Research Paper

The Mediating Role of Cognitive Emotion Regulation Strategies in the Relationship Between Early Maladaptive Schemas, Alexithymia, and Emotional Intelligence With Somatic Symptoms in People With Somatic Symptoms Disorder

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ABSTRACT

Objective: The present study was done to investigate the mediating role of cognitive emotion regulation strategies in the relationship between early maladaptive schemas, alexithymia, and emotional intelligence with the somatic symptoms in people with somatic symptom disorder (SSD).

Methods: The research population consisted of 360 people with SSD referred to the psychosomatic department of Taleghani Hospital in Tehran in 2021 and were referred by psychiatrists and psychologists of medical centers selected by an accessible sampling method. The participants were asked to complete the Toronto alexithymia scale, early maladaptive schemas questionnaire, Bar-on emotional intelligence scale, cognitive emotion regulation strategies scale, and Takata and Sakata psychosomatic symptom scale. Data were analyzed by correlation analysis and structural equation modeling test

Results: The findings indicated that the hypothesized model had a good fit with the data. The results of the path analysis showed that cognitive emotion regulation strategies play a mediating role in the relationship between alexithymia and maladaptive schemas with SSD. Also, the mediating role of cognitive emotion regulation strategies between emotional intelligence and somatic symptoms was not significant.

Conclusion: Based on the findings of the research, it can be concluded that maladaptive schemas and alexithymia with somatic symptoms have no linear and simple relationship, but other variables, such as cognitive emotion regulation strategies play a mediating role in this relationship. Also, the findings of the current research can be used in order to prevent and understand the underlying etiologies and treatment of SSD.

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Highlights

• Cognitive emotion regulation strategies moderate the relationship between early maladaptive schemas and somatic symptoms.

• Cognitive emotion regulation strategies moderate the relationship between alexithymia and somatic symptoms.

• Cognitive emotion regulation strategies were not approved as a mediator between emotional intelligence and somatic symptoms.

Plain Language Summary

Somatic symptom disorder (SSD) is the most common psychiatric disorder, especially in people aged 20-40 years. Among patients with SSD, alexithymia is the most commonly reported symptom. Also, early maladaptive schemas are the basis of many chronic psychological disorders, such as SSD. People with SSD use more negative cognitive emotion regulation strategies; therefore, they tend to show more somatic symptoms when they are in negative or threatening emotional situations. Accordingly, this study investigated the importance of cognitive emotion regulation strategies as a mediating variable in the relationship between early maladaptive schemas, alexithymia, and emotional intelligence with somatic symptoms in people with SSD. According to the findings, a new perspective is given in terms of relationships between early maladaptive schema, alexithymia, and emotional intelligence with SSD. These findings provide basic information to design interventions to teach emotion management skills based on teaching emotional intelligence and improve early maladaptive schemas.

1. Introduction

In the international statistical classification of diseases and health-related problems, the somatic symptom disorder (SSD) is identified as significant frequent and recurrent physical and clinical complaints, without sufficient medico-physical background explanation. But by the introduction of the 5th edition of the diagnostic statistical manual of psychiatric disorders, the SSD brought about major changes to the previous designation and the diagnostic criteria, which is now has been summarized in the chapter somatic symptoms and the related disorders (Hüsing et al., 2018).

According to the criteria of the diagnostic statistical manual of psychiatric disorders-5th edition (DSM-5), SSD is characterized by the presence of one or more physical symptoms that are distressing, leading to significant disruption in daily life. Extreme thoughts, feelings, or behaviors related to these symptoms are characterized by persistent and disproportionate thoughts about the importance of such symptoms, intense persistent anxiety about the mentioned symptoms or health issues, or spending a lot of time and energy on health checks assessment. Also, the symptoms are stable, often lasting more than 6 months (American Psychiatric Association, 2013). DSM-5 predicts a higher prevalence of SSD than the former somatization disorder in the general population but a lower prevalence than undifferentiated somatoform disorders, rating from 5% to 7%. Based on these numbers, SSD is one of the most common mental health disorders in medical settings and the general population (Ghapanchi et al., 2022). Psychosomatic diseases have a very high prevalence and often start before the age of 35, mostly prevalent in the 20-40 years of age. One study reported a 6-month prevalence of the disorder in the population referred to the general medical clinics as 4-6%, but the actual value may be much higher than that (up to 15%) (Behm et al., 2021). Scientific studies in the world and experiences obtained in Iran show a high prevalence of psychosomatic symptom disorders so that one out of every five patients is diagnosed with psychosomatic symptom disorder (Azami Dolat Abadi, 2015).

This disorder is also related to the nervous organ of the sympathetic system, which is scattered all over the body; thus, psychosomatic disorders may affect all bodily organs and systems, like the stomach, intestines, heart, blood vessels, lungs, muscles, bones, skin, and reproductive and urinary organs, and cause various diseases (Henningsen, 2022).

Based on the stress-vulnerability model in psychopathology, studies have shown the role of family-related factors as the underlying factor in an individual's vulnerability to this disorder (Harris & Curtin, 2002). Piaget

(1954) and Bowlby (1969) among others believe that parents' actions cause the development and expansion of some models within the cognitive organization of the individual called the schema. Schemas are the deepest cognitive levels and deterministic of the ways of thinking, feeling, and behaving and they reflect the ways that people experience emotions (Leahy, 2016). Young's schema theory shows that the early maladaptive schemas are self-damaging emotional and cognitive patterns in the individual, which are formed in the mind at the beginning of growth and development and are repeated in the course of life; they are the basis of many chronic psychological disorders. The activation of schemas causes a person to evaluate and interpret environmental events and stimuli negatively and consider them threatening and experience a large amount of negative and annoying emotions (Young et al., 2006).

Many studies have investigated the involvement of early maladaptive schemas in the development of SSD. For example, Shahamat (2011) indicated a significant relationship between early maladaptive schemas and the triple symptoms of somatization, anxiety, and depression. Also, Akhani et al. (2013) assessing people with SSD, Manavipour & Miri (2017) and Rezaei Dogaheh et al. (2015) assessing people with multiple sclerosis (of severe manifestations of SSD), Heshmati et al. (2017) assessing people with chronic pain (a characteristic of the SSD) showed that maladaptive schemas are an important contextual symptom in people suffering from these disorders.

On the other hand, in attempting to understand other factors affecting psychosomatic disorders, research indicated the significant role of alexithymia, turning into a new model of understanding the impact of emotions on physical illness and health. Patients with SSD are sensitive to negative emotions, such as stress, fear, anger, etc. They have difficulty regulating their emotions. Emotions have been of great interest to psychology experts due to evolutionary, social, and communicative reasons, and their impact on decision-making and health (Dasht Bozorgi & Rostami, 2019). Hayes et al. believe that the attempt to avoid internal experiences (e.g. negative, disturbing, and unwanted emotions) constitutes the basis for many psychological disorders (Besharat et al., 2017). Some researchers consider somatic symptoms as an expression of emotional helplessness through body language. Instead of paying attention to their emotional processes, the patients focus on their bodily feelings and exaggerate their interpretation of their normal bodily arousal. They misinterpret somatic symptoms of arousal and have a limited ability to adapt to stressful conditions, and as a result, they always look for drug treatments for their symptoms (Taylor & Bagby, 2004). When emotional information is not realized correctly and is not evaluated properly through cognitive processing, helplessness and injury of the individual would be foreseeable. This helplessness can in a reciprocating manner lead to disorderliness in the person's cognitions and emotions, which would increase the possibility of emotional somatization in stressful situations (Besharat et al., 2014).

Many studies have confirmed the relationship between alexithymia and psychological arousal of biological systems pertinent to emotions and SSD. For example, De Vroege et al. (2022), Rady et al. (2021), and Hadji-Michael et al. (2019) in their findings have highlighted the alexithymia component as one of the predictors of this disorder. Their results indicated that problems in recognizing and describing emotions (alexithymia) could lead to misinterpretation of the perceptual aspects of the body, which can consequently foster body-checking behaviors and physical discomfort.

Also, regarding other factors, recent studies have shown that success and well-being in adulthood depend on learning how to use social and emotional skills during transformation and effectively facing many challenges in life to reduce the risk of mental disorders. Studies have indicated the close relationship between mental health and emotional and social adaption so that it is titled as the predictive factor of these components (Porcelli et al., 2020).

In the meantime, the conducted studies confirm the significant relationship between emotional intelligence and mental health, and somatic symptoms. For example, Bar-On et al., 2006, Soleimani et al., (2017), Kiamarsi and Abolghasemi (2010), and also Schutte et al. (2007) showed that emotional intelligence is negatively related to psychological helplessness and general health indicators (depression, anxiety, and SSD).

Considering the importance of the aforementioned factors in the pathology of SSD, one of the main reasons for the development and continuation of SSD is the lack of identification of the mechanisms leading to the emergence of such processes. One of the mechanisms that are effective in the field of psychosomatic disorders and has increasingly attracted attention in recent years is the concept of cognitive regulation of emotion. Many new theories in the field of SSD consider it as a part of the individual's emotional response to a threat. In other words, people with emotion dysregulation tend to show more somatic symptoms when they are in negative or threatening emotional situations (Lankes et al., 2020).

While there are various definitions of emotion regulation, different theories agree that effective emotion regulation includes skills related to awareness, evaluation, and regulation of emotions and their adaptive use in stressful situations and unfortunate events. In general, these strategies are divided into two categories: Positive and negative strategies, which can be used consciously or unconsciously (Schnabel et al., 2022).

Some researchers have confirmed the significant relationship between cognitive emotion regulation problems and somatization disorder and the development of pseudo-somatic symptoms. They believe that physical symptoms associated with emotions increase in people who are deficient in using cognitive resources to regulate emotions (Rey et al., 2020). The findings of Conway et al. (2021), Schwarz et al. (2017), and Ghadiri et al. (2019) showed that more deficits in cognitive emotion regulation skills and the use of negative and non-adaptive strategies are related to physical symptoms.

The ability to cognitively regulation of emotions is effectively related to various factors. One of these variables is initial maladaptive schemas. According to the schema theory, people adopt certain strategies of emotion regulation that are appropriate to their schema patterns to deal with distress. The studies pertaining to this field show the relationship between the cognitive strategies of emotion regulation and the variables of early maladaptive schemas (Garnefski et al., 2017).

On the other hand, alexithymia is known as a disorder in emotion regulation, in which emotional information is not received correctly and is not properly evaluated through cognitive processing (Besharat & Shahidi, 2011). Therefore, alexithymia can increase the probability of using maladaptive regulatory strategies by disrupting the cognitive processing of emotions.

Also, people with higher EQ can easily regulate their emotions based on a coherent logical model that includes emotional functions. Accordingly, it can be said that emotional regulation is one of the components to build emotional intelligence (Mayer et al., 2008).

Because SSD is a common and debilitating disorder and no social stratum is safe from its damages, it is felt necessary to pay full attention to its causal factors and etiology. In general, few studies have been conducted on the relationship between early maladaptive schemas, alexithymia, emotional intelligence, and cognitive strategies of emotion regulation with SSD, which is indeed considered an innovative advantage of the current research. Accordingly, although some studies have undertaken the problem of the direct relationship between early maladaptive schemas and alexithymia variables with SSD, the problem of which variable or variables can play a mediating role in the relationship between early maladaptive schemas, alexithymia, and emotional intelligence on the one hand, and the SSD on the other hand, has not been yet investigated. Based on the available evidence, the current research was conducted with the aim of modeling the mediating role of cognitive emotion regulation strategies in the relationship between early maladaptive schemas, alexithymia, and emotional intelligence with the SSD. Accordingly, the research hypotheses were as follows:

Hypothesis 1) Cognitive emotion regulation strategies play a mediating role in the relationship between early maladaptive schemas and somatic symptoms in people with SSD.

Hypothesis 2) Cognitive emotion regulation strategies play a mediating role in the relationship between alexithymia and somatic symptoms in people with SSD.

Hypothesis 3) Cognitive emotion regulation strategies play a mediating role in the relationship between emotional intelligence and somatic symptoms in people with SSD.

2. Materials and Methods

The present study is of applied research type and of correlational studies in terms of the methodology. As for the statistical data analysis, the Pearson correlation and path analysis methods were used by SPSS software, version 24 and AMOS software, version R. The statistical society was people referring to the Department of Psychosomatics of Taleghani Hospital in 2021, as well as the patients referred by the physicians, psychiatrists, and psychologists of medical centers, and finally, 360 people were selected through random sampling method. The age range of the subjects was 18 to 60 years, inclusive of 264 females and 96 males, while the age range of 20 to 40 comprised the largest number of participants. The demographic characteristics of the studied sample are listed in Table 1.

Instruments

In this research, in order to measure the desired variables, a structured clinical interview and questionnaire were used. These questionnaires include the short form of the Yang schema questionnaire (YSQ-75), the Toronto Alexithymia scale (TAS-20), the Garnefski cognitive

Table 1. Demographic characteristics of the studied sample

Demographic Characteristics		No. (%)
Sex	Female	264(73.3)
	Male	96(26.7)
Age (y)	10-20	32(8.9)
	20-30	104(28.9)
	30-40	104(28.9)
	40-50	76(21.1)
	50-60	36(10)
	Missing	8(2.2)
Marital status	Single	172(47.8)
	Married	162(45.0)
	Divorced	26(7.2)
Education status	Diploma	147(40.8)
	Bachelor	111(30.8)
	Master	71(19.8)
	PhD	31(8.6)
Employment status	Employed	196(54.4)
	Unemployed	164(45.5)

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emotion regulation questionnaire (CERQ-18), the Bar-On emotional intelligence questionnaire (EQI-90), and the Takata-Sakata psychosomatic scale.

The short form of the Yang schema questionnaire (YSQ-75)

The maladaptive schemas short-form questionnaire was constructed in 1998 and is a 75-item questionnaire that has five subscales and is used to evaluate 15 early maladaptive schemas. Each question is scored on a 6-point scale (one for totally false, six for totally true). The subject's score for each psycho-construct is obtained by summing up the scores of five questions related to that same psycho-construct, with a score range of 5 to 30. The validity and reliability of this tool have been proven in several studies. The reliability obtained for the tool in this study using Cronbach's α for all the schemas was from 0.76 to 0.93 and the test-retest reliability coefficient in the non-clinical population was calculated between 0.50 and 0.82. The standardization of this questionnaire in Iran was performed by Ahi et al. (2008). Internal consistency obtained through Cronbach's α coefficient for different schemas ranges from 0.62 to 0.90, and for the overall scale was 0.94 (Ahi et al., 2008).

The cognitive emotion regulation questionnaire (CERQ-18)

CERQ designed by Garnefski et al (2002) is an 18-item questionnaire that measures cognitive emotion regulation strategies in response to threatening and stressful life events. This questionnaire measures 9 sub-scales and has two dimensions of cognitive positive or compatible emotion regulation and negative or incompatible emotion regulation. The positive dimension of cognitive emotion regulation includes refocusing on questions (7 and 11), refocusing on planning with questions (12 and 15), positive reappraisal (3 and 8), broader perspective (13 and 16), and acceptance with questions (1 and 5). Also, the negative dimension of cognitive emotion regulation encompasses five strategies: Self-blame with

questions (4 and 14), rumination with questions (2 and 6), catastrophizing with questions (9 and 17), and other-blame with questions (10 and 18). It is scored on a five-point Likert scale from one (never) to five (always). The minimum and maximum scores in each subscale are two and ten, respectively. The psychometric properties of the emotion-cognitive regulation questionnaire have been confirmed in international studies and have been reported as being in the range of 0.71 to 0.81 (Garnefski et al, 2002). In Iran, in a preliminary examination of the psychometric properties of this questionnaire in a sample consisting general population (368 people, including 197 females and 171 males), the calculated Cronbach's α coefficients for the subscales ranged from 0.68 to 0.89. These coefficients confirm the internal consistency of the emotion-cognitive regulation questionnaire. The content validity of CERQ was evaluated based on the judgment of eight psychological experts and the calculated Kendall's coefficient of agreement for the subscales was between 0.81 and 0.92 (Besharat & Bazaziyan, 2015).

Toronto Alexithymia scale (TAS-20)

The Toronto Alexithymia scale is a 20-question test that measures three subscales of difficulty in identifying feelings, difficulty in describing feelings, and objective thinking scored on a five-point Likert scale from one (totally disagree) to five (totally agree). The total score is also calculated from the sum of the scores of three subscales for total Alexithymia. The min and max scores are 20 and 100, respectively. A score of 60 and above is considered high-intensity Alexithymia and a score of 52 and below is considered as low-intensity Alexithymia (Bagby et al., 1994).

The psychometric properties of the TAS have been investigated and confirmed by numerous studies. Also, the concurrent validity of the Alexithymia scale was investigated and confirmed in terms of the correlation between the subscales of this test and the scales of emotional intelligence, psychological well-being, and psychological helplessness. The test-retest reliability of the TAS in a sample of 67 people on two occasions with an interval of four weeks was obtained as 0.80 and 0.87 for the whole scale and different subscales, respectively. In the standardization of the Persian version of TAS by Basharat (2007), the Cronbach's α coefficients for the whole scale and three subscales of difficulty in identification of feelings, difficulty in describing feelings, and objective thinking were calculated as 0.85, 0.82, 0.75, and 0.72, respectively, which denotes good internal consistency of the scale. Test-retest reliability of the TAS in a sample of 67 people on two occasions with an interval of four weeks was obtained and confirmed from r=0.70 to r=0.77 for the whole scale and different subscales (Besharat, 2007).

Bar-on emotional intelligence questionnaire (EQI-90)

Bar-on emotional intelligence questionnaire was prepared by Bar-On (1997) and its 2006 edition (Bar-On, 2006) is one of the most widely used psychometric tools. EQ-I has 90 questions in five dimensions (intrapersonal skills, interpersonal skills, adaptability skills, stress management, and general mood) and has 15 subscales (Nejati & Meshkat, 2017).

The reliability of the scale was obtained through the internal consistency method and the test-retest reliability was also calculated for different populations. Cronbach's α coefficient showed the range of 0.69 and 0.86 as the lower and upper limit values, respectively. In a study, the test-retest reliability was 0.66. Also, questionnaire standardization in Iran was carried out by Nejati and Meshkat (2017). The Cronbach's α validity was reported as about 0.942. The chi-square fit index was 1.96, and the square root index of the average estimation error was equal to 0.4. Hence, for the Iranian population, it has acceptable reliability, and in terms of validity, it shows good validity through the exploratory factor analysis method (Nejati & Meshkat, 2017).

Tanaka and Sakata psychosomatic complaints scale

Takata and Sakata psychosomatic complaints scale has a few items and can diagnose psychosomatic complaints in the initial stages and help to prevent the occurrence of the disease. It was developed and validated by Takata and Sakata (2004) in Japan. This scale consists of 30 items and has a single-factor structure. The answer to each section is provided by choosing one of the options "never" (zero) and "frequently" (three). Therefore, the score range of this scale lies between 0 and 90. A score between 0 and 30 indicates a weak psychosomatic complaint, between 31 and 60 indicates a moderate psychosomatic complaint, and between 61 and 90 indicates a severe psychosomatic complaint. The concurrent validity of this scale against the Goldberg scale was found to be 0.64 and 0.65 in two separate studies. The reliability of this scale was calculated through Cronbach's α method to be between 0.90 and 0.93 after three rounds of implementations, and its single-factor structure was confirmed. The standardization of the scale in Iran was performed by Hajlo (2012) on students. The test-retest reliability of the scale was calculated to be about 0.83 after one-month implementation on two occasions, and

Cronbach's α coefficient was obtained as 0.85. This questionnaire, therefore, has high validity and reliability (Hajlo, 2012).

As for the statistical data analysis, the Pearson correlation and path analysis methods were used.

3. Results

The results of descriptive indices and the distribution of variables are contained in Table 2. The skewness and kurtosis of data indicated that this value lies in the normal range of ±1.96, and the data distribution was normal.

Also, the correlation between the components of somatic symptoms, negative and positive strategies of cognitive emotion regulation, early maladaptive schemas, Alexithymia, and emotional intelligence are reported in Table 3. The correlation results indicated that there was a significant relationship between the research variables. The results showed that there was a negative significant relationship (P) between somatic symptoms, and positive emotion regulation strategies (ρ) (P=0.001, ρ=-0.848) and emotional intelligence (P=0.001, ρ=-0.208). Also, there was a significant positive relationship between somatic symptoms and negative emotion regulation strategies (P=0.001, ρ=0.840), Alexithymia (P=0.001, ρ=0.573), and early maladaptive schemas (P=0.001, ρ=0.591). There was a negative significant relationship between positive emotion regulation strategies and negative emotional regulation strategies (P=0.001, ρ=-0.742), Alexithymia (P=0.001, ρ=-0.492), and early maladaptive schemas (P=0.001, ρ=-0.571). A positive significant relationship was found between negative emotion regulation strategies and Alexithymia (P=0.001, ρ=0.512) and early maladaptive schemas (P=0.001, ρ=0.541). However, there was no significant relationship between Alexithymia and early maladaptive schemas and emotional intelligence, while only emotional intelligence had a significant relationship with the intensity of somatic symptoms.

Path analysis was used to estimate the overall research model and examine the mediating role of cognitive emotion regulation strategies in the relationship between early maladaptive schemas, Alexithymia, and emotional intelligence and the intensity of somatic symptoms in people with SSD. The analysis using the maximum likelihood method was used to estimate the parameters. To evaluate the model fit, the chi-square index (χ^2) chi-square ratio to the degree of freedom (χ^2/df), root mean square error of approximation (RMSEA), standard root mean square residual (SRMR), goodness of fit index (GFI), comparative fit index (CFI), normed fit index (NFI) and incremental fit index (IFI) were used. Based on the values obtained for the conceptual model of the research, in Table 4 it can be said that the mentioned indicators were at the optimal level and the model was well-fitted to the data (Table 4).

The results obtained from the conceptual model showed that the direct and standardized effect of early maladaptive schemas (ρ<0.001, β=-0.74) and Alexithymia (ρ<0.001, β=-0.69) on positive emotion regulation strategies was significantly negative so that the early maladaptive schemas and Alexithymia could predict positive emotion regulation strategies. But the effect of emotional intelligence (ρ<0.989, β=0.00) coefficient was not significant on the positive cognitive strategies of emotion regulation (Table 5).

Also, the results obtained from the conceptual model showed that the direct and standardized effect of early maladaptive schemas (ρ<0.001, β=-0.73) and Alexithymia (ρ<0.001, β=-0.72) on negative emotion regulation strategies was positively significant so that early maladaptive schemas and Alexithymia could predict the negative emotion regulation strategies. But the effect of emotional intelligence (ρ<0.957, β=0.00) coefficient on the negative cognitive strategies of emotion regulation was not significant (Table 5).

Also, the direct and standardized effect of positive cognitive emotion regulation strategies (ρ<0.024, β=-0.45), negative cognitive emotion regulation strategies (ρ<0.001, β=0.69), and emotional intelligence (ρ<0.001, β=-0.25) on the intensity of somatic symptoms was significant so that positive cognitive strategies of emotion regulation, negative cognitive strategies of emotion regulation, and emotional intelligence could predict the somatic symptom intensity. However, the effect of early maladaptive schemas (ρ<0.742, β=-0.14) coefficient and Alexithymia (ρ<0.819, β=-0.09) was not significant on the intensity of somatic symptoms (Table 5).

For a better understanding of the standardized coefficients of structural equation modeling analysis, the conceptual model and significant standardized coefficients of the model are reported in Figure 1 and Table 5.

Table 2. The descriptive indices and distribution of somatic symptoms, cognitive emotion regulation strategies, early maladaptive schemas, alexithymia, and emotional intelligence

Variables	Factors	Skewness	Kurtosis	Mean±SD
Negative cognitive emotion regulation strategies	Self-blame	0.055	0.212	5.45±1.271
	Over thinking	0.112	-0.134	5.54±1.498
	Catastrophizing	0.009	-0.017	5.43±1.424
	Other-blame	0.216	0.136	5.52±1.294
	Total	0.183	-0.126	21.95±4.207
Positive cognitive emotion regulation strategies	Acceptance	-0.003	0.185	5.54±1.440
	Positive refocusing	-0.226	0.193	5.47±1.339
	Refocus on planning	0.130	-0.012	5.58±1.529
	Positive reappraisal	0.088	-0.084	5.51±1.507
	Putting into perspective	0.005	-0.240	5.51±1.396
	Total	0.062	0.170	27.61±5.456
Early maladaptive schema	Disconnection/Rejection	-0.043	-0.276	79.91±1.420
	Other directedness	-0.105	0.088	20.42±2.296
	Impaired autonomy and performance	-0.004	-0.019	51.90±1.412
	Overiglance/Inhibition	0.077	0.161	45.02±1.461
	Impaired limits	0.128	0.495	30.94±1.464
	Total	0.101	0.413	228.19±6.525
Alexithymia	Difficulty identifying feelings	0.165	-0.342	20.41±1.495
	Difficulty describing feelings	-0.106	0.297	14.53±1.470
	Externally oriented thinking	-0.011	0.691	23.57±1.385
	Total	0.088	0.417	58.51±3.581
Emotinal intelligence	Intrapersonal intelligence	-0.029	-0.161	89.56±1.452
	Intrepersonal intelligence	-0.019	-0.520	53.44±1.457
	Adaptability	0.095	-0.200	53.44±1.319
	Stress management	0.046	-0.137	35.58±1.408
	General mood	-0.057	0.753	35.54±1.416
	Total	0.074	-0.426	267.55±5.271
Somatic symptoms		0.053	-0.033	44.28±14.876

M: Mean; SD: Standard deviation.

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Table 3. Normality diagram, data distribution, and correlation between somatic symptoms, cognitive emotion regulation strategies, early maladaptive schemas, alexithymia, and emotional intelligence

Variables	EI	YSQ	TAS	CERQ-neg	CERQ-pos	Takata-Sakata
EI	-----					
YSQ	0.019					
TAS	-0.003	-0.075				
CERQ-neg	0.005	0.541*	0.512			
CERS-pos	-0.020	-0.571*	-0.492*	-0.742*		
Takata-Sakata	-0.208*	0.591*	0.573*	0.840*	-0.848*	----

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Abbreviations: EI: Emotional intelligence; YSQ: Yung schema questionaire; TAS: Torento Alexithymia scale; CERQ-neg: Cognitive emotion regulation questionaire-negative; CERQ-pos: Cognitive emotion regulation questionaire-positive.

*P=0.001.

Table 4. The overall model fit indices of the research

Chi-square	df	X^2/df	GFI	AGFI	CFI	RMSEA	NFI	IFI	SRMR
239.360	217	1.103	0.940	0.924	0.994	0.018	0.937	0.994	0.041

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Abbreviations: DF: Degree of Freedom; GFI: Goodness of fit index, AGFI: Adjusted goodness of fit index; CFI: Comparative fit index; RMSEA: Root mean square error of approximation; NFI: Normed fit index; IFI: Incremental fit index; SRMR: Standard root mean square residu.

Table 5. Standardized, direct, indirect, and total coefficients in the final research model

Criterion Variables	Predictor Variables	ES	Std. E	Z	P
Positive cognitive emotion regulation	Early maladaptive schema	-0.756	0.073	-10.343	0.001
	Alexithymia	-0.627	0.06	-10.516	0.001
	Emotional intelligence	-0.001	0.047	-0.014	0.989
Negative cognitive emotion regulation	Early maladaptive schema	0.58	0.062	9.359	0.001
	Alexithymia	0.512	0.053	9.67	0.001
	Emotional intelligence	-0.002	0.039	-0.052	0.958
Somatic symptom severity	Positive cognitive emotion regulation	-6.659	2.993	-2.225	0.024
	Negative cognitive emotion regulation	13.133	9.287	1.414	0.001
	Early maladaptive schema	-2.082	6.317	-0.33	0.742
	Alexithymia	-1.269	5.537	-0.229	0.819
	Emotional intelligence	-3.995	0.533	-7.492	0.001

ES: Estimate; Std: Standardization.

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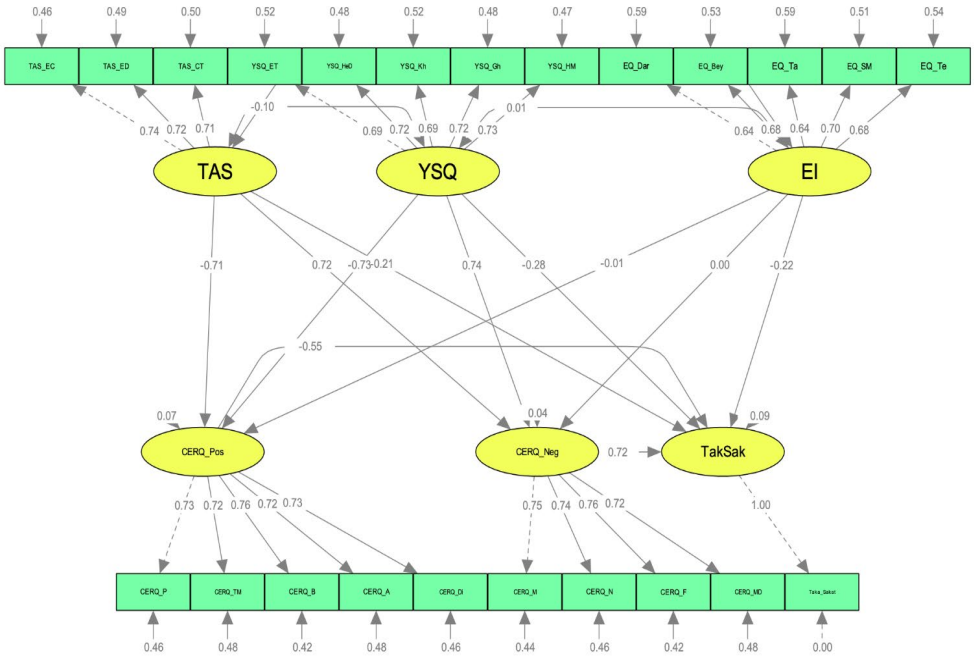

Figure 1. Results of the standardized regression coefficients in the final model

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4. Discussion

The present study investigated the mediating role of cognitive emotion regulation strategies in the relationship between early maladaptive schemas, Alexithymia, and emotional intelligence. The findings showed that compromised and non-compromised strategies of cognitive emotion regulation play a mediating role between early maladaptive schemas and Alexithymia with somatic symptoms. Accordingly, the first and second hypotheses of the research are confirmed.

Early maladaptive schemas through compromised and non-compromised strategies of cognitive emotion regulation, predict the changes related to the intensity of somatic symptoms in two opposite directions. Therefore, the direct effect of early maladaptive schemas on the positive cognitive emotion regulation strategies was negatively significant, and such effect was positively significant on the negative emotion regulation strategies.

This finding can be explained in several ways: Psychological theories state that childhood experiences in the form of the formation of cognitive schemas disrupt key aspects of healthy growth, such as the formation of positive attachment, efficient emotion regulation, and attention skills, and thereby the children are deprived of learning emotion regulation skills and interpersonal coping strategies. Therefore, these people have difficulty processing emotions and expressing them verbally, and they express their problems and conflicts somatically (Feyzioglu et al., 2022). Also, specific interpretations and schemas, and judgments about emotion predict ineffective coping strategies sequence for emotion regulation (Khrapatina & Berman, 2017). These strategies are more related to mental health problems and somatic symptoms. Such ineffective strategies, such as rumination and catastrophizing, can increase the activity of the sympathetic nervous system by increasing negative emotions, which can lead to local pain. From a biological point of view, the path of arousal of schemas to somatic symptoms through maladaptive emotion regulation strategies is such that when faced with emotional events or problems, the stress response system is affected, and then people experience high arousal and emotional sensitivity, and this would cause the inability to regulate emotions or using maladaptive emotion regulation strategies, such as rumination or catastrophizing. These maladaptive emotion regulation strategies by increasing negative emotions lead to more activity of the autonomic nervous system and the endocrine system, and then somatic symptoms and psychosomatic diseases appear.

Another finding of this research showed that compromised and non-compromised strategies of cognitive emotion regulation have a mediating role in the relationship between Alexithymia and somatic symptoms. Alexithymia predicts changes related to the intensity of somatic symptoms through compromised and non-compromised strategies of cognitive emotion regulation in two opposite directions. This means that the direct effect of Alexithymia on the positive cognitive emotion

regulation strategies was negatively significant, while its impact on the negative emotion regulation strategies, was positively significant. The results of Ghorbani et al. (2017) are consistent with this research; they showed the mediating role of cognitive emotion regulation strategies in the relationship between Alexithymia and somatic symptoms.

In explaining this finding, it can be said that some consider Alexithymia as equivalent to difficulty in emotion regulation or inability to cognitively process emotional information (Besharat et al., 2017). When emotional information is not properly received, processed, and evaluated, the helplessness and injury of the individual are predictable. This helplessness can lead to a disturbance in one's cognitions and emotions and increase the possibility of summarizing emotions in stressful conditions. Alexithymia first creates psychological helplessness in a person, causing his/her cognitive processing system to be disturbed, and as a result, the process of identifying and describing his/her emotions gets difficult. After disturbing the identification process, it also affects the regulation and management of emotions, and due to catastrophizing and rumination, it increases attention and focuses on bodily sensations. This is where the person becomes deprived of his/her power of imagination and interpretation of feelings and logical thinking and becomes more helpless than before, and eventually resorts to expressing this helplessness by intensifying his/her somatic symptoms.

The final findings of the research did not confirm the mediating role of cognitive emotion regulation strategies in the relationship between emotional intelligence and the severity of somatic symptoms. The direct effect of emotional intelligence on the intensity of somatic symptoms was larger than its indirect effect. Therefore, the third hypothesis of the research is rejected. A statistical explanation for this finding is that the stronger the direct relationship between two variables, the weaker the role and effect of the mediating variable. Therefore, where the direct relationship between two variables is strong enough, mediating variables could appear with a weaker probability. The theoretical and psychological explanation of this finding is that emotional intelligence includes the interaction between emotion and cognition, which leads to adaptive performance (Grewal & Salovey, 2005). Also, several definitions have been provided for cognitive emotion regulation over the years, which has caused this component to be included in a wide area of psychology, including topics, such as emotional intelligence, mental health, and factors affecting them. As there is a close relationship between emotional intelligence and cognitive regulation of emotion and the relevant dimensions, it seems that the scope of cognitive regulation of emotion is so wide and could be included in a category, such as emotional intelligence. Therefore, it can be said that the lack of mediating role of emotion regulation in the relationship between emotional intelligence and SSD can be explained and interpreted through the role that this variable plays as a moderator.

5. Conclusion

The current research has two types of theoretical and practical implications. At the theoretical level, the findings of the current research confirm many theoretical findings in the field of the relationship between early maladaptive schemas, Alexithymia, and emotional intelligence with SSD and add achievements to previous studies. At the practical level, it is possible to use the results of the relationships between early maladaptive schemas, Alexithymia, and emotional intelligence, and SSD in the prediction, prevention, and identification of chronic disorders with unknown etiology and the disabilities caused by such disorders. Also, these results highlight the necessity of training emotion regulation skills and increasing emotional awareness as well as awareness of the underlying emotional-behavioral pattern in the general and clinical population.

Research limitations

This study had several limitations. Firstly, due to the correlation design of this research, the findings mostly described the relationships and predictive role of emotional components on physical symptoms. However, with the presented explanations, the causal inference can be predicted to some extent.

Also, subjects in this study were selected from those referred to the hospitals and tertiary care clinics, who possibly had moderate to severe disease intensity and thus may represent the lower end of the disease severity continuum where high levels of Alexithymia or early maladaptive schemas may be prevalent. These patients may also have psychological distress, psychiatric comorbidities, and abnormal illness behaviors that have yet to be diagnosed.

It should also be noted that SSD has many physiological and physical manifestations, and in this study, people were included in the study without considering the affected area of the body and only by receiving a diagnosis of SSD.

The variables of this research were also collected through self-reporting. A major problem with this collection method lies in controlling the effect of social desirability. The use of multiple assessment methods is also suggested to overcome this problem.

Among the other limitations of this research is no control of intervening variables, such as socio-economic status, ethnicity, and gender, making it necessary to generalize the research findings cautiously.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles were considered in this article. The participants were informed of the purpose of the research and its implementation stages. They were also assured about the confidentiality of their information and were allowed to leave the study whenever they wished, and if desired, the research results would be available to them

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Authors' contributions

All authors contributed equally to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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