

Original Paper

# Cognitive Flexibility and Its Dimensions in Patients With Gastrointestinal Diseases



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## ABSTRACT

**Introduction:** Gastrointestinal diseases are one of the most common and chronic non-communicable diseases that impose high stress and cost on society and the health system.

**Objective:** The present study aimed at comparing Cognitive Flexibility and its dimensions between gastrointestinal patients and healthy subjects.

**Materials and Methods:** This is a comparative analytical study. The study population consisted of all patients with gastrointestinal problems referred to the gastroenterology clinics (privately owned) and their healthy companions in Bandar-e Anzali City, Iran, in 2018. Of these people, 184 were selected as study samples using convenience sampling technique. They were divided into two groups of test and control. The study tool was Dennis and Vander's Cognitive Flexibility inventory. The obtained data were analyzed using descriptive statistics and inferential statistics of multivariate analyses of variance and the Independent t-test. The significance level was set at 0.05.

**Results:** The age of the participants ranged from 30 to 50 years, and 52% of the patients and 51% of the controls were female. Test results indicated a significant difference between two groups in terms of Cognitive Flexibility and perception of controllability (a dimension of Cognitive Flexibility) ( $P < 0.05$ ). No significant difference was found between two groups regarding other dimensions of Cognitive Flexibility (perception of alternatives and human behavior).

**Conclusion:** According to the results, attention to the psychological aspects associated with gastrointestinal diseases is essential.

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## Highlights

- The three aspects of Cognitive flexibility are the tendency to perceive difficult situations as controllable conditions, the ability to provide multiple explanations for life events and behavior, and the ability to create various solutions to stressful situations.
- Healthy people have a higher level of Cognitive flexibility and perception of controllability compared to patients with gastrointestinal problems.
- No significant difference was found between patients with gastrointestinal problems and healthy people regarding the perception of alternatives and human behavior.

## Plain Language Summary

The present study aimed at comparing Cognitive flexibility and its dimensions between gastrointestinal patients and healthy subjects. Gastrointestinal diseases are non-communicable diseases where psychological factors and personality traits have an impact on their occurrence and exacerbation. One of these factors is Cognitive flexibility, which is a personality trait in all people with varying degrees and refers to the type of a person's reaction to new experiences and situations. Cognitive flexibility helps people perceive difficult situations as controlled conditions. Therefore, it is important to study the existence and level of Cognitive flexibility and its impact on the physical condition and the occurrence or exacerbation of diseases, including gastrointestinal disorders.

## Introduction

**G**astrointestinal diseases are one of the most common and chronic non-communicable diseases that impose high stress and cost on society and the health system [1].

Chronic gastrointestinal diseases may exacerbate abnormal family dynamics and cause mood and eating disorders. When gastrointestinal diseases and mental illness occur together, the process and prognosis of both disorders become complicated [2].

Patients with gastrointestinal diseases have a higher rate of psychiatric counseling, which indicates the association between gastrointestinal diseases and psychiatric disorders. Psychiatric and psychological factors affect the onset, continuation, and prognosis of gastrointestinal diseases, and the relationship between stress, anxiety, and psychological reactions and gastrointestinal diseases has always received attention [3]. For example, gastroesophageal reflux disease is the most prevalent esophageal disorder and is a major reason for using anti-acid drugs. Based on a study of patients with gastroesophageal reflux disease, factors such as severe stress, extreme excitement, family disputes, and depression are triggers of gastrointestinal symptoms [2].

In general, it is believed that psychological factors play a role in the emergence of all diseases [4]. Keeping that

in mind, studies on the causes of gastrointestinal diseases should be conducted in a multifactorial way. In other words, according to the biopsychosocial model, the researcher must pay attention to the role of psychological factors, especially the fundamental characteristics of personality on the disease underlying cause [5].

Meanwhile, attention to Cognitive Flexibility (CF) is important. CF refers to the individual ability to face internal and external experiences, and as a personality trait, it varies from person to person in different degrees and determines the type of reaction to new experiences [6]. Currently, there is no consensus on how to define CF. In general, the ability to switch cognitive sets to adapt to changing environmental stimuli is the main component in the functional definition of CF [7]. It also refers to an individual's assessment about the controllability of conditions which varies in different situations [8].

CF states that flexibility requires the ability to communicate with the present moment and having the power to distinguish oneself from personal thoughts and experiences [9, 10]. The three aspects of CF are a tendency to perceive difficult situations as controllable conditions, the ability to provide multiple explanations for life events and behavior, and the ability to create various solutions to difficult situations [7]. People with CF do not avoid internal or external experiences, but

sometimes seek new experiences [11]. They tolerate conflicts more efficiently [12].

In contrast, people with less CF can hardly forget their initial experiences; they insist on their past experiences which had negative consequences for them, and this insistence hurts their compatibility with the new conditions [13]. Many behavioral abnormalities and disorders are associated with CF. For example, some studies have shown CF relationship with general psychological distress, depression, anxiety [14-16], schizophrenia, obsessive-compulsive disorder [17, 18], and eating disorder [19]. CF plays a crucial role in the formation and development of various behaviors in individuals, including behaviors related to health [12, 16]. Burton et al. [20] in a study on the role of CF as one of the supporting factors of resilience, reported that resilience training significantly improved CF.

It should be noted that the resilience program increases the positive affections, bring up effective coping strategies, and decreases adverse affections, stress, and depression [21]. Different research results have shown low CF in cardiac patients compared to healthy people [22, 23], in students with rumination compared to those without rumination [24], in students with symptoms of the obsessive-compulsive disorder compared to normal group [25], and in divorced women compared to those with successful marriage [26].

Results of Roshan et al. study also show that patients with irritable bowel syndrome (one of the most common gastrointestinal diseases), had less resilience compared to healthy people [27]. Considering the importance of CF and its subscales in the emergence and worsening of physical ailments, it seems necessary to carry out a study on this issue. In this regard, this study aims to compare CF and its components among patients with gastrointestinal diseases and healthy people.

## Materials and Methods

This is a comparative analytical study. The study population consisted of two groups. The first group included all patients (n=130) with gastrointestinal problems referred to the gastroenterology clinics (privately owned) in Bandar-e Anzali City, Iran, in 2018. The second group included all companions of the patients (n=140) referred to the clinics. The sample size was 200. A total of 100 patients selected from the patients in the first group based on the inclusion criteria and using convenience sampling method (test group) and

100 healthy controls from companions of the patients in the second group.

The controls were age- and gender-matched with the first group and were selected by using a convenience sampling method. Then the study questionnaires were distributed among them (for proper matching and avoiding the effect of healthy group on the test group's response to questions, companions who were not involved in the study were used). Finally, since some questionnaires remained uncompleted by some subjects, the sample size was reduced to 184 (92 in the test group and 92 in the control group).

The inclusion criteria were as follows: having gastrointestinal problems, being 30-50 years old, lacking a chronic or acute disease at the same time with gastrointestinal problem based on the patient's report (e.g. heart disease, kidney disease and any disease that requires continuous treatment and care), being able to read and write, and willing to participate in the study. To meet the ethical guidelines, the participants were assured of the confidentiality of their information. They were also free to leave the study at any time. The verbal informed consent was obtained from them.

The data collection tools were a demographic form (surveying age, gender, marital status, educational level, income, and history of disease) and Cognitive Flexibility Inventory (CFI) designed by Dennis and Vander [7]. It is a 20-item self-report tool that measures CF required for the individual's success in challenging and replacing destructive thoughts with productive ones. Questions are scored on a 7-point Likert-type scale [28]. The total score ranges from 20 to 140; higher scores indicate good CF and lower scores poor CF [7].

This inventory is used to evaluate the level of individual progress in clinical and non-clinical settings and in creating flexible thinking for cognitive-behavioral therapy of depression and other mental illnesses. Its Persian version has three subscales of "perception of controllability" assessing by items 1, 2, 4, 7, 9, 11, 15, and 17; "perception of alternatives" assessing by items 3, 5, 6, 12, 13, 14, 16, 18, 19, 20; and "perception of human behavior" assessing by items 8 and 10. The items 2, 4, 7, 9, 11, and 17 are scored in reverse order.

The collected data were analyzed in SPSS V. 23. Descriptive statistics were used for describing demographic information; multivariate ANOVA for comparing groups in terms of CF; and the Independent t-test for comparing the mean scores of two groups in terms of three subscales of CF.

**Table 1.** Demographic characteristics of the study participants

Variables		N (%)	
		Test	Control
Age (y)	30-50	92(100)	92(100)
Gender	Male	44(48)	45(49)
	Female	48(52)	47(51)
Marital status	Single	14(15)	9(10)
	Married	78(85)	83(90)
Education	Junior high school	32(34.8)	27(29.3)
	High school diploma	30(32.6)	18(19.6)
	Bachelor degree	28(30.4)	42(45.7)
	Master degree	2(2.2)	5(5.4)
Income (\$)	150-250	10(10.9)	9(9.8)
	250-500	55(59.8)	55(59.8)
	>500	27(29.3)	28(30.4)
History of disease	Yes	33(36)	-
	No	59(64)	-
Duration of treatment (y)	<1	50(54.3)	-
	1-2	22(23.9)	-
	2-3	13(14.2)	-
	>3	7(7.6)	-

## Results

The Mean±SD age of the participants in the test group was 39.82±6.22 years, and in the control group, it was 39.70±6.23 years. About 52% of the patients and 51% of the controls were female. Also, 85% of the patients and 90% of the controls were married. Majority of the patients (34.8%) had a junior high school education, and most of the controls had a bachelor degree. About 64% of the patients had no history of the disease (Table 1).

The Mean±SD score of CF in controls was found as 85.20±7.23 and in patients as 80.57±9.02. Also, the mean±SD score of perception of controllability in the controls and patients were 33.98±5.78 and 30.20±6.09, respectively. Based on the ANOVA results, there was a significant difference between groups in terms of CF level ( $F=14.76$ ,  $P<0.05$ ). Also, a significant difference was found between groups concerning their perception of controllability ( $F=18.69$ ,  $P<0.05$ ), but no significant difference in terms of perception of alternatives and human behavior (Table 2). Furthermore, the

**Table 2.** Multivariate analyses of variance results for comparing CF between two study groups

Variable	Sum of Squares	df	Mean Square	F	Sig.	Etta Squared
CF	986.28	1	986.28	14.76	0.01	0.08
Perception of controllability	658.17	1	658.17	18.69	0.01	0.09
Perception of human behavior	9.14	1	9.14	1.72	0.19	-
Perception of alternatives	111.14	1	111.14	1.76	0.19	-

**Table 3.** Comparing the Mean score of CF subscales between two study groups

CF Subscales	Group	Mean±SD	df	t	Sig.*
Perception of controllability	Test	30.20±6.09	182	-4.32	0.01
	Control	33.98±5.78			
Perception of human behavior	Test	7.26±2.48	182	1.31	0.45
	Control	6.82±2.13			
Perception of alternatives	Test	42.88±9.23	182	-1.33	0.19
	Control	44.43±6.44			

\* Independent-test

t-test results revealed that controls had higher mean scores in the perception of controllability compared to the patients (Table 3).

### Discussion

Results of the current study show that the total score of CF and perception of controllability (as a component of CF) are significantly different between patients with gastrointestinal diseases and healthy people, and the patients had lower scores. Roshan et al. reported that patients with irritable bowel syndrome had less resilience compared to healthy people [27]. Given that the fundamental component in the definition of CF is to switch cognitive sets in dealing with changing environmental stimuli, one can conclude that patients should have problems in this area [7].

CF enables people to accept stressful situations by making changes in their cognitive sets, and face them instead of rejecting them which can result in a higher level of resilience that can help them to adapt their problems with the least damage. This finding agrees with the study of Burton et al. where an association between CF and resilience was reported [20]. Patients' low CF can cause them to insist on their beliefs, even though these beliefs have harmful consequences.

Sometimes this insistence leads to a conclusion that events are out of their control. Gradually, it forms a pessimistic explanatory style, and at the end, they will not be able to adapt positively or negatively in dealing with new and sometimes critical situations. This finding is consistent with the study results of Carbonella and Timpano [13]. In addition, the lack of CF can make people cognitively unable to reconstruct and easily face internal and external experiences, which will further hurt their health status [11].

One of the essential aspects of CF in individuals is their assessment of the controllability of conditions [8]. Patients' lack of perceptions of controllability, believing that events are not under their control, attributing success to external and temporary factors (chance and accidents), and failures to internal and personal factors, lead to prejudice new situations and eventually, not to take any action to solve those situations or adapt to them.

Regarding other aspects of CF, such as the perception of alternatives and human behavior, no significant differences were reported between groups. CF helps a person to deal adequately with the pressures, enables him/her to examine different options in dealing with specific conditions, and at the end, chooses the best one. People with CF not only do not avoid internal and external experiences but even seek new experiences [11]. The low level of CF can damage the treatment process of the patients. There may be a two-way relationship between the situations and their damages. Experiencing specific and critical situations without enough CF can cause damages which can further reduce the people's CF. Therefore, CF also plays an important role in behaviors related to health [16].

According to the results of this study regarding the low level of CF in patients with gastrointestinal problems and considering the effect of this factor on the quality of life, it is advisable to teach school students how to deal correctly with stressful and unexpected situations (to increase their Cognitive Flexibility) in the form of life skills programs and continue this training until adulthood. With this training, we can certainly raise their awareness of how to deal with special situations in life and prevent many problems in the future.

Regarding the limitations of this study, because of using a self-reporting tool, there is a possibility of bias in responses to questions. Moreover, since sampling was con-

ducted using convenience technique, our results are not generalizable. Hence, we recommend that further studies be conducted using random sampling technique.

## Ethical Considerations

### Compliance with ethical guidelines

This study was approved by the Ethics Committee of Payame Nour University of Astana Ashrafieh Branch (Code: IR.PNU.REC.1397.074).

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### Authors' contributions

All authors contributed in preparing this article.

### Conflict of interest

The authors declared no conflict of interest.

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