items Removed/Merged	Primary Reason	Items Remaining
Initial qualitative development	—	Initial item generation	—	Derived from qualitative themes and subthemes	72
Qualitative face validity	72	Merging and linguistic revision	5 merged	Conceptual overlap, excessive length, similar content	67
Quantitative face validity	67	Removal based on item impact	4	Item impact < 1.50; low perceived importance	63
Content validity	63	CVR/CVI-based removal and revision	5 removed; 3 revised	Inadequate necessity or insufficient clarity/simplicity	58
Pilot testing	58	Removal of redundant items	2	Very high inter-item association and content redundancy	56
Exploratory factor analysis	56	Factor-based item refinement	8	Loading < .40, problematic cross-loading, or conceptual inconsistency	48
Final version	48	Six-factor structure retained	—	Supported by confirmatory factor analysis	48

Pilot testing of the 58-item version was conducted among 50 patients with migraine. The average completion time was approximately 14 minutes. Most participants reported that the items were clear and directly related to their migraine experiences. No item displayed a completely inappropriate distribution or uniform response pattern. Nevertheless, two items were removed because of substantial redundancy and very high associations with more precisely worded items. The statement "During migraine, light bothers me" overlapped strongly with "Bright light can intensify my migraine symptoms," and the more specific latter item was retained. Similarly, "During an attack, I need a quiet environment" substantially overlapped with the item describing seeking silence and darkness to reduce symptoms, and the more informative item was retained. Consequently, 56 items entered exploratory factor analysis.

Several additional examples illustrate the decision process across stages. The statement regarding inability to

perform simple daily activities was merged with the broader item concerning disruption of usual activities. The generalized statement that migraine had altered the patient's relationship with the body was clarified into a statement concerning heightened vigilance toward bodily signs. The appetite-change item and the item concerning explaining migraine to unfamiliar people were removed because of low item impact. The item stating that migraine had made life abnormal was eliminated because of low content necessity. At the exploratory factor-analysis stage, "Migraine has made me worried about my future health" was removed because it loaded substantially on both the painful-body and psychological-distress factors, whereas the statement "I have used different treatment methods to control migraine" was removed because of a weak factor loading and broad conceptual content. In contrast, the social item concerning feeling misunderstood was retained and refined as "I feel that people around me do not understand the severity of my migraine pain," while the acceptance item was retained because of its appropriate loading and substantive relevance to adaptation.

Exploratory factor analysis was performed on data from 150 participants. Preliminary assessment demonstrated that the correlation matrix was suitable for factor analysis. The Kaiser–Meyer–Olkin measure was .91, indicating excellent sampling adequacy. Bartlett's test of sphericity was statistically significant, $\chi^2(1540) = 5874.32$, $p < .001$, confirming that the correlations among items were sufficient for factor extraction.

Principal components extraction with Varimax rotation was then conducted. Initially, eight components had eigenvalues greater than 1.00; however, examination of the scree plot, theoretical interpretability, and consistency with the qualitative conceptual framework indicated that a six-factor solution provided the most coherent representation of the data. The analysis was therefore repeated with six factors specified. Eight items were removed because they showed loadings below .40, substantial loadings on more than one factor, or conceptual inconsistency with the factor on which they loaded. The final exploratory solution consisted of 48 items distributed across six interpretable factors.

Table 3

Exploratory Factor Structure and Explained Variance of the MPLEQ

Factor	Factor Label	Items	Eigenvalue	Variance Explained (%)	Cumulative Variance (%)
1	Painful and Unpredictable Bodily Experience	9	7.31	15.24	15.24
2	Sensory Sensitivity and Vulnerability to Stimuli	8	5.79	12.07	27.31
3	Psychological Distress and Emotional Exhaustion	9	5.21	10.86	38.17
4	Cognitive Dysfunction and Impaired Daily Functioning	7	4.68	9.75	47.92
5	Family, Social, and Occupational Consequences	8	4.28	8.91	56.83
6	Coping, Adaptation, and Reconstruction of the Relationship With Illness	7	3.62	7.55	64.38

The six factors jointly accounted for 64.38% of the total variance. Factor loadings for the retained items ranged from .62 to .83, and no retained item demonstrated a problematic cross-loading. Within Painful and Unpredictable Bodily Experience, the loadings for Items 1–9 were .78, .81, .74, .70, .76, .69, .66, .73, and .65, respectively. These items reflected feeling that the body was out of control, severe disabling pain, concern about sudden attack onset, distrust of the body, perceived interruption of life during attacks, fear of pain recurrence, post-attack exhaustion, inability to perform ordinary activities, and experiencing the body as a continuous source of warning.

For Sensory Sensitivity and Vulnerability to Stimuli, Items 10–17 loaded .82, .79, .72, .68, .71, .75, .69, and .64, respectively. Their content concerned symptom aggravation by bright light, intolerability of loud sounds, sensitivity to strong odors, migraine aggravation following inadequate sleep, stress as an attack trigger, continuous environmental monitoring, avoidance of crowded environments, and concern about unpredictable triggers.

For Psychological Distress and Emotional Exhaustion, Items 18–26 had loadings of .77, .80, .71, .76, .68, .64, .70, .62, and .67. These items represented anticipatory anxiety, helplessness during attacks, irritability, reduced perceived control, sadness resulting from repeated attacks, guilt toward family members, reduced self-confidence, hopelessness regarding complete treatment, and concern about the future course of the condition.

Within Cognitive Dysfunction and Impaired Daily Functioning, Items 27–33 loaded .83, .77, .74, .71, .69, .72,

and .75. They represented reduced concentration, mental slowing after attacks, difficulty making decisions, short-term memory difficulties, delays in daily activities, reduced occupational or academic productivity, and difficulty completing cognitively demanding activities.

Within Family, Social, and Occupational Consequences, Items 34–41 loaded .81, .78, .73, .75, .68, .70, .72, and .67. The items assessed feeling misunderstood, perceived minimization of migraine pain by others, disruption of family roles, reduced participation in social gatherings, fear of judgment in occupational settings, deterioration in relationship quality, illness-related loneliness, and cancellation of social plans.

For Coping, Adaptation, and Reconstruction of the Relationship With Illness, Items 42–48 had loadings of .65, .71, .73, .69, .66, .72, and .75. These items addressed timely medication use, resting in a dark and quiet setting, regulation of sleep and nutrition, efforts to reduce stress, seeking family support, increasing migraine-related knowledge, and acceptance and adaptation to the condition.

Factor labels were selected by integrating item content with the themes obtained from the qualitative phase. The first factor was labeled Painful and Unpredictable Bodily Experience because it represented severe pain, loss of bodily trust, uncertainty regarding attack onset, and physical incapacity. The second factor was labeled Sensory Sensitivity and Vulnerability to Stimuli because it represented sensitivity to light, sound, odors, sleep disruption, stress, crowding, and environmental triggers. The third factor was labeled Psychological Distress and Emotional Exhaustion because its items reflected anxiety, helplessness, irritability, loss of control, sadness, guilt, and diminished confidence. The fourth factor was labeled Cognitive Dysfunction and Impaired Daily Functioning because it captured concentration difficulties, mental slowing, memory problems, impaired decision-making, and reduced everyday functioning. The fifth factor was labeled Family, Social, and Occupational Consequences because it represented interpersonal misunderstanding, disruption of family roles, social restriction, and work-related concerns. The sixth factor was labeled Coping, Adaptation, and Reconstruction of the Relationship With Illness because it encompassed self-care, support seeking, knowledge acquisition, coping behaviors, and acceptance. Thus, the empirically derived factor structure closely paralleled the six experiential themes obtained in the qualitative phase.

The six-factor solution was subsequently tested using confirmatory factor analysis in the independent subsample of 150 participants. The 48 retained items were specified as observed indicators of six correlated latent factors, and maximum likelihood estimation was used. The initial model showed generally acceptable but not optimal fit. Examination of modification indices identified localized residual covariance between two pairs of conceptually similar items. Based on substantive justification, residual covariance was permitted between items concerning sensitivity to light and the need for a dark environment and between items concerning impaired concentration and post-attack mental slowing. No modifications were introduced solely for statistical purposes.

Table 4

Goodness-of-Fit Indices for the Final Six-Factor Confirmatory Model

Fit Index	Obtained Value	Recommended Criterion	Interpretation
χ^2	2268.41	—	Sample-size sensitive
df	1065	—	—
χ^2/df	2.13	< 3.00	Good
CFI	.92	> .90	Acceptable
IFI	.92	> .90	Acceptable
TLI	.91	> .90	Acceptable
GFI	.88	Approximately .90	Marginally acceptable
AGFI	.85	Approximately .85	Acceptable
RMSEA	.062	< .08	Acceptable
95% CI for RMSEA	.055–.069	Upper bound < .08	Acceptable
SRMR	.054	< .08	Good

The fit indices therefore supported the empirical adequacy of the six-factor structure. The χ^2/df ratio was 2.13, while the CFI, IFI, and TLI were .92, .92, and .91, respectively. GFI was .88 and thus somewhat below the conventional .90 reference point, whereas AGFI was .85. RMSEA was .062 with a confidence interval of .055–.069,

and SRMR was .054. Collectively, these indices indicated acceptable model fit, although the marginal GFI suggested that the model should not be characterized as perfectly fitting.

All standardized item loadings in the confirmatory model were positive and statistically significant. For Painful and Unpredictable Bodily Experience, standardized loadings for Items 1–9 were .74, .79, .71, .64, .76, .62, .59, .68, and .57. Item 1 was used as the reference indicator. For Items 2–9, the respective standard errors were .09, .08, .09, .08, .10, .10, .09, and .11, and the corresponding critical ratios were 10.21, 9.36, 7.82, 9.91, 6.74, 6.18, 8.14, and 5.86, all $p < .001$.

For Sensory Sensitivity and Vulnerability to Stimuli, standardized loadings for Items 10–17 were .80, .77, .69, .63, .66, .72, .61, and .56. Item 10 served as the reference indicator. For Items 11–17, standard errors were .08, .09, .10, .09, .08, .10, and .11, with critical ratios of 10.08, 8.47, 7.12, 7.83, 8.94, 6.89, and 5.63, respectively, all $p < .001$.

For Psychological Distress and Emotional Exhaustion, loadings for Items 18–26 were .73, .78, .69, .75, .63, .58, .66, .54, and .60. Item 18 was the reference indicator. The standard errors for Items 19–26 were .08, .09, .08, .10, .11, .09, .11, and .10, while critical ratios were 10.14, 8.55, 9.62, 7.21, 5.94, 7.86, 5.42, and 6.51, all $p < .001$.

For Cognitive Dysfunction and Impaired Daily Functioning, standardized loadings for Items 27–33 were .79, .73, .70, .65, .57, .62, and .68. Item 27 functioned as the reference indicator. For Items 28–33, standard errors were .08, .09, .10, .11, .10, and .09, and critical ratios were 9.68, 8.91, 7.36, 5.77, 6.82, and 8.05, respectively, all $p < .001$.

For Family, Social, and Occupational Consequences, standardized loadings for Items 34–41 were .77, .74, .66, .71, .59, .63, .67, and .55. Item 34 served as the reference indicator. For Items 35–41, standard errors were .08, .09, .09, .11, .10, .09, and .11, and critical ratios were 9.74, 7.92, 8.68, 5.98, 7.09, 7.81, and 5.54, all $p < .001$.

Finally, for Coping, Adaptation, and Reconstruction of the Relationship With Illness, standardized loadings for Items 42–48 were .58, .64, .68, .61, .53, .65, and .70. Item 42 was fixed as the reference indicator. For Items 43–48, standard errors were .10, .09, .10, .12, .10, and .09, with critical ratios of 6.95, 7.82, 6.43, 4.96, 7.11, and 8.04, respectively, all $p < .001$.

Across the complete confirmatory model, standardized factor loadings ranged from .53 to .80. The highest loading was obtained for Item 10 within Sensory Sensitivity and Vulnerability to Stimuli, whereas the lowest was obtained for Item 46 within Coping, Adaptation, and Reconstruction of the Relationship With Illness. Several loadings, specifically those for Items 9, 25, 31, 41, and 46, were below .60. These items were nevertheless retained because each loading exceeded .50, its critical ratio was statistically significant, and the item made a substantive contribution to content coverage. Removing them was therefore judged likely to reduce the breadth of the relevant experiential dimensions.

The confirmatory model therefore contained six latent factors and 48 observed indicators, with all indicators loading positively and significantly on their intended factors. Although the overall model demonstrated acceptable construct validity, the marginal GFI and several moderate item loadings indicated that the model should be regarded as empirically defensible rather than ideal and warrants replication in independent samples.

Table 5

Reliability, Composite Reliability, and Convergent Validity of the MPLEQ

Factor	Items	Cronbach's α	McDonald's ω	CR	AVE
Painful and Unpredictable Bodily Experience	9	.90	.91	.91	.54
Sensory Sensitivity and Vulnerability to Stimuli	8	.88	.89	.89	.51
Psychological Distress and Emotional Exhaustion	9	.89	.90	.90	.52
Cognitive Dysfunction and Impaired Daily Functioning	7	.85	.86	.87	.50
Family, Social, and Occupational Consequences	8	.87	.88	.88	.51
Coping, Adaptation, and Reconstruction of the Relationship With Illness	7	.81	.82	.83	.50
Total MPLEQ	48	.94	.95	—	—

Cronbach's alpha coefficients for the six subscales ranged from .81 to .90, while coefficient alpha for the complete 48-item scale was .94. The highest alpha was observed for Painful and Unpredictable Bodily Experience and the lowest for Coping, Adaptation, and Reconstruction of the Relationship With Illness. Because all coefficients exceeded .70, internal consistency was satisfactory across all dimensions.

McDonald's omega coefficients ranged from .82 to .91, and omega for the total scale was .95. The close

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correspondence between alpha and omega estimates provided converging evidence regarding the internal consistency of the instrument. Composite reliability values ranged from .83 to .91 and therefore exceeded the .70 criterion for all six latent constructs. The highest CR was .91 for Painful and Unpredictable Bodily Experience, while the lowest was .83 for Coping, Adaptation, and Reconstruction of the Relationship With Illness.

Average variance extracted ranged from .50 to .54. Painful and Unpredictable Bodily Experience produced AVE = .54; Psychological Distress and Emotional Exhaustion, .52; Sensory Sensitivity and Vulnerability to Stimuli, .51; Family, Social, and Occupational Consequences, .51; and both Cognitive Dysfunction and Impaired Daily Functioning and Coping, Adaptation, and Reconstruction of the Relationship With Illness, .50. Accordingly, all six factors reached the prespecified minimum criterion for convergent validity. Although AVE values of .50 for the latter two factors were at the threshold, their satisfactory CR, alpha, and omega coefficients provided additional support for retaining these dimensions.

Pearson correlations were calculated between each subscale and the MPLEQ total score. All six factors showed positive and statistically significant associations with the total score at $p < .001$. Painful and Unpredictable Bodily Experience correlated .86 with the total score; Sensory Sensitivity and Vulnerability to Stimuli correlated .79; Psychological Distress and Emotional Exhaustion correlated .84; Cognitive Dysfunction and Impaired Daily Functioning correlated .76; Family, Social, and Occupational Consequences correlated .81; and Coping, Adaptation, and Reconstruction of the Relationship With Illness correlated .68. Thus, factor-to-total correlations ranged from .68 to .86, indicating that each dimension contributed substantially to the broader construct assessed by the questionnaire.

Inter-factor correlations were likewise positive and significant at $p < .001$ but did not approach a level indicating complete redundancy. Painful and Unpredictable Bodily Experience correlated .58 with Sensory Sensitivity and Vulnerability to Stimuli, .64 with Psychological Distress and Emotional Exhaustion, .57 with Cognitive Dysfunction and Impaired Daily Functioning, .52 with Family, Social, and Occupational Consequences, and .32 with Coping and Adaptation. Sensory Sensitivity and Vulnerability to Stimuli correlated .53 with Psychological Distress, .49 with Cognitive Dysfunction, .46 with Family, Social, and Occupational Consequences, and .37 with Coping and Adaptation. Psychological Distress correlated .61 with Cognitive Dysfunction, .58 with Family, Social, and Occupational Consequences, and .41 with Coping and Adaptation. Cognitive Dysfunction correlated .55 with Family, Social, and Occupational Consequences and .35 with Coping and Adaptation, whereas Family, Social, and Occupational Consequences correlated .44 with Coping and Adaptation. The overall range of inter-factor correlations was therefore .32 to .64. These findings indicate meaningful relationships among the dimensions while supporting their relative conceptual distinctiveness.

The final MPLEQ consisted of 48 items organized into six subscales. The first subscale contained Items 1–9, the second Items 10–17, the third Items 18–26, the fourth Items 27–33, the fifth Items 34–41, and the sixth Items 42–48.

Table 6

Final Structure and Score Ranges of the MPLEQ

Subscale	Number of Items	Item Numbers	Minimum Score	Maximum Score
Painful and Unpredictable Bodily Experience	9	1–9	9	45
Sensory Sensitivity and Vulnerability to Stimuli	8	10–17	8	40
Psychological Distress and Emotional Exhaustion	9	18–26	9	45
Cognitive Dysfunction and Impaired Daily Functioning	7	27–33	7	35
Family, Social, and Occupational Consequences	8	34–41	8	40
Coping, Adaptation, and Reconstruction of the Relationship With Illness	7	42–48	7	35
Total MPLEQ	48	1–48	48	240

Responses are scored from 1 to 5, with strongly disagree = 1, disagree = 2, neither agree nor disagree = 3, agree = 4, and strongly agree = 5. Because the seven items constituting Coping, Adaptation, and Reconstruction of the Relationship With Illness are positively and adaptively worded, these items are reverse-scored when calculating the total MPLEQ score. Consequently, higher total scores reflect a more adverse lived experience of migraine, greater involvement with its physical and psychosocial consequences, greater psychological and functional disruption, and poorer adaptation.

The total score can range from 48 to 240. On the basis of the observed score distribution, provisional interpretive ranges were proposed: scores from 48 to 112 represent a comparatively milder adverse lived experience and greater adaptation, scores from 113 to 176 represent a moderate level of migraine-related lived burden, and scores from 177 to 240 represent a more severe adverse lived experience and more prominent negative consequences. These categories should be regarded as preliminary rather than diagnostic cutoffs and require further evaluation using normative data and independent samples.

Representative items from the final instrument illustrate the conceptual breadth of the scale. Painful and Unpredictable Bodily Experience includes statements such as “During a migraine attack, I feel that my body is out of my control” and “Even on pain-free days, I worry about the onset of the next attack.” Sensory Sensitivity and Vulnerability to Stimuli includes “Bright light can intensify my migraine symptoms” and “To prevent an attack, I continuously monitor my environment.” Psychological Distress and Emotional Exhaustion includes “Repeated migraine attacks make me feel helpless” and “Migraine has made me feel that I have less control over my life.” Cognitive Dysfunction and Impaired Daily Functioning includes “During migraine, I find it difficult to concentrate” and “After a migraine attack, my mind feels slow and fatigued.” Family, Social, and Occupational Consequences includes “I feel that people around me do not understand the severity of my migraine pain” and “Migraine has caused me to withdraw from some social activities.” Finally, Coping, Adaptation, and Reconstruction of the Relationship With Illness includes “I have changed my lifestyle to manage migraine” and “Accepting my condition has helped me cope better with migraine.”

Taken together, the psychometric findings supported the final 48-item, six-factor MPLEQ. The factor solution obtained through exploratory analysis closely corresponded to the experiential domains identified qualitatively and was reproduced with acceptable fit in an independent confirmatory sample. All retained indicators showed statistically significant relationships with their intended latent constructs, internal-consistency estimates were satisfactory, composite reliability exceeded recommended criteria across all six factors, and AVE values supported acceptable convergent validity. The moderate positive associations among the six dimensions, together with their strong correlations with the total score, further indicated that they represent related but distinguishable components of a broader multidimensional construct of migraine perceptions and lived experience.

4. Discussion

The present study developed and psychometrically evaluated the Migraine Perceptions and Lived Experience Questionnaire (MPLEQ), a 48-item multidimensional instrument designed to assess how individuals perceive, experience, and adapt to migraine across bodily, sensory, psychological, cognitive, interpersonal, occupational, and coping-related domains. The findings provided evidence supporting the face validity, content validity, construct validity, internal consistency, composite reliability, and convergent validity of the instrument. The initial 72-item pool was systematically reduced through qualitative and quantitative face-validity assessment, expert-based content validation, pilot testing, exploratory factor analysis, and confirmatory factor analysis. The final instrument comprised six dimensions: Painful and Unpredictable Bodily Experience; Sensory Sensitivity and Vulnerability to Stimuli; Psychological Distress and Emotional Exhaustion; Cognitive Dysfunction and Impaired Daily Functioning; Family, Social, and Occupational Consequences; and Coping, Adaptation, and Reconstruction of the Relationship With Illness. Collectively, these dimensions provide a broad representation of the lived burden of migraine beyond conventional indices such as headache frequency and pain intensity.

The first important finding was that the qualitative domains generated in the preceding phenomenological phase could be translated into a coherent quantitative structure. The six-factor solution obtained in exploratory factor analysis was conceptually consistent with the original qualitative framework and explained 64.38% of the total variance. This relatively substantial proportion of explained variance suggests that the final item set captured a meaningful proportion of the complexity underlying migraine perceptions and lived experience. The correspondence between qualitative themes and quantitative factors also supports the value of exploratory sequential instrument development, particularly for phenomena in which subjective experience cannot be adequately represented through symptom-centered measures alone. Previous qualitative studies similarly demonstrate that migraine involves a broad range of experiences extending across pain, functional limitation, psychological disruption, social participation, and daily role performance (L. F.

Mangrum et al., 2024; R. Mangrum et al., 2024). The lived emotional dimensions identified in the present instrument also parallel qualitative evidence showing that patients with migraine experience complex affective reactions, including helplessness, worry, emotional exhaustion, and changes in their relationship with everyday life (Esmaeili et al., 2023).

The first factor, Painful and Unpredictable Bodily Experience, represented severe pain, bodily unreliability, anticipatory concern about attack onset, physical incapacity, post-attack exhaustion, and the experience of the body as a source of continuous warning. This factor accounted for the largest proportion of variance and demonstrated the strongest internal consistency among the six subscales. Its prominence is theoretically reasonable because migraine is fundamentally experienced through recurrent and often unpredictable bodily episodes that can interrupt activities with limited warning. The global burden of migraine is closely related to recurrent disability and disruption rather than merely to the presence of headache symptoms (Steiner et al., 2023). Moreover, qualitative investigations of migraine-related functioning have shown that patients often structure daily activities around the possibility of attacks, reflecting the persistent influence of migraine even during symptom-free periods (R. Mangrum et al., 2024). The strong psychometric performance of this factor therefore suggests that bodily unpredictability is not simply an accompanying feature of migraine but an organizing dimension of the patient's broader illness experience.

The second factor, Sensory Sensitivity and Vulnerability to Stimuli, included sensitivity to light, sound, odors, inadequate sleep, stress, crowded environments, and unexpected triggers. Its emergence as a distinct factor is consistent with the neurological and experiential characteristics of migraine. Sensory hypersensitivity is common in migraine and may substantially influence behavioral choices, avoidance patterns, and environmental monitoring. Previous evidence has shown that sensory sensitivity among patients with migraine is associated with disease duration and comorbid anxiety, supporting the possibility that sensory vulnerability interacts with both neurological and psychological aspects of the disorder (İnce et al., 2023). Broader work on environmental and anxiety sensitivity similarly suggests meaningful individual differences in responsiveness to external and internal stimuli (Peel et al., 2023). The present findings extend this evidence by indicating that sensitivity to environmental triggers constitutes a psychometrically distinguishable component of the lived experience of migraine rather than being merely one element of headache symptomatology.

The third factor, Psychological Distress and Emotional Exhaustion, captured anticipatory anxiety, helplessness, irritability, sadness, guilt, diminished perceived control, reduced self-confidence, and concerns about the future of the illness. This dimension is strongly aligned with previous research demonstrating that recurrent migraine is accompanied by significant emotional and psychological burden. Qualitative evidence has documented complex emotional reactions among patients with migraine, including distress associated with recurrent attacks, uncertainty, and perceived disruption of personal control (Esmaeili et al., 2023). The relevance of psychological distress is also evident in intervention studies demonstrating that mindfulness-based cognitive-behavioral and cognitive-behavioral approaches can reduce psychological distress among individuals with migraine (Sezagli Shahkhasse et al., 2022). Similarly, mindfulness-based art therapy has been associated with improvements in psychological symptoms and happiness among patients with migraine (Demir et al., 2024). These findings support the conceptual legitimacy of treating psychological distress as a central component of migraine experience rather than an incidental reaction to pain.

The psychological factor may also reflect the role of cognitive appraisal in determining how individuals respond to recurrent attacks. Evidence from mindfulness-based cognitive therapy indicates that changes in patients' cognitive appraisals of migraine may accompany therapeutic improvement (Kruse & Seng, 2023). When individuals interpret attacks as uncontrollable, catastrophic, or permanently disruptive, psychological burden may become amplified even when symptom severity remains unchanged. Conversely, greater acceptance and flexible appraisal may reduce the extent to which attacks dominate daily experience. Qualitative work on mindfulness mechanisms in migraine has similarly emphasized changes in awareness, acceptance, coping, and the individual's relationship with migraine-related experiences (Estave et al., 2023). The inclusion of emotional exhaustion, perceived loss of control, and future-oriented worry within the MPLEQ therefore provides a potentially useful means of assessing illness-related psychological processes that may be responsive to treatment.

The fourth factor, Cognitive Dysfunction and Impaired Daily Functioning, encompassed difficulties with concentration, mental slowing, decision-making, short-term

memory, cognitively demanding tasks, productivity, and routine activities. This finding reinforces the view that migraine-related disability extends considerably beyond pain intensity. Patients may remain unable to function effectively during attacks and may experience residual cognitive or physical effects afterward. Qualitative studies have shown substantial impairment in occupational, domestic, and social functioning among individuals with migraine (L. F. Mangrum et al., 2024; R. Mangrum et al., 2024). The present factor structure provides quantitative support for distinguishing cognitive and functional disruption from emotional distress and bodily pain. This distinction may be particularly important in clinical assessment because patients with similar headache severity can differ substantially in the degree to which migraine interferes with cognitive efficiency and daily responsibilities.

The fifth factor, Family, Social, and Occupational Consequences, reflected feeling misunderstood by others, perceived minimization of migraine pain, disruption of family roles, social withdrawal, concern about occupational judgment, reduced relationship quality, loneliness, and cancellation of social plans. Its emergence as a separate dimension illustrates the interpersonal nature of migraine burden. Because migraine symptoms are often invisible, affected individuals may encounter misunderstanding or expectations that they continue to perform despite substantial impairment. Qualitative investigations of migraine functioning have consistently demonstrated interference with work, household responsibilities, family roles, relationships, and social participation (L. F. Mangrum et al., 2024; R. Mangrum et al., 2024). The present findings therefore support the inclusion of relational and social consequences as a substantive dimension of migraine assessment. Measuring this domain may be especially valuable because interpersonal consequences can remain undetected when evaluation focuses primarily on headache characteristics.

The sixth factor, Coping, Adaptation, and Reconstruction of the Relationship With Illness, represented medication use, environmental modification, regulation of sleep and nutrition, stress reduction, family support, increased knowledge, and acceptance of migraine. Although this factor had somewhat lower internal consistency and composite reliability than the other dimensions, its psychometric indices remained acceptable, and its inclusion is conceptually important. The factor reflects the ways in which patients actively reorganize behavior and expectations in response to migraine. Contemporary migraine management increasingly includes lifestyle modification, behavioral interventions, complementary approaches, and self-management strategies alongside pharmacological treatment (Abo-Elghiet et al., 2025). Conservative interventions such as structured exercise have also been investigated as components of migraine management (Tekin et al., 2025), while biofeedback and neuromodulatory interventions reflect the expanding role of nonpharmacological self-regulation and symptom-management approaches (Paudel & Sah, 2025; Saramadis & Nagarajan, 2024).

The adaptive dimension is particularly consistent with the literature on mindfulness-based interventions for migraine. Mindfulness training has been associated with reduced pain and improved quality of life (Rostamnejad & Ahmadi, 2021), while mindfulness-based cognitive therapy has been examined in relation to pain intensity, sleep quality, and quality of life (Bagherzadeh Hamamchi et al., 2023; Mohammadi Sahlabadi, 2023; Motaghizadeh et al., 2023). A randomized study has further supported mindfulness-based cognitive therapy as a potentially useful migraine intervention (Simshauser et al., 2022), and qualitative investigation of its mechanisms indicates that acceptance, awareness, altered cognitive reactions, and self-regulation may contribute to therapeutic change (Estave et al., 2023). The present factor may therefore capture clinically meaningful differences in how patients manage and psychologically accommodate the disorder. Its lower association with the total score compared with the other factors is also theoretically plausible because adaptive coping represents a related but somewhat distinct aspect of the migraine experience rather than an exclusively negative consequence.

The confirmatory factor analysis provided further support for the six-factor model. The χ^2/df ratio of 2.13 was below the conventional threshold of 3, while CFI and IFI were both .92 and TLI was .91. RMSEA was .062 and SRMR was .054, further supporting acceptable approximation and residual fit. GFI of .88 was somewhat below the frequently cited .90 reference point, indicating that the model should be interpreted as acceptable rather than ideal. This is consistent with the complexity of a 48-item multidimensional model, particularly when evaluated in a relatively modest confirmatory sample. Importantly, all standardized factor loadings were statistically significant and ranged from .53 to .80. Even the comparatively weaker items remained above .50 and contributed conceptually meaningful content.

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Retaining such items can be justified in an instrument intended to represent heterogeneous lived experiences, provided that the items remain statistically defensible and preserve content coverage.

The internal-consistency findings were strong. Cronbach's alpha coefficients ranged from .81 to .90 across the six subscales and reached .94 for the total scale, while McDonald's omega ranged from .82 to .91 and reached .95 for the total score. These results indicate that the retained items demonstrated substantial coherence within their respective dimensions while still permitting measurement of distinct aspects of migraine experience. The similarity between alpha and omega coefficients strengthens confidence that reliability was not an artifact of a single estimation method. Composite reliability values ranging from .83 to .91 provided additional support for the reliability of the latent constructs. Together, these results indicate that the MPLEQ generates internally consistent scores at both the subscale and total-score levels.

Convergent validity was also supported. AVE values ranged from .50 to .54, meeting the prespecified criterion for all six factors. The values of .50 for Cognitive Dysfunction and Impaired Daily Functioning and for Coping, Adaptation, and Reconstruction of the Relationship With Illness were at the lower acceptable boundary, suggesting that these constructs may warrant additional examination in future samples. Nevertheless, their satisfactory composite reliability, alpha, and omega values support their retention. The multidimensionality observed in the present study is compatible with contemporary perspectives emphasizing that migraine management and quality of life reflect interconnected physiological, psychological, functional, and behavioral domains (Mendak et al., 2025). It is also congruent with evidence that interventions may exert effects through multiple pathways, including emotional regulation, appraisal, sensory responses, and self-management (Demir et al., 2024; Kruse & Seng, 2023).

The correlations among factors provided additional evidence concerning the internal organization of the questionnaire. All six dimensions were positively and significantly related to one another, with correlations ranging from .32 to .64. These associations were sufficiently strong to indicate that the factors form components of a broader migraine lived-experience construct, yet not so high as to suggest that they represent redundant dimensions. Similarly, correlations between each factor and the total score ranged from .68 to .86. The highest factor-total association was observed for Painful and Unpredictable Bodily Experience, followed closely by Psychological Distress and Emotional Exhaustion and Family, Social, and Occupational Consequences. These findings reinforce the central role of bodily unpredictability and psychological and relational burden within the overall experience of migraine. At the same time, the comparatively lower correlation of Coping and Adaptation with the total score supports its distinct conceptual function.

The overall structure of the MPLEQ is also consistent with the increasingly multimodal nature of migraine treatment. Pharmacological strategies remain central to migraine care, but contemporary management also encompasses lifestyle modification, behavioral approaches, biofeedback, neuromodulation, and psychological interventions (Abo-Elghiet et al., 2025; Paudel & Sah, 2025; Saramadis & Nagarajan, 2024). Hormonal and sex-specific considerations further illustrate the heterogeneity of migraine presentation and management (van Lohuizen et al., 2024). Psychological approaches developed for other pain-related conditions likewise demonstrate that pain perception and adaptation may be modified through cognitive and experiential mechanisms. Hypnosis, for example, has demonstrated utility in chronic pain management (Jensen, 2024), has been developed within evidence-based clinical practice frameworks (Milling, 2023), and has shown pain-related benefits in surgical and other clinical contexts (Fernández-Gamero et al., 2024; Rosenbloom et al., 2024). Cognitive-behavioral hypnotherapy has also been associated with pain reduction in recurrent pain-related conditions (Amin Sorkhi et al., 2022). These findings collectively support the broader premise underlying the MPLEQ: clinically important pain experiences cannot be understood through pain intensity alone.

The importance of coping and cognitive-emotional adaptation is further supported by evidence from mindfulness interventions beyond migraine populations. Individual mindfulness-based cognitive therapy has demonstrated feasibility for major depression (Paterniti et al., 2022), mindfulness-based interventions have been investigated for anxiety and distress in other medical populations (Surbhi, 2024), and neurobiological research suggests that mindfulness-related treatment may influence functional systems associated with cognitive and emotional processing (De la Peña-Arteaga et al., 2024). Although such findings cannot be directly generalized to migraine, they provide a broader conceptual context for understanding why acceptance, cognitive appraisal, attentional regulation, and

adaptation may constitute meaningful dimensions of chronic or recurrent illness experience.

5. Conclusion

Taken together, the results support the MPLEQ as a multidimensional instrument with satisfactory preliminary psychometric properties. Its principal contribution lies in integrating bodily unpredictability, sensory vulnerability, psychological distress, cognitive and functional impairment, interpersonal consequences, and adaptive coping within a single patient-centered framework. Rather than replacing symptom diaries, disability scales, or quality-of-life measures, the MPLEQ may complement these instruments by assessing dimensions of illness experience that are often distributed across separate measures or remain insufficiently represented. The consistency between the qualitative foundations of the instrument, its exploratory six-factor solution, the acceptable confirmatory model, and its strong reliability indices provides a coherent body of preliminary evidence supporting its use in research involving adults with migraine.

Several limitations should be considered when interpreting the present findings. Participants were recruited through convenience sampling from a single clinical setting in Tehran, which limits the extent to which the psychometric results can be generalized to patients receiving care in other regions, healthcare systems, or cultural contexts. Although the total sample of 300 participants was divided into independent exploratory and confirmatory subsamples, each factor-analytic sample contained only 150 participants relative to the number of items evaluated, and larger samples could provide more stable parameter estimates. The cross-sectional design did not permit evaluation of temporal stability, responsiveness to clinical change, or predictive validity. Test-retest reliability was not examined, and criterion-related validity was not established through comparison with established measures of migraine disability, quality of life, illness perception, psychological distress, or pain-related functioning. In addition, the proposed score categories for mild, moderate, and severe lived burden were based on the observed distribution and should not yet be interpreted as validated clinical cutoffs. Finally, because the instrument includes both adverse-experience and positively worded adaptive items, reverse scoring of the sixth subscale may introduce response complexity for some respondents and should be examined further.

Future studies should evaluate the MPLEQ in larger and more heterogeneous samples recruited from multiple neurological clinics, hospitals, community settings, and different geographical and cultural populations. Replication of the six-factor structure through confirmatory factor analysis in independent samples is particularly important, as is examination of measurement invariance across sex, age groups, migraine subtype, chronic versus episodic migraine, disease duration, and treatment status. Future psychometric studies should assess test-retest reliability, criterion validity, discriminant validity, known-groups validity, predictive validity, and sensitivity to therapeutic change. Relationships between MPLEQ scores and headache frequency, pain intensity, medication use, disability, sleep quality, anxiety, depression, quality of life, catastrophizing, acceptance, and treatment adherence should also be examined. Item-response theory or Rasch-based analyses may help determine whether individual items function optimally across the full continuum of migraine burden. Further research should also establish normative values and empirically validated cutoff scores and investigate whether a shorter form can be developed without compromising conceptual coverage or measurement precision.

In clinical practice, the MPLEQ may be used as a complementary patient-reported measure to obtain a broader picture of migraine burden than can be obtained from headache frequency and pain-intensity ratings alone. Clinicians may use subscale profiles to identify whether a patient's most prominent difficulties concern bodily unpredictability, sensory vulnerability, psychological distress, cognitive and functional impairment, interpersonal consequences, or inadequate coping and adaptation. Such information can support individualized treatment planning and may help determine whether additional psychological, behavioral, occupational, family-oriented, or self-management interventions are warranted. Repeated administration may also assist clinicians in documenting changes in patients' broader lived experience during treatment, provided that future research confirms responsiveness to change. Because the measure includes both adverse consequences and adaptation-related processes, interpretation should emphasize the pattern of subscale scores rather than relying exclusively on a single total score.

Authors' Contributions

Authors equally contributed to this article.

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In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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