

# The relationship between early maladaptive schemas and three dimensions of headache impact in Iranian outpatients with chronic migraine without aura

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## Abstract

**Introduction:** Although many researches showed that there are several psychiatric comorbidities in people suffering from migraine headache, few studies investigated the relationship between deep psychopathological structures and headache variables. The purpose of the present study was to elucidate the relationship between early maladaptive schemas and three dimensions of headache impact, pain intensity, disability and affective distress among Iranian outpatient females suffering from chronic migraine without aura.

**Methods:** 136 consecutive outpatients suffering from a chronic migraine without aura were recruited from 553 consecutive outpatients complaining of a persistent headache and/or referred to a specialized headache clinic in Baqiyatallah Hospital. All participants completed two questionnaires regarding Schema Questionnaire–Short Form McGill Pain Questionnaire–Short Form, Migraine Disability Assessment Scale, and the the State-Trait Anxiety Inventory-Trait subscale. Finally, Pearson product-moment correlation coefficients and multiple regression analyses were calculated to investigate relationships between the research variables.

**Results:** The data analyses indicated that a significant amount of the variance of pain intensity was explained by self-sacrifice, emotional inhibition, and unrelenting standards/hypercriticalness. Also, self-sacrifice and unrelenting standards/hypercriticalness explained a significant amount of the variance of disability. Further, a significant amount of variance of affective distress explained by emotional inhibition and unrelenting standards/hypercriticalness.

**Discussion:** The findings emphasize on the predictive role of this early maladaptive schemas, especially early maladaptive schemas of the domain of overvigilance/inhibition. Also, this study implicitly suggests that schema therapy can be an appropriate remedy for reducing headache impact dimensions, at least, in Iranian female outpatients suffering from migraine without aura.

**Keywords:** Early Maladaptive Schema, Migraine, Intensity, Disability, Distress

## Introduction

Migraine is one of the most frequent types of primary headaches in various societies [1, 2, 3], similarly in Iran [4, 5]. In general, among the Iranian population, the average prevalence of primary headaches, migraine and tension-type headache, are lower than Western countries but higher than previous studies conducted in other Asian countries like Turkey and Korea [4].

Migraine has been recognized as a complex condition with interacting organic [6, 7], psychological [8, 9, 10, 11, 12, 13], and social [14, 15] aspects.

This multidirectional disorder impacts many aspects of sufferer's life [15, 16]. In brief, the headache impact has been defined by three major dimensions [17, 18]. These dimensions included: (i) *Pain*: It is obvious that pain is the most striking aspect of migraine headache which is the main focus of sufferers, clinicians and researchers; (ii) *Disability*: According to World Health Organization's ranking of disability causes, headache is one of the 10 most disabling conditions [19]; and (iii) *Affective distress*: Many studies reported that chronic migraine is associated with a higher level of psychological distress [9, 20, 21, 22]. A growing body of literature indicates that there are various psychiatric comorbidities in people with a primary headache, especially migraine [23, 24, 25, 26, 27]. Also, various studies have shown that some personality characteristics are significantly correlated with headache-specific variables [28-30]. Moreover, some studies have demonstrated that adverse childhood experiences is associated with chronic headaches in adulthood [31-36], especially in females [37, 38]. Also, previous research findings indicated that migraine is associated with childhood familial atmosphere [39, 40, 41, 42]. Therefore, it can be hypothesized that there is a significant relationship between deep psychological or psychopathological structures and migraine-related variables.

Early Maladaptive Schema (EMS) is one of such profound psychopathological structures. In brief, EMSs are self-defeating affective and cognitive patterns that begin early in one's development and repeat throughout life [43]. In other words, EMS is the deepest level of cognition that contains memories and intense emotions when activated by life events [43, 44], and leads to adopt maladaptive coping strategies [43, 45]. In schema-focused approach of psychotherapy, EMSs are considered as a core concept in psychopathological etiology [46]. Brief definitions of EMSs are outlined in Table 1.

Especially, in schema therapy, EMSs are thought to play a determinant role in different forms of prolonged characterological issues [43]. In this framework, it was theorized that EMSs develop primarily as a result of toxic childhood experiences, and might be at the core of personality disorders, milder characterological problems, and many chronic Axis I disorders [4

3].

On the other hand, the previous researches have indicated that the onset of migraine headache is dramatically affected by negative life events and psychological stresses [47, 48]. Furthermore, migraine sufferers adopt maladaptive coping styles more than healthy population [49]; and then, people with other types of headache [50]. In people with chronic migraine, therefore, it was hypothesized that headache-related variables would be associated with EMSs. Although, investigation of EMSs has been previously conducted both in people with chronic pain [51, 52, 53] and in people with chronic primary headache [12], a few studies examined the relationship between EMSs and migraine's outcomes. The purpose of the present study is investigation of the

relationship between EMSs and three dimensions of headache impact—pain intensity, disability and affective distress—among Iranian outpatient females suffering from chronic migraine without aura.

Overall, given the arguments advanced above, the purpose of the current study was to investigate the relationships between EMSs and three dimensions of headache impact in Iranian female outpatients suffering from chronic migraine without aura.

## Methods

In this study, 136 consecutive outpatients suffering from a chronic migraine without aura were recruited from 553 consecutive outpatients complaining of a persistent headache and/or referred to a specialized headache clinic in Baqiyatallah Hospital in Tehran from September 2013 to November 2014. The participants selected using the study selection criteria: (i) having diagnosis of chronic (i.e., it occurring on  $\geq 15$  days/month on average for  $> 3$  months) migraine without aura, in accordance to criteria of the second edition of International Classification of Headache Disorders (ICHD-II). Note that migraine with aura was not included in the study, because significant differences have been reported in terms of personality traits [54]. All diagnoses were separately made by the first and Second authors. Only persons who received the identical diagnosis by both evaluators were included in the study sample; (ii) no history of facial neuralgia and seizure; (iii) no history of severe mental disorders or current substance abuse; (iv) sufficient ability to reading Farsi, the official Iranian language, for completion of the research questionnaires. Demographic and clinical characteristics of the sample are shown in Table 2.

Participants' EMSs were assessed using the Young Schema Questionnaire–Short Form (YSQ-SF) [44]. The YSQ-SF is a self-report instrument that consists of 75 items and respondent rates each item on a Likert scale, from 1 "completely untrue of me" to 6 "describes me perfectly". This questionnaire measures fifteen EMSs which were grouped in five schema domains (Table 2). Higher rating scores in each EMS shows greater degree of it. It is a reliable and valid instrument [44]. Cronbach' Alphas for each subscale of original version ranged from 0.83 to 0.96 and test–retest coefficients from .50 to .82 in a nonclinical population [55]. Sadooghi et al. indicated that 15 subscales of Farsi version of the YSQ-SF demonstrated good internal consistency (Cronbach' Alphas of subscales ranged from .62 to .90) [56]. Also, cross-cultural validity of the YSQ-SF was approved [56]. In addition, Yousefi et al reconfirmed the psychometric properties of its Farsi version [57]. In the present study (N = 136) also Alphas of subscales ranged from 0.60 to 0.81. Participants' perception of intensity of their headache pain was measured using the sensory subscale of McGill Pain Questionnaire–Short Form (MPQ-SF) [58]. The MPQ-SF is a 15-item self-report instrument that is consisting of two subscales that measures sensory and affective dimensions of the pain perception. In the present study, the level of sensory dimension applied as the main

measure, in order to assessment of the pain dimension of the three dimensional model of chronic headache [18].

**Tables 1.** Brief descriptions of fifteen EMSs categorized in five domains (adopted from Young *et al* [43]).

Domain/Schema	Brief Description
<b>Domain I: Disconnection/Rejection</b>	<b>The expectation that one's needs for security, safety, stability, nurturance, empathy, sharing of feelings, acceptance and respect will not be met in a predictable manner.</b>
Abandonment/Instability	The perceived instability or unreliability of those available for support and connection.
Mistrust/Abuse	The expectation that others will hurt, abuse, humiliate, cheat, lie, manipulate, or take advantage.
Emotional Deprivation	The expectation that one's desire for a normal degree of emotional support will not be adequately met by others.
Defectiveness/Shame	The feeling that one is defective, bad, unwanted, inferior or invalid in important respects or that one would be unlovable to significant others if exposed.
Social Isolation/Alienation	The feeling that one is isolated from the rest of the world, different from other people, and/or not part of any group or community.
<b>Domain II: Impaired Autonomy/Performance</b>	<b>Expectations about oneself and the environment that interfere with one's perceived ability to separate, survive, function independently or perform successfully.</b>
Dependence/Incompetence	The belief that one is unable to handle one's everyday responsibilities in a competent manner without considerable help from others.
Vulnerability to Harm/Illness	Exaggerated fear that imminent catastrophe will strike at any time and that one will be unable to prevent it.
Enmeshment/Undeveloped Self	Excessive emotional involvement and closeness with one or more significant others (often parents) at the expense of full individuation or normal social development.
Failure	The belief that one has failed will inevitably fail or is fundamentally inadequate relative to one's peers in areas of achievement.
<b>Domain III: Impaired Limits</b>	<b>Deficiency in internal limits, responsibility to others or long-term goal orientation; leads to difficulty respecting the rights of others, cooperating with others, making commitments or setting and meeting realistic personal goals.</b>
Entitlement/Grandiosity	The belief that one is superior to other people, entitled to special rights and privileges or not bound by the rules of reciprocity that guide normal social interaction.
Insufficient Self-Control/Self-discipline	Pervasive difficulty of refusal to exercise sufficient self-control and frustration tolerance to achieve one's personal goals or to restrain the expression of one's emotions and impulses.
<b>Domain IV: Other-Directedness</b>	<b>An excessive focus on the desires, feelings and responses of others at the expense of one's own needs in order to gain love and approval, maintain one's sense of connection or avoid retaliation.</b>
Subjugation	Excessive surrendering of control to others because one feels coerced submitting in order to avoid anger, retaliation or abandonment.
Self-Sacrifice	Excessive focus on voluntarily meeting the needs of others in daily situations at the expense of one's own gratification.
<b>Domain V: Overvigilance/Inhibition</b>	<b>Excessive emphasis on suppressing one's spontaneous feelings, impulses and choices or on meeting rigid, internalized rules and expectations about performance and ethical behavior, often at the expense of happiness, self-expression, relaxation, close relationships or health.</b>
Emotional Inhibition	The excessive inhibition of spontaneous action, feeling or communication, usually to avoid disapproval by others, feelings of shame or losing control of one's impulses.
Unrelenting Standards/Hypercriticalness	The belief that one must strive to meet very high internalized standards of behavior and performance, usually to avoid criticism.

**Tables 2.** Descriptive statistics of the research sample (N = 136).

Variable	Statistics
<b>Demographic</b>	
Marital Status <i>F (%)</i>	Married: 79 (58) Single: 57 (42)
Age (Years)	38.24 (6.53)
Education (Years) <i>M (SD)</i>	12.80 (2.04)
<b>Headache-specific</b>	
Frequency <i>M (SD)</i>	16.93 (1.62)
Duration <i>M (SD)</i>	5.6 (1.02)
Chronicity (Years) <i>M (SD)</i>	3.91 (1.74)
<b>Headache impact dimensions</b>	
Pain Intensity [McGill] <i>M (SD)</i>	26.47 (3.21)
Disability [MIDAS] <i>M (SD)</i>	15.64 (4.23)
Distress [STAI-T] <i>M (SD)</i>	41.37 (3.42)

Also, the affective dimension was entered as a secondary

measure of the study. The MPQ-SF is a reliable and valid questionnaire [58]. In the previous pilot testing of the Farsi-translated MPQ-SF, its internal consistency reliability was good, for both the sensory ( $\alpha = 0.82$ ) and the affective ( $\alpha = 0.74$ ) dimensions [59]. In the present study, only scores of sensory subscale were entered in final analyses. In this study (N = 136), Cronbach' Alpha of MPQ-SF sensory subscale was 0.76.

The Migraine Disability Assessment Scale (MIDAS) was applied to assess impacts of participants' experience of chronic headaches on their adaptive functions, particularly, the degree of interference brought by their headache in daily, vocational and social activities [60]. In this study, the degree of disability was the one of the primary measures. It has adequate internal consistency ( $\alpha = 0.83$ ) and test-retest reliability ( $\phi = .84, p < 0.01$ )

(Stewart et al., 2001). In the previous pilot testing of this measure [59]. The internal consistency reliability of the Farsi version of MIDAS was good ( $\alpha = 0.79$ ). In present study (N = 136), also, Cronbach' Alpha of the Farsi version of MIDAS was 0.82.

In order to the assessment of the general disposition to experience affective distress by participants, the State-Trait Anxiety Inventory-Trait subscale (STAI-T) was implemented. The STAI-T is a 20-item self-report inventory [61]. In this research, STAI-T was the one of the primary measures of the study, because, according to three-dimensional model of headache impact [18], trait anxiety is the best indicator of affective distress brought by headache. STAI-T has a high internal consistency ( $\alpha = 0.92$ ) and adequate test-retest reliability ( $\phi = 0.86$   $p < .01$ ) [61]. In the pilot testing of Farsi-translated STAI-T, its internal consistency reliability was good ( $\alpha = 0.82$ ) [56]. Also, in present study, Cronbach' Alpha of it was 0.87.

Statistical calculations were done using PASW statistics 17 software (SPSS Inc., Chicago, IL, USA). In the first stage of analysis, Pearson product-moment correlation coefficients were calculated to investigate relationships between the research variables. Therefore, before the main analyses, normality of distributions of all research variables, as an important assumption of Pearson coefficient, was evaluated. To ensure this assumption, first, the scores of variables which were significantly skewed were  $\log_{10}$  transformed, then entered in final analyses.

In the next stage, multiple regression models were run to determine whether EMSs which significantly correlated with each of three headache impact dimensions were predictive of these dimensions. Given gender and age is an important demographic variable in this area [62], the

age was statistically controlled in regression analyses. Significance of two-tailed tests was interpreted at  $p < .05$ . Also, in order to control for inflated type one error due to multiple testing, if appropriate, the Bonferroni p-value adjustment was applied.

### Results

Based on data obtained from hospital portfolios of participants, the average headache frequency in the study sample (N = 136) was 16.93 days over the last month before day of data collection, and 43% of sample reported headache frequency above the average. Average ratio of headache (hours/headache days) was 5.6 hours per day, and this value in 54% of participants was more than the average. 47% of participants reported experiencing sensory dimension of headache above the study sample mean. 59% of the sample declared severe pain disability (i.e., MIDAS score 21 or upper). Also, 61% of sample reported moderate level of affective distress (i.e., STAI-T score 12) or upper. The selected descriptive statistics of the sample are shown in Table 2.

Bivariate correlation coefficients between EMSs and three dimensions of headache impact—pain, disability and affective distress—were depicted in Table 3. To ensure the assumption of normality of distributions, the scores of variables which were significantly skewed, before entering in the final analyses, were  $\log_{10}$  transformed. As shown in Table 3, the four EMSs (Mistrust/Abuse, Self-Sacrifice, Emotional Inhibition, and Unrelenting Standards/Hypercriticalness) were positively correlated with pain intensity; the two EMSs (Self-Sacrifice and Unrelenting Standards/Hypercriticalness) were significantly associated with disability; and the four EMSs (Social Isolation/Alienation, Self-Sacrifice, Emotional Inhibition, and Unrelenting Standards/Hypercriticalness) were positively correlated with affective distress.

**Table 3.** Correlations matrix (N = 136).

Variable	A/I	M/A	ED	D/S	SI/A	D/I	VH/I	E/US	F	E/G	ISC/SD	S	SS	EI	US/H	Pain	Disb.	Dist.
A/I	1	0.7	0.08	0.11	0.07	0.09	-0.04	0.05	0.11	-0.06	0.12	0.05	0.09	-0.04	0.08	-0.05	.080	.12
M/A		1	0.06	0.09	0.02	0.11	0.07	0.11	0.09	-0.10	0.05	-0.10	0.11	0.09	0.09	0.15*	0.11	.14
ED			1	0.07	0.08	-0.08	0.10	0.12	0.10	0.04	-0.04	0.06	-0.06	0.07	0.013	0.07	0.10	.12
D/S				1	-0.05	0.10	0.07	0.08	0.10	-0.05	0.09	-0.09	0.12	0.07	0.09	0.04	0.10	.11
SI/A					1	0.07	0.09	0.04	-0.09	-0.11	0.08	-0.07	0.09	-0.05	0.07	0.07	0.08	.15*
D/I						1	0.11	0.06	0.06	-0.06	0.12	-0.11	0.10	0.10	0.08	0.13	0.05	.11
VH/I							1	0.09	0.08	-0.08	0.10	-0.11	0.08	0.07	0.11	0.10	0.14	0.12
E/US								1	0.11	-0.10	0.07	0.04	0.13	-0.06	0.09	0.09	0.04	0.14
F									1	0.04	0.11	0.07	0.06	0.03	0.06	0.08	0.14	0.10
E/G										1	0.10	0.13	-0.12	0.09	0.11	0.11	0.06	0.09
ISC/SD											1	-0.09	0.09	0.11	0.08	-0.09	0.07	0.13
S												1	0.08	0.09	-0.09	0.14	0.9	0.11
SS													1	0.12	0.13	0.27**	0.39**	0.15*
EI														1	0.08	0.28**	0.11	0.31**
US/H															1	0.25**	0.21**	0.29**
Headache impact dimensions																1	.16*	18*
																	1	.12
																		1

SMs: Early Maladaptive Schemas: A/I: Abandonment/Instability; M/A: Mistrust/Abuse; ED: Emotional Deprivation; D/S: Defectiveness/Shame; SI/A: Social Isolation/Alienation; D/I: Dependence/Incompetence; VH/I: Vulnerability to Harm/Illness; E/US:

Enmeshment/Undeveloped Self; F: Failure; E/G: Entitlement/Grandiosity; ISC/SD: Insufficient Self-Control/Self-discipline; S: Subjugation; SS: Self-Sacrifice; Emotional Inhibition; US/H: Unrelenting Standards/Hypercriticalness; Disb.: Disability; Dist.: Distress.

\* =  $p < 0.05$ , \*\* =  $p < 0.01$

To begin with, in order to control the age in the linear regression analyses, this demographic variable was entered in the first step of regression models, and then, the EMSs, as predictor variables, were entered in the second step of them. In each models, one of the dimensions of headache impact was entered as the criterion variable. Finally, 3 separate regression models were run.

As displayed in Table 4, in the first model, pain intensity were entered as criterion variable, and four EMSs, mistrust/abuse, self-Sacrifice, emotional inhibition, and unrelenting standards/hypercriticalness, were entered as predictors. Three EMSs, self-sacrifice, emotional inhibition, and unrelenting standards/ hypercriticalness significantly predicted pain intensity, but mistrust/abuse did not significantly explain the variance of pain intensity. In the second model, disability was entered as criterion variable, and two EMSs, self-sacrifice and unrelenting standards/hypercriticalness, were entered as predictors. As depicted in Table 5, the both EMSs positively predicted

disability.

In the third model, affective distress was entered as criterion variable, and four EMSs, social isolation/alienation, self-sacrifice, emotional inhibition and unrelenting standards/hypercriticalness were entered as predictors. As shown in Table 6, Emotional inhibition and unrelenting standards/hypercriticalness significantly predicted affective distress, however isolation/alienation, self-sacrifice were not significant predictive of it.

### Discussion

The present study aimed to investigate the relationship between fifteen EMSs and three dimensions of headache impact-pain, disability and affective distress—among Iranian female outpatients diagnosed with migraine without aura. As shown in Table 3, five EMSs were associated with one or more of headache impact dimensions.

**Table 4.** Summary of regression analysis for EMSs predicting pain intensity in female outpatients suffering from migraine without aura ( $N = 136$ ).

Variable	Step 1			Step 1		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Age	0.194	0.072	0.098	0.160	0.063	0.086
Mistrust/Abuse				0.094	0.053	0.131
Self-Sacrifice				0.325	0.201	0.268*
Emotional Inhibition				0.361	0.242	0.298*
Unrelenting Standards/Hypercriticalness				0.304	0.213	0.224*
$\Delta R^2$		0.09			0.18	
$\Delta F$		1.78			6.34**	

$\Delta R^2$  = change in  $R^2$ ,  $\Delta F$  = change in  $F$ , \* =  $p < 0.05$ , \*\* =  $p < 0.01$

**Table 5.** Summary of regression analysis for EMSs predicting disability, controlling age, in Iranian outpatient females suffering from migraine without aura ( $N = 136$ ).

Variable	Step 1			Step 1		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Age	0.125	0.047	0.057	0.098	0.058	0.062
Self-Sacrifice				0.524	0.412	0.502**
Unrelenting Standards/Hypercriticalness				0.292	0.204	0.213*
$\Delta R^2$		0.07			0.15	
$\Delta F$		1.32			5.86**	

$\Delta R^2$  = change in  $R^2$ ,  $\Delta F$  = change in  $F$ , \* =  $p < 0.05$ , \*\* =  $p < 0.01$

**Table 6.** Summary of regression analysis for EMSs predicting affective distress in female outpatients suffering from migraine without aura ( $N = 136$ ).

Variable	Model 1			Model 1		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
Age	0.067	0.039	0.048	0.058	0.034	0.043
Social Isolation/Alienation				0.099	0.058	0.146
Self-Sacrifice				0.095	0.061	0.141
Emotional Inhibition				0.429	0.313	0.332*
Unrelenting Standards/Hypercriticalness				0.401	0.297	0.311*
$R^2$		0.04			0.13	

$F(\text{for change of } R^2)$ 

1.02

4.39\*\*

 $\Delta R^2 = \text{change in } R^2, \Delta F = \text{change in } F, * = p < 0.05, ** = p < 0.01$ 

Moreover, regression analyses indicated that three EMSs (self-sacrifice, emotional inhibition, and unrelenting standards/hypercriticalness) were predictive of pain intensity; two EMSs (Self-Sacrifice and Unrelenting Standards/Hypercriticalness) predicted headache disability; and affective distress also was significantly predicted by two EMSs (Emotional Inhibition, and Unrelenting Standards/Hypercriticalness). Therefore, according to the results, three EMSs (Self-Sacrifice, Emotional Inhibition, and Unrelenting Standards/Hypercriticalness) considerably involved in predicting headache impact dimensions in the sample.

The *emotional inhibition EMS* positively predicted the pain intensity and the affective distress in Iranian female outpatients suffering from migraine without aura. This result is largely consistent with migraine literature and schema therapy assumptions. *Passchier et al* found that physiological pathways along which emotional inhibition might contribute to an attack of migraine after a stressful situation [63]. According to the young's theory, *emotional inhibition* is recognized as the excessive inhibition of spontaneous action, feeling, or communication, usually to avoid disapproval by others, feelings of shame, or losing control of one's impulses [43]. Furthermore, *Cao et al* using a five-factor perspective of personality, indicated that the patients with migraine scored significantly higher on aggression-hostility component than healthy controls. In schema therapy, one of the most common areas of inhibition involves inhibition of anger and aggression [43]. In study of *Passchier et al*, also, the migraine patients showed a trend towards more repression of their emotions and significantly more self-aggression than the controls [63]. They suggested that self-aggression appeared to be positively associated with the headache frequency in the migraine group [63].

Also, self-sacrifice EMS was a positive predictive of the two dimensions of headache impact, pain intensity and disability. *Young et al* have noted that it is common for patients with self-sacrifice schema to have psychosomatic symptoms such as headaches, and these symptoms may also be a direct result of the stress created by giving so much and receiving so little in return [43]. On the other hand, self-sacrifice often involves a sense of over-responsibility for others [43]. Using the Rorschach test, *Pizza et al* found significant defects in problem-solving and decision-making processes among 240 patients with headache (including migraine with and without aura), with the subsequent risk to avoid making decision [30]. They explained that these lead to incapacity to adapt responses to stimulus and to take on responsibility, as well as to an inhibited sense of duty [30]. Therefore, it can be concluded that the sense of over-responsibility is one of the noticeable features of migraine sufferers. Given the foresaid operation of emotional inhibition, the sense of over-responsibility can be inhibited, and consequently, it may result in disruptions in behavioral functioning (e.g., problem-solving and decision-making), and thus, these disruptions can serve as an indirect way to exempt from

overwhelming perceived responsibilities. According to the *Young et al*, physical symptoms, such as headache, may provide these patients with a way to bring attention to themselves, without having to ask for it directly and without conscious awareness [43]. In other words, patients with self-sacrifice feel permission to receive care or to decrease their care for others [43].

Furthermore, all three dimensions of headache impact were positively predicted by unrelenting standards/hypercriticalness. In *Rezaei Dogaheh et al's* study, this EMS was recognized as a predictor of developing headaches in adult patients with migraine [12]. As *Young et al* [43] noted, one of the main characteristics of this EMS is perfectionism—the need to do things “right”, inordinate attention to detail, or underestimating one's level of performance (p.21). Some previous studies showed that perfectionism is associated with headache. For example, *Bottos and Dewey* indicated that university students with higher scores in perfectionism experience more frequent headaches [64]. *Afshar, et al* indicated that patients with migraine significantly have higher mean of perfectionism scores than healthy participants [65]. *Savari*, studying students of a university in Ahvaz, found a significant positive relationship between the level of perfectionism and the migraine headache severity [11]. *Abolghasemi et al* also found a significant difference in perfectionism level between patients with migraine and healthy individuals [13]. Moreover, “*preoccupation with time*” is another main feature of this EMS [43]. It is one of the main components of the Type A behavior pattern [66, 67], and several studies showed that the type a behavior pattern is prevalent in patients with migraine [68].

According to the *Young's* schema therapy, EMSs functionally influence the one's information processing which can lead to cognitive biases [46]. In other words, since the chronic headache may be complexly related to patient's psychopathologies, it is expected that thinking about and evaluating headache may activate EMSs, and consequently, self-reports would be distorted by these activated EMSs. For example, *Bottos and Dewey* found that perfectionists may generate their own stress through their tendency to appraise more situations as hassles [64]. Therefore, the standards/hypercriticalness EMS may cause the overestimation of the pain intensity and affective distress. Moreover, as mentioned above, disability, as the behavioral aspect of migraine impact, is significantly predicted by outpatients' EMSs—sacrifice and unrelenting standards/hypercriticalness. It is noteworthy that individual's maladaptive behavioral components develop as responses to a schema, and thus, behaviors are driven by schema but are not its part [43]. Therefore, it can be hypothesized that EMSs impact on level of outpatient's disability in two paths. On the one hand, the outpatients' perception of actual degree of their disability may be considerably biased due to activation of EMSs. On the other hand, a significant share of the impact of pain intensity on disability may be mediated by EMS, instead

of its direct effect. For example, *Mo'tamedi* et al found that group-based Acceptance and Commitment therapy (ACT) program can improve functioning of females with chronic primary headache even without significantly reducing their pain intensity [59]. Therefore, it would be appropriate to suggest investigating the mediating role of EMSs in the relationship between pain intensity and disability in this population.

Furthermore, participants' two more self-reports, pain intensity and affective distress, may be influenced by such cognitive biases. Because the chronic headache may be complexly related to patient's psychopathologies, it is expected that thinking about and evaluating headache may activate EMSs, and consequently, activated EMSs may create distortions in self-reports. For example, *Bottos* and *Dewey* found that perfectionists may generate their own stress through their tendency to appraise more situations as hassles [64]. Therefore, the standards/hypercriticalness EMS may cause the overestimation of pain intensity and affective distress. Future studies need to address these complex relations.

In light of several limitations of the present study, we should be cautious in generalizing the results. First, a nonrandom sample was recruited in the present study. Therefore, in terms of recommendations for future research, the authors suggest replicating this study using a more randomly selected sample. Second, it was a clinic-based study, and previous researches have shown that distressed patients more likely to seek treatment [24]. Therefore, it is recommended re-investigating these relationships in a population-based study. Third, the sample of the present study only comprised of female outpatients. So, given the gender differences in several variables, such as comorbid distress and disability [24], and treatment-seeking [69, 70], it is suggested that future studies be conducted with a group comprised of Iranian males with chronic migraine without aura, and the results be compared with results of a group of Iranian women. Also, authors recommend studying the relationships between EMSs and treatment-seeking in persons with migraine. Finally, as shown in Table 3, no significant association was found between the majority of EMSs and affective distress, however related  $p$ -values related to many of them were fairly close to the minimum significance level ( $p < 0.05$ ); for example, Mistrust/Abuse ( $r = .14$ ,  $p < 0.052$ ). Therefore, it is expected that in a sample with larger size these would be significant. On the other hand, considering the use of regression procedures for data analysis in the study, in general, this sample size ( $N = 136$ ) can be a controversial issue [71]. For instance, despite that the Mistrust/Abuse was significantly associated with the pain intensity, the correlation was not so strong ( $r = .15$ ,  $p < .041$ ), and thus, in the regression analysis its predictive role could not be confirmed. That way, the authors recommend replicating the present study using more adequate sample sizes.

Overall, although neither chronic migraine is not a psychiatric disorder *per se*, nor the reduction of the objective pain intensity is a therapeutic target of schema therapy, these findings suggest that schema therapy

would be an effective treatment for the reduction of client's overestimation of the pain intensity, through modification of the EMSs. Moreover, schema therapy through modifying EMSs can improve outpatient's sense of affective distress and disability, and subsequently, promote their quality of life. Also, this purpose can be achieved using acceptance-based psychotherapies. For example, ACT can reduce cognitive fusion with automatic thoughts (caused by activation of EMSs) and experiential avoidance from accompanying unpleasant private experience, and increase value-based actions [59]. Accordingly, authors recommend examining and/or comparing the effectiveness of schema therapy and acceptance-based psychotherapies on reduction of three headache impact dimensions among outpatients suffering from chronic migraine without aura. Further, it is recommended investigating the mediating role of EMSs, especially self-Sacrifice, emotional inhibition, and unrelenting standards/hypercriticalness, in the relationship of pain intensity with disability and affective distress.

## Conclusion

Migraine is recognized as one of the most multidimensional medical conditions. The findings showed that there are associations between some cognitive structures (early maladaptive schemas) and headache impacts among persons suffering from this condition. Therefore, it is anticipated that schema-focused interventions can be effective in reducing headache impacts in patients with migraine.

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