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The Mediating Role of Health-Promoting Lifestyle in Stressful Life Events and Health Indicators of Patients with Irritable Bowel Syndrome: a Salutogenic Approach

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Abstract

Objective: Irritable bowel syndrome is a chronic psychosomatic disease. Stressful events play a critical role in this disease, and lifestyle modification is one of the treatment priorities for these patients. The present study aimed to examine the role of health-enhancing lifestyles among stressful life events and salutogenic health indicators in these patients.
Method: Data analysis was done by structural equation modeling. The statistical population included all patients with irritable bowel syndrome referred to Imam Sajjad Hospital in Tehran in 2019 and 2020. The statistical sample was 229 patients selected through Purposive sampling and diagnosed by a psychiatrist based on ROME-IV criteria. Research tools included the Bringsen Salutogenic Health Indicators Scale, Sarason Life Events Inventory, and Walker Health-Promoting Lifestyle Profile-II. Data analysis was done by SPSS-20 and LISREL-8 software. Ethical considerations based on confidentiality, respect for the rights of individuals, human dignity, and avoiding harming the participants and distorting information were observed. Also Participants had full authority to withdraw from the study at any time
Results: The relationship between lifestyle (t=2.723, ß=0.17) and stressful events (t=-2.31, ß=-0.42) with salutogenic health indicators was significant. The mediating role of lifestyle between life events and salutogenic health indicators was meaningful at P<005 and a standard coefficient (0.0-13.11).
Conclusion: It seems that lifestyle and control over stressful events affect the health indicators of patients with irritable bowel syndrome. Therefore, it is suggested to provide appropriate training programs to control and manage stressful events and provide strategies to modify lifestyle to improve health.

Keywords: Irritable Bowel Syndrome, Health Status Indicators, Life Change Events, Health Promoting Life Style.

Introduction

According to its nature and biological-psychological-social variables, each chronic disease affects self-concept, self-confidence, self-efficacy, self-esteem, identity, individual and social performance, and ultimately the quality of life. In these types of disorders, the patient's participation in the treatment is of special importance. Factors such as self-care, self-management, effective stress-coping skills, empowering the patient through psychological interventions, etc., affect the process of medical care and adaptation with the patient (Lubkin & Larsen, 2013). Irritable bowel syndrome is a chronic and widespread psychosomatic disease, in which psychological factors are influential (Fouché. et al., 2006). One of these factors that play a critical role in irritable bowel syndrome is stressful life events.

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Also, the cause of many chronic diseases is an individual's lifestyle and behavior. Health-promoting behaviors are one of the best ways by which people can promote, provide, and maintain their health level (Motlagh, Mazlomi Mahmoud Abadi, & Momiri, 2011, cited by Noami, 2021). The management of irritable bowel syndrome should also include diet and lifestyle recommendations, emphasizing the importance of self-help and effective symptom management (Barrett, 2019). Since it is claimed that psychological factors affect medical conditions, by considering the mentioned variables, i.e., stressful events and health-promoting lifestyle, we examined them as health indicators in patients with irritable bowel syndrome.

According to the definition of Gastrointestinal diseases by the World Organization in 2009, irritable bowel syndrome is a chronic and debilitating functional disorder that affects 9-23% of the world's population (Saha, 2014) and 21.5% of Iranian adults (Keshteli et al., 2015). This disease is characterized by symptoms including discomfort or pain in the stomach accompanied by changes in bowel function (diarrhea or constipation). Symptoms occur in the absence of organic causes, and since the focus is on abdominal function and not an abnormality of body structure, irritable bowel syndrome is considered a functional disorder (Cohen et al., 2003). Irritable bowel syndrome is the most common, costly, and disabling gastrointestinal dysfunction (Cohen et al., 2003). The symptoms of this disorder impose a lot of costs on the industry, including loss of working hours and efficiency, which undoubtedly affects one's mood, energy levels, overall health, self-perception, and quality of life (Fouché et al., 2006). It brings enormous economic and human costs for the patient, family, and society, and it is the second cause of absence from work after the common cold (Pourmohseni Klori et al., 2015).

The prevalence of irritable bowel syndrome varies according to urban and rural areas, gender, age, culture, family relationships, and psychological factors. The pathophysiology of irritable bowel syndrome is not fully understood; however, possible factors include innate visceral hypersensitivity - changes in bowel movements - stomach - changes in intestinal permeability - genetic factors - communication, bilaterally in the brain - bowel - mild intestinal inflammation - changes in microbial composition (Sundin et al., 2017). The psychological factors that have been studied in this disease are stress, psychological damages, such as anxiety, depression, transformation hysteria, physical symptoms, hysterical reactions, phobias, obsessions, neurotic symptoms, increased levels of hostility, the role of personality traits, individual differences in terms of health and illness, specific personality traits, trauma related to abuse, life events and psychological stress, mental perception and evaluation of stress and coping resources, illness behavior, coping styles, and defense mechanisms (Muscatello et al., 2016). In terms of comorbidity, these patients often suffer from non-intestinal symptoms, such as musculoskeletal problems, fatigue, anxiety, depression, and diet-related factors that trigger gastrointestinal symptoms, fibromyalgia, and chronic fatigue syndrome (Fouché, 2006). Two pathogenic and salutogenic (origin of health) approaches have proposed factors as risk and resistance factors in predicting adaptation to health conditions (Boyer & Paharia, 2008).

The term salutogenesis, first proposed by Antonovsky in 1979 - which was the combination of the Greek word salus, meaning health, and genesis, meaning origin - led to a paradigm shift in the field of medicine, and instead of focusing only on the reduction of disease-causing factors, emphasizes on the factors that increase health and support human well-being. In the traditional model of health (pathogenic), one of the disease control strategies is

focusing on disease factors or targeting pathogenic factors, whereas, in the salutogenic perspective, targeting is generally to create health, that is, focusing on creating and maintaining health instead of looking for specific causes for illness. Regarding treatment methods, the traditional view uses interventions and external treatment recommendations to reduce traumatic factors; in contrast, the salutogenic model focuses on internal and potential treatment resources for active adaptation to new conditions. The goal of each approach is to achieve health, but salutogenic focuses on positive aspects. This approach suggests strategies that help increase people's health and well-being in environments with high levels of stress (Antonovsky, 2022; Mittelmark & Bull, 2013; Bonmatí et al., 2019; Bhattacharya et al., 2020; Brick, 2022). Antonovsky (1996) put the basis of health promotion on the factors that optimize health. The salutogenic approach focuses on people's need to understand the factors that actively maintain and promote health (Morgan & Ziglio, 2007; Calmeiro et al., 2016).

From this perspective, health is a positive mental experience that can be measured by feeling or experiencing physical, mental, and social well-being as an indicator. Also, health as a process of empowering people to increase control and improve their health requires adopting a healthy lifestyle (Garmy et al., 2017). According to the salutogenic model, illness is a common occurrence in modern life and humans need necessities to adapt to it (Stuart et al., 2002). In the salutogenic view, stress is a general herald, which affects the general resources of resistance available to the individual. Physical and biochemical stressors interact with endogenous pathogens and disease cycles that affect the health status along with stress and determine the individual's status on the health-disease continuum (Mittelmark, 2017). Stressful events are associated with serious chronic diseases (Sarason et al., 1985). Stressful life events are triggers of irritable bowel syndrome. Sufferers notice that changes in emotional states, such as stress, anxiety, and depression, are often accompanied by flare-ups of their symptoms. Research has shown that this disease is more common in people who experienced traumatic events in the past (Defrees & Bailey, 2017). The management of irritable bowel syndrome should initially include diet and lifestyle recommendations, emphasizing the importance of self-help and effective symptom management (Barrett, 2019). Walker defined the health-promoting lifestyle as a multi-dimensional model, including the individual's perceptions and actions, which starts with self-motivation and helps to strengthen the level of health and self-fulfillment (1990). Pender divided the health-promoting lifestyle into six dimensions: nutrition, physical activity, stress management, interpersonal relationships, spiritual growth, and health responsibility. Maintaining health requires improving a health-promoting lifestyle. From Toll's view, health-promoting behaviors, including the human tendency to update, participation to keep and increase health levels, personal perfection, and self-fulfillment, are considered complementary components of a healthy lifestyle. Mirghafourvand et al. (2014) defined health-promoting behaviors as a multi-dimensional pattern of self-motivated activities to maintain health, satisfaction, and self-fulfillment (Sousa et al., 2015).

Considering these issues, we addressed the main problem of the research: Does the structural model of health indicators based on life events with the mediation of lifestyle have a good fit?

Because most of the research done in Iran and abroad has been on the pathogenic perspective or risk factors regarding irritable bowel syndrome, in this study, we focused on the salutogenic (the origin of health) so that the research has an innovative aspect, and also be related to the field of health psychology,

which emphasizes empowering people in terms of disease management and health promotion. Health psychology examines how biological, psychological, and social factors affect people's health and illness and uses psychological science to promote health, prevent disease, and improve healthcare systems. Perspectives based on health promotion, such as the salutogenic perspective, are more focused on factors of resistance to illness, such as a sense of coherence, successful management of tension, resources to cope with stress, a person's perception of health, healthy lifestyle, and the like, in patients who suffer from chronic physical problems. The purpose of health promotion programs with a salutogenic model of health is to increase internal and external awareness of sources of general resistance and increase the ability to apply them in daily life to improve health. Not only do these programs focus on minimizing the likelihood of disease, but also on strengthening the general resistance resources available to each patient. Thus it facilitates participants' progress toward wellness, as Antonovsky described (Langeland et al., 2006). The review of the related literature showed that a model based on the salutogenic point of view regarding compatibility with irritable bowel syndrome was not developed yet. Developing such a model can lead to a better understanding of factors and variables affecting the disease and ultimately help patients adapt to their painful conditions. This model can provide criteria for preparing training packages and therapeutic interventions based on the salutogenic perspective for those suffering from this disease, therapists, and caregivers. It can also provide fields for other interested researchers.

Bhatt et al. (2022), in a longitudinal study for predicting neuro-psychological-social changes of symptoms in women with irritable bowel syndrome, confirmed the role of stressful life events. In a longitudinal analysis based on Japanese health insurance data, Okazaki et al. (2022) showed an increase in the incidence of irritable bowel syndrome after the 2018 flood in Japan. Ju et al. (2020) compared life events in patients with irritable bowel syndrome and healthy people. The results showed that the prevalence of unfortunate life events in affected people is much higher than in healthy people. In a systematic meta-analysis, Ng et al. (2019) investigated the relationship between irritable bowel syndrome and post-traumatic stress disorder and confirmed the role of stress in developing this disease.

Kaczyńska et al. (2020) in a study showed that following the food pyramid of irritable bowel syndrome, modifying the diet, and pursuing the diet (avoiding coffee, dairy products, alcohol, spicy foods, and liquids) can minimize the symptoms of irritable bowel syndrome. Gu et al.'s study (2015) showed there is a likelihood of a relationship between eating habits and lifestyle with irritable bowel syndrome. Bradford et al. (2012) studied the relationship between disturbing life events and the rate of irritable bowel syndrome, and the results showed that in the experimental compared to the control group, the number of general damage, emotional and sexual abuse, and physical punishments were significant. Ghorbani et al. (2018) investigated the relationship between stressful life events, personality type D, catastrophizing, and psychological helplessness with the severity of symptoms in patients with irritable bowel syndrome. The results indicated the impact of stressful life events, catastrophizing, and psychological helplessness on the severity of irritable bowel syndrome symptoms. The study of Haji Shafiei et al. (2020) showed that, in general, a healthy lifestyle is related to reducing the probability of irritable bowel syndrome and following a healthy lifestyle pattern, including eating habits, diet quality, physical activity, avoiding smoking, and preventing psychological stress can be considered as critical factors in irritable bowel syndrome

management strategies. Also, a cross-sectional study by Vakhshuury and Khoshdel (2019) on 600 military personnel working at Base 05 of the Kerman Army Forces showed that correcting eating habits is associated with a decrease in the rate of irritable bowel syndrome.

Solati et al. (2008) studied the relationship between stress and irritable bowel syndrome. The results showed that negative psychological stress and stressful life events are influential components in patients with irritable bowel syndrome, which should be considered in planning and treatment strategies. Based on the previous research, it can be concluded that stressful events and health-promoting lifestyles can be good predictors for determining the health status of people with irritable bowel syndrome. Emphasizing the salutogenic model on creating, maintaining, and improving health can be considered a new approach to promoting health and adapting to stressful conditions. In this study, salutogenic health indicators were selected as dependent or output variables, stressful events as input or independent variables, and health-promoting lifestyle as a mediating variable.

The conceptual model of the research is shown in Figure 1.

Method

This research was correlational based on structural equation modeling. The number of distributed questionnaires was 250, of which 229 were fully answered and returned. The statistical population of the study included all medical patients suffering from irritable bowel syndrome referred to the Gastroenterology and Neurology Clinic of Imam Sajjad Naja Hospital in 2019 and 2020. A statistical sample of 229 people was selected from the research population through convenience sampling. A sample size higher than 200 is recommended for good structural equation modeling (Klein, 2015). The inclusion criteria of the study were an age range of 18 years and above, having at least eighth-grade education, no drug abuse disorder, psychotic symptoms, organic brain disorder according to the family or the patient's report, and the diagnosis of irritable bowel syndrome by the physician and based on the ROME-IV scale. Inclusion criteria were:

1- Unwillingness to continue answering the questionnaires

2- Improper and incomplete completion of questions.

Since some of the questionnaires used in this research were in the original language, Wilde et al.'s (2005) model was used for the translation process and cultural adaptation. After completing this process, the questionnaires were first given to the sample people in person, and then due to the spread of the Coronavirus, they were distributed online to the subjects. The collected data were analyzed with Pearson correlation tests and path analysis using SPSS-20 and Lisrel software 8. In this research, to observe the ethical consideration, the research objective and method were explained to

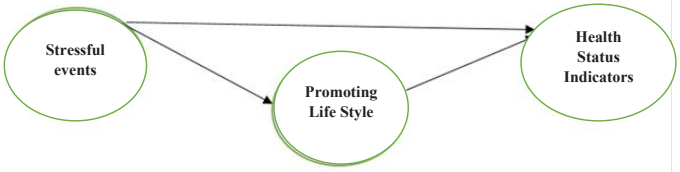


Figure 1- Conceptual research model adapted from Antonovsky's salutogenic model 1979 quoted from Mittelmark 2017

the subjects, and they ensured the confidentiality of their information.

Measures

1- Bringsen Salutogenic Health Indicators Scale (SHIS): This scale was made based on theories related to health concepts. While most health measurement tools were developed by focusing on the pathogenic approach, Bringsen et al. (2009) developed the SHIS scale under the influence of Antonovsky's salutogenic theory (origin of health). This questionnaire contains 12 questions with a difference in meaning, which is designed on a 6-point scale from positive to negative. The maximum score for each question is 6 (in case of a positive answer) and the minimum score is 1. For intrapersonal characteristics, a total of 7 questions A, B, C, D, I, J, L, the highest score is 42 if all the answers are positive and the minimum score is 7. For the interaction performance, a total of 5 questions E, F, G, H, and K were calculated and the range of the maximum and minimum score is between 30 and 5. The overall score of the index value, a total of 12 questions means the sum of IPC and IAF indices. The maximum score of the positive index is 72 and the minimum is 12. A higher score indicates better salutogenic health. The subscales include mood, tension, sleep, concentration, creativity, accuracy, emotional expression, illness, energy level, social ability, and physical performance. Cronbach's alpha of the original version was 0.92 (Bringsén et al., 2009), and Cronbach's alpha of the translated version was 0.81.

2- Sarason Life Events Questionnare (LEQ): This questionnaire measures various events in a person's life in personal, health, interpersonal relationships, job, etc., and their impact on the person. It has 82 questions that the subject identifies the events or changes in his life in the past year. The score of negative events, the total amount The effects that the subject answered "bad", the score of positive events, the sum of the effects that the subject answered "good". The total score of events, the sum of "good" and "bad" effects. Cronbach's alpha of the questionnaire has been reported between 0.78-0.83. This questionnaire contains 46 stressors that are scored on a 6-point Likert scale 13) Cronbach's alpha of the questionnaire was reported between 0.78-0.83. This questionnaire contains 46 stressors scored on a 6-point Likert scale. Sali et al. (2013) in a study reported the sensitivity of this test as 83% and its accuracy as 81% at the cut-off point of 100, and considered it a suitable screening tool for assessing stress levels and distinguishing people at risk of health problems and disorders.

3- Walker Health-Promoting Lifestyle Profile-II (HPLP II): This questionnaire consists of 52 questions with 6 subcategories under the headings of nutrition, physical activity, responsibility for health, stress management, interpersonal relationships, and spiritual growth. The HPLPII asks the respondent to indicate on a 4-point Likert response scale (never, sometimes, often, and usually) how often they perform specific health-promoting behaviors. Overall, the health-promoting lifestyle score and the behavioral dimension score are obtained using the average of the responses for the total. Among them, 52 questions and 8 to 9 items are calculated for each subsection (Mohammadi Zaidi, 2011). Cronbach's alpha was reported as 0.82 for the whole scale and 0.64 to 0.091 for the subscales (the reliability of the Persian profile was 0.91). The subscales include spiritual growth, stress management, nutrition, physical activity, responsibility for health, and interpersonal support (Tanjani et al., 2016).

The collected data were analyzed using Pearson correlation tests and path analysis using SPSS-20 and Laserl-8 software. Bootstrap provides the most powerful and logical method to obtain indirect effects

(Preacher & Hayes, 2008). The result of this method is that if the upper and lower limits of the percentage for the mediating path are of the same sign (both positive or both negative) or the zero value is not placed between these two limits, the indirect causal path is significant. To check the fitness, validity, and reliability of the life event relationship measurement model, confirmatory factor analysis was used on the health salutogenic index with the mediation of a health-promoting lifestyle.

Results

In this study, there were 229 participants with an age range of 18-49 years with a mean of 30.27 and a standard deviation of 4.18, of which 130 (56.8%) were women and 99 (43.2%) were men. 81 people (35.4 percent) of the research sample were single, 110 people (48 percent) were married, 6 people (2.6 percent), and 32 people (14 percent) were separated. Table 1 presents the descriptive characteristics of the research variables.

Inferential results

First, to check the presumptions of the structural equations, the assumption of the normality of the scores distribution was checked with the Kolmogorov- Smirnov test. The values of the Z statistic of this test are shown in Table 2.

As the results of Table 2 show, none of the calculated Kolmogorov- Smirnov statistics are significant ($p>0.05$); therefore, it can be said that the scores of the variables have a normal distribution and this assumption of using parametric tests is established.

According to the results in Table 3, the tolerance statistics of the research variables is close to 1, so the level of collinearity between the variables is

Table 1. Minimum, maximum, mean, and standard deviation of research variables

Research variables	Minimum	Maximum	Mean	SD	Qualitative index
Health Salutogenic Indicators	14	61	33.34	9.39	Moderate
Health promoting lifestyle	54	206	142.90	35.90	High
Life events	46	231	156.51	35.43	High

Table 2. The results of the Kolmogorov- Smirnov test to check the normality of the distribution of scores

Variable	Kolmogorov- Smirnov		
	Statistic	df	Sig
Health Salutogenic Indicators	0.052	229	0.200
Health promoting lifestyle	0.049	229	0.200
Life events	0.052	229	0.200

Table 3. The results of the Collinearity indices of the research variables

Collinearity statistics Variable	Tolerance	VIF
Health-promoting life-style	0.756	1.322
Negative effect of life events	0.821	1.219

low. As Table 3 shows, the VIF value of all research variables is lower than 2; therefore, the degree of collinearity between the variables is acceptable, and the statistical assumption of non-collinearity between the variables was met.

After checking the default assumptions of the structural equations, the fit of the research model was checked: "Does the structural model of salutogenic health indicators based on life events with the mediation of health-promoting lifestyle in patients with irritable bowel syndrome have a good fit?"

First, we examined the fit of the research model to see if the selected constructs for this model have appropriate validity.

Therefore, the data has been statistically compatible with the factorial structure and the theoretical basis of the hidden variables of the research. Figure 2 shows the standard coefficients of the research variable measurement model.

The standardized path coefficients of the research variables are in the range of 0.44 to 0.78, and all the paths of the variables related to their evident variables are significant at the level of 0.001, which indicates that the evident variables are fit for measuring the variables.

As the results of the correlation matrix in Table 5 show, salutogenic health indicators have a positive and meaningful relationship with health-promoting style (r=0.45, p=0.001) and a negative and significant relationship with stressful life events (r=-0.21, p=0.002). Also, the health-promoting lifestyle has a negative and significant relationship with life events (r=-0.38, p=0.001). Then we examined the fitness of the general model of the research. The results of the fit indices are given in Table 6.

The main question was whether the structural model of the relationship between stressful life events and salutogenic health indicators through the mediation of a health-promoting lifestyle in people with irritable bowel syndrome has a good fit.

According to the values in Table 6, the proposed model had a good fit, and therefore, the research hypothesis is confirmed .The appropriate value of RMSEA is suggested as 0.05 >, and its acceptable value as < 0.08. (Xia & Yang, 2019).

Figure 3 shows the structural model of the research. Circles represent latent variables, life events as exogenous variables, health-promoting lifestyles as mediating variables, and salutogenic health indicators as endogenous variables in the model. After confirming the fit of the general research model, we investigated the mediating role of health-promoting lifestyle in the relationship between life events and salutogenic health indicators in patients with irritable bowel syndrome. The proposed hypotheses were:

H01: There is a significant relationship between stressful life events and salutogenic health indicators in patients with irritable bowel syndrome.

H02: There is a significant relationship between

Table 4. Fit indices of the model measuring the impact of life events on the health salutogenic index with the mediation of lifestyle

Fit index	Acceptable domain	Health promoting lifestyle	life events
CMIN/df	< 5	4.33	4.23
RMSEA	< 0.10	0.09	0.06
SRMR	< 0.08	0.07	0.04
CFI	> 0.90	0.90	0.94
IFI	> 0.90	0.91	0.93
NFI	> 0.90	0.91	0.92

Table 5. Correlation matrix and extracted average variance of health-promoting lifestyle, life events, salutogenic health indicators

Variable	1	2	3
Health salutogenic indicators	0.725		
Health promoting lifestyle	0.45**	0.425	
Life events	-0.21**	-0.38**	-0.21**

health-promoting lifestyle and salutogenic health indicators in patients with irritable bowel syndrome.
H03: Health-promoting lifestyle has a mediating role in the relationship between stressful life events and salutogenic health indicators in patients with irritable bowel syndrome.

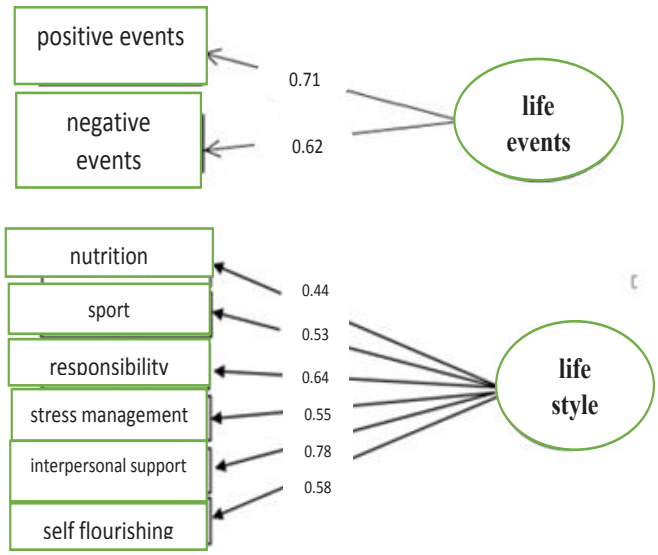
Examining the first hypothesis: According to Table 7, the coefficient of the direct path of life events (t=-2.31, ß=-0.42) was obtained on salutogenic health indicators. Considering that in the structural model, the significance of the path coefficient is determined by using the t value, if the t value is more than 1.96, the relationship between the two structures is significant. Therefore, the direct standard coefficient of life events on health indicators was significant, and the first hypothesis was confirmed.

Examining the second hypothesis: There is a significant relationship between health-promoting lifestyle and salutogenic health indicators in patients with irritable bowel syndrome.

According to Table 7, the coefficient of the direct path between health-promoting lifestyle and salutogenic health indicators (t=2.723, ß=0.17) was obtained. Considering that in the structural model, the significance of the path coefficient is determined by using the t value, if the t value is more than 1.96, the relationship between the two structures is significant. Therefore, the direct standard coefficient of a health-promoting lifestyle on salutogenic health indicators is significant, and the second hypothesis is confirmed.

Examining the third hypothesis: Health-promoting

Figure 2. Standard coefficients of the research model



lifestyle has a mediating role in the relationship between stressful life events and salutogenic health indicators in patients with irritable bowel syndrome.

Table 6- Fit indices of the General Model

Fit indices	X2 /df	CFI	IFI	NFI	NNFI	RMSEA
Scores	2.97	0.91	0.90	0.90	0.92	0.08
Acceptance scope	1-5	>0.90	0-1	>0.90	>0.90	< 0.05

of life events and salutogenic health indicators with the mediation of lifestyle was significant with the standard coefficient of -0.04 at the level of p<0.05,

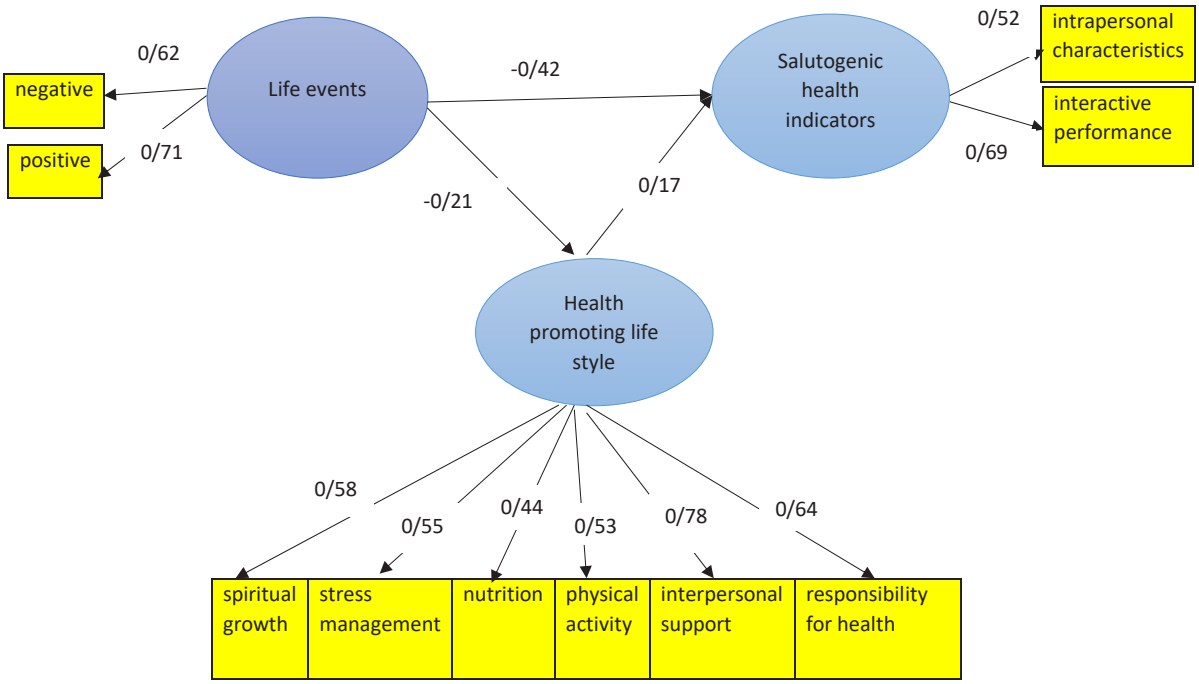


Figure 3. Structural model of salutogenic health indicators based on stressful life events with the mediation of health-promoting lifestyle

The upper and lower limits of the Bootstrap test in the indirect path of the mediating role of lifestyle between life events and salutogenic health indicators were obtained as -0.01 and -0.08, respectively.

Due to the same sign of these two extremes, the path and the third hypothesis was confirmed.

Discussion

This research investigated the effect of health-promoting lifestyle in relation between stressful

Table 7. Coefficients of direct paths for the hypothetical research model

Direct path		b	Beta	Standard error	T statistics	P	Results
Life events	Salutogenic indicators	-0.01	-0/42	0.017	-2.31	0.756	confirmed
Life style	Salutogenic indicators	0.04	0.17	0.017	2.723	0.007	confirmed

Table 8. Indirect path coefficients for the proposed research model

Indirect path	Indirect Beta	The number of sample reproductions	Bootstrap approximation		Confidence percentage	estimation error
			upper limit	lower limit		
The mediating role of health-promoting lifestyle between stressful life events and salutogenic health indicators	-0.04	1000	-0.01	-0.08	95%	0.019

life events and health indicators in patients with irritable bowel syndrome with a salutogenic approach. Confirmation of the fit of the proposed model of this research showed that the variables of stressful life events and health-promoting lifestyle were suitable predictors for the health status of patients with irritable bowel syndrome. Life events are associated with the possibility of physical and psychological problems. People who have experienced some changes in their lives probably have physical and psychiatric disorders. Evidence indicates the relationship between life stress and physical diseases (Dohrenwend & Dohrenwend, 1974). Life stressors are associated with severe chronic diseases (Sarason et al., 1985). Irritable bowel syndrome is a stress-sensitive disorder of the interactions between the brain and the bowel, which is associated with a high prevalence of unfortunate events early in life, and a higher number of life events is associated with the probability of disease occurrence (Ju et al., 2020). In general, emotional and sexual abuse and corporal punishments are observed to a great extent in affected people (Bradford et al., 2012). Affected people experience fewer positive life events, more disease behavior, and more childhood events (Derosman, 1994).

Stressful life events also affect the severity of irritable bowel syndrome symptoms (Ghorbani et al., 2019). The results of this study regarding the relationship between stressful events and health status in patients with irritable bowel syndrome are consistent with the results of Butt et al. (2022), Okazaki et al. (2022), Ju et al. (2020), Solati et al. (2018), Ghorbani et al. (2019), Ng et al., (2019), and Bradford et al. (2012). The direct and meaningful effect of the health-promoting lifestyle on salutogenic health indicators confirmed that the management of irritable bowel syndrome should also include diet and lifestyle recommendations, emphasizing the importance of self-help in symptom management (Barrett, 2019). Lifestyle is one of the most critical factors of health promotion, which by developing and adjusting health-promoting behaviors and empowering people to control their health, leads to an increase in health in the individual and society. The results of studies show that the type of behavior and lifestyle affect people's health. Nutrition, physical activity, free time, and communication with family, friends, colleagues, and clients are symbols of this category (Abbasi & Agha Amiri, 2021). Reducing the symptoms of the disease in patients with irritable bowel syndrome requires multiple care, such as nutritional education, education to deal with lifestyle changes and stress control (Kim & Ban, 2005).

Following some diets and eating patterns, such as having breakfast and slow eating, and chewing food well reduces the prevalence of functional gastral disorders (Vakhshuury & Khoshdel, 2019).

The relationship between lifestyle habits and eating behaviors and frequency of food consumption has shown that irritable bowel syndrome is related to irregular eating, lack of physical activity, and sleep quality (Gu et al., 2015). Healthy dietary habits (regular food patterns, balanced intake of snacks, long or moderate intervals between meals and sleep, and low consumption of high-fat foods) significantly reduce the risk of irritable bowel syndrome (Haji Shafiei et al., 2020). Paying attention to the role of diet and its management in the treatment of irritable bowel syndrome and lifestyle, such as a regular eating pattern, reducing the consumption of insoluble fibers, alcohol, caffeine, fatty and spicy foods, regular physical activity, and drinking enough water are emphasized in the management of the disease. Modifying the lifestyle and following the diet reduces the triggers of irritable bowel syndrome and the severity of the symptoms (Cozma-Petru et al., 2017).

The analysis of the path of a health-promoting lifestyle showed that this variable positively and meaningfully mediated the relationship between life events and salutogenic health indicators, which include two aspects of intrapersonal performance and interpersonal dimension and sub-categories of mood level, tension, sleep, concentration, creativity, accuracy, emotion expression, illness, energy level, social ability, and physical performance. This finding was also consistent with the cross-sectional study of Vakhshuury and Khoshdel and the studies of Gu et al. (2015), Haji Shafiei et al. (2020), and Kaczyńska et al. (2020).

The limitations of this study were: 1- This research was a cross-sectional correlational, so we cannot obtain a cause-and-effect conclusion. 2- To collect data, self-report tools were used, as a result, social acceptability, self-report orientation, situational effects, poor recall, and self-report errors affected the measurement of variables. The role of stigma as a patient can create defensiveness and resistance in the subject, and the anxiety of social justice can make the subject's response go wrong. The results of this research can be used to conduct applied research and intervention approaches based on the goal of health promotion, in health care centers, hospitals, and a group of society that are involved in stressful jobs, such as policemen, health system workers, paramedics, etc., who are at risk and probability suffer from irritable bowel syndrome. Considering a therapeutic approach focused on salutogenic factors and the cultural norms of our country, providing constructive strategies, teaching management of stressful events, and adopting a healthy lifestyle to adapt to other health conditions people may encounter in their life are the outcomes of this study.

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Conflict of interest

The researchers state that there is no conflict of interest in the results of this research.

The role of authors

The first author was the main researcher, the presenter of the idea and design of the study, data collection, and data analysis. The second and third authors were the supervisors, and the fourth author was the advisor professor of this research. All the authors contributed to the initial writing of the article and reviewed it, and with the final approval of the present article, they accept the responsibility of accuracy and truthfulness of the material contained in it.

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