

Research Paper

The Predictive Role of Maladaptive Schemas in Chronic Pain of Adolescents



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ABSTRACT

Background: Chronic pain is a prevalent issue among adolescents, negatively impacting various aspects of their lives.

Objectives: To better understand the factors influencing adolescent pain, this study aimed to explore the predictive significance of maladaptive schemas concerning chronic pain.

Methods: A total of 1,302 adolescents aged 12-21 years old were randomly selected from Shiraz, Iran, to participate in this study. Screening questions aligned with the 11th revision of the international classification of diseases (ICD-11) were used to identify adolescents with chronic pain. The young's schema questionnaire-short form (YSQ-SF) was utilized to evaluate maladaptive schemas. Hierarchical logistic regression analysis was performed to investigate the contributions of various variables in predicting chronic pain.

Results: The hierarchical logistic regression analysis revealed a significant contribution of the "disconnection/rejection" domain (OR=0.997, P=0.004) in predicting chronic pain. Additionally, maternal chronic pain (OR=0.878, P=0.008) was a predictor in this model.

Conclusions: The results suggest that maternal chronic pain can be a predictor of chronic pain in adolescents. Furthermore, the "disconnection/rejection" domain was identified as a notable predictor of chronic pain in this age group.

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Introduction

Recent research findings highlight a concerning increase in the prevalence of chronic pain among children and adolescents. For instance, a comprehensive systematic review indicates that pediatric chronic pain is estimated to affect 11% to 38% of this population [1]. Notably, the prevalence of chronic pain among children and adolescents in Spain, involving a cohort of 1,115 individuals aged 8-18 years old, is notably high at 46% [2]. Similarly, in New Zealand, a substantial proportion of students aged 12-18 years (22.8%) reported experiencing chronic pain for 6 months or more [3].

The most commonly reported complaints by adolescents include stomach pain, back pain, headaches and musculoskeletal pain. Chronic pain exerts negative impacts on various aspects of adolescents' lives, including school attendance and peer relationships and can even be accompanied by anxiety and depression [4]. It is essential to recognize that pain is not only a physical sensation but also serves as an indicator of the patient's psychological distress [5]. Therefore, pain evaluations should encompass dynamic and intricate physiological, psychological and social interactions, adopting the biopsychosocial model [6]. The [International Association for the Study of Pain \(IASP\)](#) has identified psychological factors as diverse predictors of pain intensity. Specifically, experiences during childhood that diminish the sense of safety have been linked to a higher risk of chronic pain in children and adolescents. [7, 8]. Furthermore, research suggests that early-life psychosocial adversities, such as maltreatment, violence, and extreme poverty, can significantly impact a child's growth trajectory, physical health status, and various body systems throughout his/her life [9]. The results of a study suggest a significant association between childhood trauma and the long-term reporting of pain within the studied populations [10].

Adverse and distressing experiences during childhood and adolescence lead to extensive and enduring patterns, including memories, cognitions, emotions, and physical sensations, known as "maladaptive schemas." These schemas become activated in response to various stimuli throughout life, leading to distorted interpretations of events and subsequent experiences of distressing emotions, ultimately resulting in maladaptive and harmful behavioral responses. Maladaptive schemas are classified into five domains based on unmet emotional needs during early life: Disconnection/rejection, impaired autonomy/performance, over-vigilance/in-

hibition, other-directedness, and impaired limits [11, 12]. According to Young et al. model, these maladaptive schemas can contribute to various psychological pathologies [12]. For example, the disconnection/rejection domain emerges from unfulfilled needs for stability, security, love, affection and a sense of belonging. It is associated with mood disorders, such as depression, eating disorders and personality disorders. The impaired autonomy/performance domain arises when an individual's expectations of him/herself interfere with his/her perceived abilities for independent functioning and successful task performance, often leading to anxiety disorders. Moreover, individuals with impaired limits exhibit deficits and inadequacies in internal constraints and a sense of responsibility toward others or may display a tendency toward long-term life goals, potentially leading to aggression and substance abuse. Additionally, in the other-directedness domain, there is an excessive focus on fulfilling the inclinations, emotions and wishes of others to gain love and acquiescence surrender, often at the cost of disregarding the individual's requirements. Lastly, the over-vigilance/-inhibition domain emerges from an extreme emphasis on self-restraint, suppression of emotions and impulses, or rigid and internalized rules and expectations, resulting in a loss of happiness, self-expression, peace of mind, close relationships and overall well-being [12-23].

While the connection between chronic pain and emotional problems, including depression, as potential outcomes of maladaptive schemas is gaining recognition [24-26], the exploration of the relationship between maladaptive schemas and chronic pain remains limited. For instance, Heshmati conducted a study on 100 students using a non-probability sampling method, and revealed that disconnection/rejection, over-vigilance/inhibition, and other-directedness were the most related domains to chronic pain in students [27]. Additionally, two recent studies by Vakili et al. and Heshmati et al. with samples of 100 adults and 201 undergraduate students, respectively, reported that depression acted as a mediator in the relationship between maladaptive schemas and chronic pain [28, 29]. In a study involving 300 patients, individuals' inclination toward employing cognitive emotion regulation strategies mediated the association between maladaptive schemas and the perception of chronic pain [30].

Despite previous studies facing limitations related to small sample sizes [27-29] and convenience sampling [28-30], the present study aimed to overcome these challenges by investigating the predictive role of adolescents' maladaptive schemas in their chronic pain.

Emphasizing the need for further research with larger sample sizes, mainly focusing on less-discussed factors, like psychological experiences during childhood, the study aimed to provide a comprehensive understanding of the interplay between these factors in adolescents and their influence on chronic pain.

Methods

This cross-sectional research was carried out in Shiraz, Iran, from January to June 2021.

Participants

The study comprised youths aged between 12 and 21 years [31]. A total of 1334 adolescents were randomly chosen to participate in the research. Inclusion criteria were the youths who attended educational institutions in Shiraz and were content and capable of completing online-based questionnaires. Adolescents with physical conditions unrelated to pain, persistent mental illnesses, or developmental disorders were excluded from the study, as well as those without parental contact.

Sample size determination

To determine the sample size, the researchers utilized G*Power software, version 3, considering a statistical power of 95% and five variables, and relying on data from a prior study ($R^2=0.06$) [32]. Initially, the calculated sample size was 320 participants. However, given the expectation that at least 30% of adolescents in Shiraz might be afflicted by chronic pain [33], the minimum required sample size was set at 1067. Taking into account an estimated 25% dropout rate, the final sample size was determined to be at least 1,334 adolescents.

Sampling process

The participant selection involved utilizing a systematic sampling method. This entailed the random selection of 840 high school students aged between 12 and 18, as well as 494 college students aged between 18 and 21, to participate in the study. In the initial stage, 16 schools were randomly chosen from various Shiraz districts. From each selected high school, 52 students were included through random sampling. Similarly, 17 faculties were randomly selected from Shiraz, with approximately 29 students recruited from each faculty.

Questionnaires

Chronic pain assessment

In addition to gathering demographic data, including age, gender, birth order, parents' occupation and educational background, the evaluation of chronic pain utilized three screening queries derived from the 11th revision of the international classification of diseases (ICD-11) [34]:

1) Are you presently experiencing any pain, and if so, is it chronic or occasional? 2) Have you endured this pain or inconvenience for over three months? 3) Does this pain and inconvenience significantly impact your mundane and daily activities?

After providing affirmative responses to all three questions, the adolescents underwent a further assessment to determine their pain's underlying cause, frequency, history, and intensity [35]. Each adolescent fulfilled the assessment forms independently. In our prior study, we confirmed the quantitative face validity of each item by calculating their impact scores, all of which were ≥ 1.5 . We also conducted both qualitative and quantitative evaluations of content validity, with the content validity ratio (CVR) for the items falling between 0.87 and 1, surpassing the minimum acceptable value. To assess reliability using the re-test method, we had 80 respondents answer the same questions again after two weeks and all the questions demonstrated a correlation coefficient ≥ 0.74 [33].

Maladaptive cognitive schemas

Assessment of maladaptive cognitive schemas in adolescents was carried out using the Young's schema questionnaire-short form (YSQ-SF). The short form of this questionnaire comprises 75 items, and participants replied to each item on a 6-point Likert scale, where one indicates "completely untrue of me" and six indicates "describes me perfectly." The YSQ-SF evaluates 15 maladaptive schemas across five domains: Disconnection/rejection, autonomy/impaired performance, other-directedness, over-vigilance/inhibition and impaired limits. If the total scores for any of these domains exceed 25, it indicates the presence of a maladaptive schema in that area [36]. Multiple studies have provided evidence for the YSQ-SF's favorable validity and reliability [37, 38].

In Khosravani et al. research, the Persian version of the instrument employed in this study exhibited strong reliability (Cronbach's $\alpha=0.75-0.91$) and confirmed crite-

tion, predictive and discriminant validity [39]. The questionnaire demonstrated excellent internal consistency in the current study, with coefficient omega values of 0.95 for the overall questionnaire, 0.89 for disconnection/rejection, 0.89 for impaired autonomy/performance, 0.80 for other-directedness, 0.81 for over-vigilance/inhibition and 0.82 for impaired limits.

Statistical analysis

In the statistical analysis, descriptive measures (Mean±SD for continuous variables and frequencies and percentages for categorical variables) were used to describe demographic characteristics. A univariate logistic regression approach was utilized to investigate potential predictors (independent variables) associated with chronic pain, including age, gender, birth order, parental career and education and maladaptive schemas.

Variables with significance levels <0.2 or showing a notable association with chronic pain in univariate analyses were selected for hierarchical multiple regression analyses (method: Enter). Demographic characteristics were initially examined for their relationship with chronic pain. Subsequently, parental chronic pain was introduced into the regression model, considering its known impact on pediatric chronic pain [40]. Finally, maladaptive schemas were added to assess their contribution to explaining the variance in chronic pain, controlling for previously entered variables. Adjusted odds ratios and 95% confidence intervals (CI) were calculated and reported. SPSS software, version 22 was used for all statistical analyses, with a predetermined significance level of <0.05.

Results

Sample characteristics

Among the 1333 adolescents invited to participate, 1302 took part in the study, resulting in an impressive response rate of 97.67%. The participants' Mean±SD age was 16.87±1.94, ranging from 12 to 21 years. Most participants were male (53.70%), and approximately 53.80% were the eldest child in their family. Regarding education, most fathers (62.80%) and mothers (70.70%) had completed a diploma or had a lower education level. Regarding employment, most fathers (80.40%) were employed, while most mothers (80.10%) were housewives. A detailed breakdown of the participants' demographic characteristics can be found in Table 1.

Characteristics of chronic pain

The pain attributes of the adolescent participants are presented in Table 2. Out of all the participants, 219 adolescents (16.8%) met the ICD-11 criteria for chronic pain. The average pain intensity reported by these individuals over the preceding two weeks was recorded at 4.74±2.48. Among those experiencing chronic pain, the majority (35.2%) reported having pain attacks at least once a month. The most prevalent types of chronic pain reported by adolescents were headaches (37.90%) and musculoskeletal pain related to the spinal column (18.70%).

Univariate logistic regression models

In the analysis using univariate logistic regression with no-chronic pain as the reference group, several factors were examined to assess their correlation with chronic pain. These factors included age, gender, birth order, father's career, father's educational status, mother's career, mother's educational status, and father's chronic pain, as well as other-directedness and impaired limits (Table 3). As single predictors, none of these variables showed a significant correlation with chronic pain.

However, three variables demonstrated significant associations with chronic pain. These were the mother's chronic pain, which explained 3% of the variance, impaired autonomy and performance, which explained 1.3% of the variance, and over-vigilance and inhibition, which explained 1.9% of the variance. Additionally, the "disconnection/rejection" domain exhibited a significant association with chronic pain and displayed the best model fit, explaining 4.6% of the variance (Table 3).

Multiple regression analyses

Table 4 displays the hierarchical logistic regression analysis outcomes, which examined the contributions of variable blocks entered simultaneously in predicting chronic pain. The first step of the hierarchical regression assessed the significance of gender ($P<0.2$) in the univariate model, revealing that gender did not significantly contribute to chronic pain. In the second step, the model included gender, a mother's chronic pain and a father's chronic pain. While the mother's chronic pain emerged as a significant predictor ($b=1.16$, $P=0.006$) in this model, the father's chronic pain and gender did not show significant associations. This model explained 3.8% of the variance [$\Delta R^2=0.043-0.005$] compared to the previous model ($R^2=0.5\%$). Lastly, the model incorporated schemas. The "disconnection/rejection" do-

Table 1. Participants' demographic characteristics

Variables	OR (95% CI)	P	Nagelkerke R Squared
Age (y)	1.00 (0.86, 1.17)	0.973	8.54×10 ⁻⁷ (-)*
Gender	0.58 (0.31, 1.08)	0.088	0.009
Birth order	1	Ref	
	2	0.76 (0.36, 1.6)	0.466
	3	1.19 (0.51, 2.8)	0.692
	≥4	1.66×10 ⁻⁸ (-)	0.997
Father's job	Retired	Ref	
	Worker, employed, non-governmental	0.90 (0.40, 2.05)	0.796
	Unemployed	0.44 (0.05, 3.67)	0.450
	Father's education	1.16 (0.62, 2.17)	0.647
Mother's Job	Homemaker	Ref	
	Worker, employed, non-governmental	1.24 (0.59, 2.63)	0.573
	Retired	1.89×10 ⁻⁸ (-)	0.998
	Mother's education	1.08 (0.56, 2.11)	0.813
	Father's chronic pain	1.76 (0.82, 3.76)	0.144
	Mother's chronic pain	2.77 (1.38, 5.54)	0.004
Maladaptive schemas	Disconnection/Rejection	1.02 (1.01, 1.04)	P<0.001
	Impaired autonomy/performance	1.02 (1, 1.03)	0.031
	Other-directedness	1.02 (0.99, 1.05)	0.245
	Over vigilance/inhibition	1.03 (1.01, 1.06)	0.015
	Impaired limits	1.03 (1, 1.06)	0.050

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Notes: Reference group in regression analysis: No-chronic pain group; Gender (coding: Female)=reference category; 2=male; Birth order (coding: 1st-child=reference category, 2nd child=2, 3rd child=3, ≥4th child=4); Father's Job (coding: Retired=reference, worker, employed, non-governmental= 2, unemployed =3); Father's education (coding: Diploma and lower=reference category, university=2); Mother's Job (coding: Homemaker=reference category, worker, employed, non-governmental=2, retired=3); Mother's education (coding: Diploma and lower=reference category, university=2); Father's chronic pain (coding: No=reference category, 1=yes); Mother's chronic pain (coding: No=reference category, 1=yes).

*The range of CI is from zero to infinity.

main (OR=0.997, P=0.004) was found to contribute to the prediction of chronic pain. Additionally, a mother's chronic pain (OR=0.878, P=0.008) continued to be a predictive factor in this model. Including schemas led to a substantial 7.2% [$\Delta R^2=0.115-0.043$] enhancement in the explained variance, resulting in a total explained variance of 11.5%.

Discussion

This research is directed at exploring the predictive role of various maladaptive schema domains in the development of chronic pain in adolescents. Based on the study outcomes, it was found that chronic pain in mothers can predict chronic pain in adolescents. Additionally,

Table 2. Chronic pain characteristics in adolescents (n=1302)

Variables	Classification	No. (%)
Pain type	Chronic	219(16.8)
	Acute	33(2.5)
	Pain-free	1050(80.6)
Frequency of chronic pain	≥1 attack per day	32(14.6)
	≥1 attack per week	66(30.1)
	≥1 attack per month	77(35.2)
Causes of chronic pain	Constant	14(6.4)
	No report	30(13.7)
	Migraine	65(29.7)
	Injuries and accidents	12(5.5)
Pain diagnoses	Unknown cause	91(41.5)
	Others	51(23.3)
	Headache	83(37.9)
	Spinal column/musculoskeletal pain	41(18.7)
	Chest pain	39(17.8)
	Abdominal pain	29(13.2)
	Others	27(12.4)

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the disconnection/rejection domain was identified as a predictor of chronic pain in adolescents.

Furthermore, the outcomes of this study showed a noticeable conjunction between chronic pain in adolescents and chronic pain in their mothers. According to research findings, the diminished overall health (both mental and physical) of parents was indirectly linked to increased interference with child pain. This connection was mediated first by heightened parent pain catastrophizing, followed by an escalation in both parent protective behaviors and child pain catastrophizing [41]. Children of mothers with chronic pain are at a higher risk of experiencing chronic pain and related harmful mental and somatic health consequences [40, 42]. Stone and Wilson proposed five potential mechanisms in their model for the relationship between chronic pain in parents and chronic pain in children, along with related destructive issues: 1) Genetics, 2) Changes in early neural development, 3) Social learning of pain-specified behaviors (catastrophizing their own or their child's

pain), 4) General parenting and family health, and 5) Exposure to demanding surroundings. Moreover, the model includes three potential mediators: 1) The existence of chronic pain in the other parent, 2) the timing, duration, and location of the parents' chronic pain, and 3) the features of the children (gender, stage of development, race or ethnicity, and temperament). All of these factors likely impact the expansion of chronic pain and its connected consequences for children of parents with chronic pain. Specifically, chronic pain in mothers may affect the neural development of their children through stress and health behaviors during pre- and perinatal periods [40].

Another finding of this study indicates that, among various factors, the domain of disconnection or rejection can predict chronic pain in adolescents. This finding aligns with Heshmati's study, which reported the predictive role of the disconnection/rejection domain in chronic pain among university students [27].

Table 3. Univariate models: OR (95% CI), significance value and nagelkerke

Variables	OR (95% CI)	P	Nagelkerke R Squared
Age (y)	1 (0.86, 1.17)	0.973	8.54×10 ⁻⁷ (-)*
Gender	0.58 (0.31, 1.08)	0.088	0.009
Birth order	2	0.76 (0.36, 1.6)	0.466
	3	1.19 (0.51, 2.8)	0.692
	≥4	1.66×10 ⁻⁸ (-)	0.997
Father's Job	Worker, employed, non-governmental	0.9 (0.4, 2.05)	0.796
	Unemployed	0.44 (0.05, 3.67)	0.45
	Father's education	1.16 (0.62, 2.17)	0.647
Mother's Job	Worker, employed, non-governmental	1.24 (0.59, 2.63)	0.573
	Retired	1.89×10 ⁻⁸ (-)	0.998
	Mother's education	1.08 (0.56, 2.11)	0.813
Maladaptive schemas	Father's chronic pain	1.76 (0.82, 3.76)	0.144
	Mother's chronic pain	2.77 (1.38, 5.54)	0.004
	Disconnection/rejection	1.02 (1.01, 1.04)	<0.001
Maladaptive schemas	Impaired autonomy/performance	1.02 (1, 1.03)	0.031
	Other-directedness	1.02 (0.99, 1.05)	0.245
	Over vigilance/inhibition	1.03 (1.01, 1.06)	0.015
	Impaired limits	1.03 (1, 1.06)	0.05

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Note: Reference group in regression analysis: No-chronic pain group; Gender (coding: Female)=reference category, 2=male); Birth order (coding: 1st child=reference category, 2nd child=2, 3rd child=3, ≥4th child=4); Father's Job (coding: Retired=reference, worker, employed, non-governmental=2, unemployed=3); father's education (coding: Diploma and lower=reference category, university=2); Mother's Job (coding: Homemaker=reference category, worker, employed, non-governmental=2, retired=3); Mother's education (coding: Diploma and lower=reference category, university=2); Father's chronic pain (coding: No=reference category, 1=yes); Mother's chronic pain (coding: No=reference category, 1=yes).

*The range of CI is from zero to infinity.

Individuals with the disconnection/rejection domain struggle to form secure and satisfying emotional attachments. As a result, they experience various emotions, such as abandonment, distrust, neglect, shame, guilt, and alienation. This cognitive pattern is likely to develop in families characterized by emotional coldness, distance, isolation, unpredictability, and a lack of trust [12]. Among the psychosocial factors that are effective and influential in chronic pain based on the bio-psycho-social model [6], inefficient family system behaviors have been noted [43]. Specific parental characteristics, such as emotional neglect that leads to unmet adolescent needs and the

formation of this maladaptive schema domain, are associated with chronic pain [10, 11, 44-47]. The various negative emotions experienced by adolescents in such families, manifesting through this maladaptive schema domain, can all threaten mental health [17, 21-23, 48]. Additionally, Vakili et al. demonstrated in their study that the disconnection/rejection domain mediates chronic pain through depression in chronic pain patients [28]. Furthermore, given the overlap between chronic pain and poor mental health, it has been established that factors, such as decreased quality of life, negative emotions, depression, stress, etc. can lead to chronic pain [49-54].

Table 4. Hierarchical logistic regression predicting chronic pain in adolescents (n=1302)

Variables	R ²	B ¹ (SE)	OR (95% CI)	P
Model 1	0.005			
Gender		0.41 (0.37)	1.51 (0.73, 3.15)	0.268
Model 2	0.043			
Gender		0.29 (0.38)	1.34 (0.64, 2.82)	0.438
Mother's chronic pain		1.16 (0.42)	3.19 (1.04, 7.25)	0.006
Father's chronic pain		0.032 (0.46)	1.03 (0.42, 2.53)	0.944
Model 3	0.115			
Gender		0.253 (0.39)	1.288 (0.60, 2.76)	0.515
Mother's chronic pain		1.13 (0.0.43)	3.09 (1.33, 7.15)	0.008
Father's chronic pain		0.13 (0.47)	1.138 (0.45, 2.87)	0.784
Disconnection/rejection		0.03 (0.01)	1.033 (1.01, 1.05)	0.004
Impaired autonomy/performance		-0.003 (0.015)	0.997 (0.97, 1.03)	0.847
Other-directedness		-0.04 (0.02)	0.959 (0.91, 1.01)	0.084
Over vigilance/inhibition		0.012 (0.02)	1.012 (0.96, 1.06)	0.622
Impaired limits		0.02 (0.025)	1.02 (0.97, 1.07)	0.43

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Overall model evaluation: *R²=0.028(Cox&nell), 0.115(Nagelkerke); model χ^2 (8)=27.92, P<0.0001, B¹: Parameter estimation.

Moreover, according to Brown's perspective, maladaptive schemas impact how a person perceives and pays attention to various stimuli, potentially leading to misunderstandings of senses and physical cues [55]. Also, Riebel et al. demonstrated that individuals with somatoform disorders hold self-views of vulnerability and an incapacity to cope with tension [56]. Hence, maladaptive schemas are involved in either initiating or perpetuating pain by misunderstanding physical senses and engaging in catastrophic thinking about physical symptoms.

Another noteworthy point is that individuals with maladaptive schemas are less inclined to seek help to reduce their pain. They believe that no one can assist them, which may lead them to express physical grievances and psychosomatic disorders as a means of attracting attention and care from others, as mentioned by Yang et al. [50]. However, this function is often beyond their conscious awareness, and the secondary gain can positively reinforce and perpetuate pain in these individuals. In other words, individuals with a domain of rejection or abandonment may have an unconscious inclination to experience pain [27]. From another per-

spective, individuals with such schemas tend to avoid expressing their emotions, thereby describing their physiological aspects, including pain, in physical terms due to limited emotional awareness and verbal ability [28].

To sum up, the current results reveal that the domain of rejection and abandonment holds predictive value for chronic pain in adolescents. This investigation provides a novel perspective on the contributing factors to chronic pain in this age group, elucidating the connection between maladaptive schemas and prevalent physical issues, like chronic pain. As a result, these findings can have implications for schema therapy interventions for patients with chronic pain. By incorporating cognitive, behavioral, and relational approaches, the outcomes of this study can facilitate the modification of maladaptive schemas, ultimately leading to pain reduction in individuals suffering from chronic pain. Furthermore, these discoveries potentially benefit both families and school teachers, as they play pivotal roles in shaping the cognitive schemas of children and adolescents. In this context, fostering close and affectionate relationships

with children, providing appropriate emotional support, and setting reasonable and rational expectations can be crucial in minimizing the risk of developing or exacerbating pain in adolescents. Encouraging positive parental behaviors that foster constructive and enriching experiences during childhood and adolescence, while meeting their needs and consequently fostering adaptive schemas [57, 58] can help reduce the likelihood of maladaptive schemas, particularly in the domain of rejection/abandonment [59, 60]. This approach can contribute to building trust, independence, self-esteem, a sense of worth, and an enhanced capacity to form secure relationships in adolescents. All these factors play vital roles in improving their physical and psychological well-being, and a lack of them can lead to physical health disadvantages [61–63]. The results of this study can also offer valuable insights for family therapy, group therapy, and educational programs focused on appropriate interactions with adolescents dealing with chronic pain. Conversely, by implementing policies promoting healthier lifestyles and enhancing overall community well-being, we can anticipate a reduction in chronic pain among families, encompassing both parents and children.

The present study has some restrictions that should be acknowledged. Firstly, chronic pain assessment relied on self-report questionnaires rather than clinical examinations, potentially introducing some degree of response bias to the measured variables [64]. However, it is crucial to consider McCaffrey's perspective, which argues that pain is subjective and persists for as long as the individual perceives it [65]. Secondly, the study's cross-sectional design deters us from the foundation of spontaneous relations based on the current findings. To gain a deeper understanding of how adolescents' psychological characteristics contribute to chronic pain, further prospective longitudinal studies are necessary. Moreover, since the questionnaires were completed online, there is uncertainty regarding whether all adolescents completed them. Additionally, there are other factors not investigated in this study that play a role in influencing chronic pain among adolescents. Therefore, it is strongly advised to conduct further research to explore additional psychosocial variables not considered in this study. Furthermore, replicating this study with diverse samples encompassing various age groups and cultural backgrounds would be advantageous for assessing the generalizability of the findings.

Conclusion

Considering the growing prevalence of chronic pain among adolescents lately, it becomes crucial to recog-

nize the elements that contribute to this issue. One such factor is cognitive schemas in adolescents, although prior research has primarily focused on their impact on psychological well-being rather than chronic pain. Consequently, this study sought to investigate the following question: "Can maladaptive schemas predict the development of chronic pain in adolescents?" The findings of this study indicated that chronic pain in mothers, along with maladaptive schemas related to rumination and avoidance in adolescents, could influence the occurrence of chronic pain in this age group. Interventions aimed at preventing or modifying maladaptive schemas in adolescents could play a pivotal role in effectively managing chronic pain within this population. It is essential for parents and guardians to become familiar with maladaptive schemas, recognize the significance of employing effective communication strategies and acquire the necessary knowledge and skills to address the psychological needs of adolescents. Building upon the insights from this study, implementing cognitive-behavioral educational programs targeted at modifying or reducing maladaptive schemas for parents, guardians, and adolescents could prove instrumental in diminishing the likelihood of developing or exacerbating chronic pain among adolescents.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of Shiraz University of Medical Sciences (Code: IR.SUMS.REC.1399.1033). Eligible participants were informed about the research's purpose and were emphasized that their involvement was entirely voluntary. An electronic informed consent form was completed by all the adolescents. Data collection was conducted anonymously, without any reference to individuals' names.

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Authors contributions

Conceptualization: Maryam Shaygan and Giti Setoodeh; Study design: Parvin Ghaemmaghami; Investigation: Saghar Salari; Writing the original draft: Saghar Salari and Maryam Shaygan; Review, editing and final approval: All authors.

Conflicts of interest

The authors declared no conflict of interest.

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