

Investigating the Relationship between Perfectionism and Fatigue with the Mediating Role of the State of Flow in Patients with Inflammatory Bowel Disease

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Abstract

Introduction: The negative impact of perfectionism on Inflammatory Bowel Disease (IBD) may be explained by its relationship with negative cognitive biases, increased reactivity to stressors, and feelings of pressure. The present study was conducted to investigate the relationship between perfectionism and fatigue, as well as the mediating role of drowning in patients with IBD.

Method: The current research represents a descriptive correlational study. The study's statistical population included all IBD patients in Tehran. A total of 361 IBD patients from July to October 2023 in Tehran were selected as the sample using the multi-stage cluster method. The sampling method used in this study was a multi-stage cluster method. The data collection instruments were the Short Terry Negative and Positive and Negative Perfectionism Scale (PNP), Multidimensional Fatigue Inventory (MFI), and the Flow State Scale (FSS). The structural equation modeling method using SPSS27 software and Smart PLS 4 software was used to verify the research hypotheses. The Sobel test was used to test the significance of the mediating variables. A significant value in this research was considered 0.05.

Results: Findings revealed that positive perfectionism had a negative and significant relationship with fatigue in IBD patients ($\beta = -0.261$, $P = 0.002$). On the other hand, it was discovered that negative perfectionism had a strong and positive association with mental fatigue in individuals with IBD. This suggests that those with IBD who exhibit negative perfectionism are more prone to experiencing mental fatigue. ($\beta = 0.30$, $P < 0.001$). This finding suggests that IBD patients with negative perfectionism are more likely to experience fatigue. Additionally, positive perfectionism had a positive effect on the flow state ($\beta = 0.596$, $P < 0.001$) and had a negative and significant impact on fatigue ($\beta = -0.414$, $P < 0.001$). In addition, according to the Sobel test, the study mediator variable was significant.

Conclusion: Fatigue can have a significant impact on patients' lives, as it is associated with lower quality of life, functional impairment, absenteeism, and mood disorders. According to research results, negative perfectionism has a negative and significant impact on drowning.

Keywords: Perfectionism, Fatigue, State of Flow, Inflammatory Bowel Disease Patients

Introduction

Autoimmune diseases generally occur in less than 7% of people, most often in young and middle adulthood, and the incidence varies after puberty in women compared to men [1]. Currently, there are more than 100 autoimmune diseases and the number of autoimmune diseases is increasing. One of the autoimmune diseases is Inflammatory Bowel Disease (IBD) [2]. The prevalence of this disease is about 10-20% of the general population and it is the most common digestive disorder, which is more related to psycho-social factors compared to other digestive disorders such as IBD [3]. IBD may affect as many as 200 individuals in every 100,000 adults unlike some of the developed countries, there are still facing a significant increase in the prevalence of IBD in the Asian continent and developing countries

such as Iran. Also, in Iran, the common cases of IBD are expected to increase by 2.5 times from 2021 to 2030 [4]. The number of individuals suffering from this disease in Iran is estimated to be close to 10,000 by researchers [5]. Illness management and its psychosocial effects are related to aspects of perfectionism. Research shows that IBD patients have significantly higher levels of perfectionism [6].

Perfectionism is a personality trait characterized by striving for perfection and setting infinitely high standards for performance, accompanied by a tendency toward highly critical evaluations of one's behavior [7]. Also, the level of perfectionism in people with IBD is very high [6]. Clinically, many patients with IBD, present as perfectionistic perfectionism is one of the variables associated with IBD. Factors such as anxiety, perfectionism, and life pressures also influence the development of his IBD [6]. Perfectionism is also considered a multifaceted personality trait with positive and negative aspects [8]. According to this study, perfectionism means having lofty, ambitious, and ambiguous goals to achieve them [9]. This includes his two dimensions of positive or adaptive perfectionism and negative or maladaptive perfectionism [1]. The typical perfectionist enjoys competing and striving for excellence and perfection while being aware of personal limitations [10]. However, due to unrealistic expectations, negative perfectionists think they are not doing something well and are therefore never satisfied with their performance [11]. Negative perfectionism, coupled with negative cognitive biases and feelings of needing to be perfect, has a negative impact on IBD. People with negative perfectionism have harsh, negative self-evaluations and judge themselves from an all-or-nothing perspective and the only criteria for evaluation are failure or success [12]. Moreover, personality characteristics such as perfectionism would predispose the individual to develop or maintain a fatigue state [13]. Positive and negative perfectionism have a direct impact on burnout [14]. Maladaptive perfectionism is positively related to higher levels of arousal, and higher levels of arousal are positively related to burnout [13]. The prevalence of fatigue in patients with IBD is between 22 and 77% [15]. Fatigue is associated with mood disorders and can therefore have a significant impact on patients' lives [16]. Fatigue can also affect functional capacity and quality of life [17]. The more severe the patient's fatigue, the worse the quality of life [18]. Fatigue is associated with many chronic

inflammatory conditions, such as IBD, and leads to an adverse impact on quality of life. Fatigue often goes under-recognized and untreated in the IBD population, detrimentally affecting patients' quality of life [16, 19].

According to previous studies, patients with IBD were twice as likely to experience fatigue in a separate study that examined healthy controls. Moreover, it was shown by researchers that IBD patients are more likely to avoid strategies when they experience fatigue, which is strongly linked to blood flow status [20, 21]. Flow states are one of the reasons why people don't feel tired as time passes [22]. A flow state is a psychological state that comes with optimal positive experiences, and when a person is deeply engaged in the activity, they are performing an innate flow that motivates a person for the sake of the activity itself, regardless of the consequences [23]. The concept of flow is based on positive psychology and refers to feelings of positivity and enjoyment of an activity [24]. Researchers believe that some people have certain personality traits that are ideal for achieving flow. These personality traits include persistence, curiosity, low self-centeredness, and a high degree of doing activities that are only known as intrinsic motivation for internal reasons, and people who have more of these personality traits are said to have a goal-oriented personality [22].

Flow states are associated with physical and mental activities. Also, people who experience a flow state intensively can focus more intensely on stimuli [25]. On the other hand, people with less flow experiences pay more attention to all environmental stimuli [26]. In this regard, research suggests that generating positive mental emotions and creating a flow state can improve learning during an illness crisis [27]. In another study, researchers revealed that the feeling of pleasure and happiness is the result of the cognitive and emotional evaluation of the flow experience [28]. According to research, a flow state can result in positive attitudes and enhanced performance [29].

The significance of the factors mentioned in this article lies in patients who have not been adequately researched. A gap in this study is the failure to pay attention to variables associated with this group. The rarity of studies on this subject using the same sample group makes this study distinct. Therefore, the current study seeks to answer the question of whether flow state mediation influences perfectionism and psychological fatigue in IBD patients. The conceptual model of the present study can be seen in Figure 1.

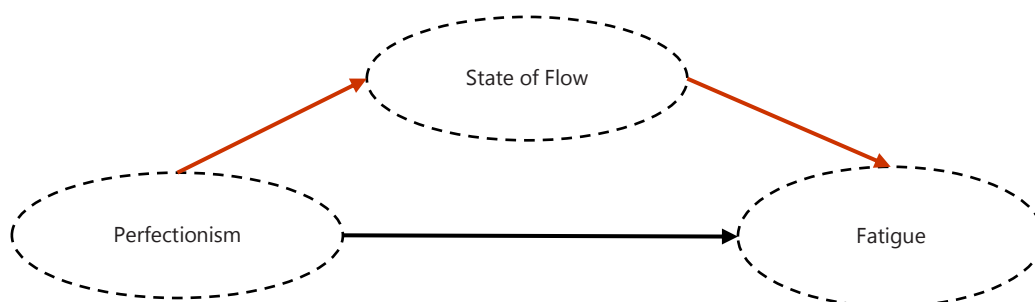


Figure 1. Conceptual model of research.

Method

In this descriptive-correlation study, path analysis was conducted to determine the associations of research variables. The target population included IBD Patients from July to October 2023 in Tehran. A total of 361 IBD patients were selected as the sample using cluster sampling method. The number of structural equation model parameters was calculated based on the number of direct paths, exogenous variables, and error variance. The research model included three exogenous (independent) variables as well as four direct paths. According to a previous study [30], with the number of paths and variables, 250 to 350 participants are enough to test the proposed model and research hypotheses. Due to the possibility of dropping out participants, 370 questionnaires were distributed among the patients, and finally, 361 questionnaires were analyzed by removing 9 incomplete questionnaires. The inclusion criteria of this study included patients with a history of IBD, who were able to read; those who had a consent for research participation with no serious psychological or physical problems according to their testimony. The exclusion criteria included a defect in completing the questionnaires. Other exclusion criteria included patients with unclassified inflammatory bowel disease (IBDU), pregnant patients, and patients with alcohol or drug abuse. The way of conducting this research was first to obtain permission for conducting research and then referring to designated hospitals. Names of hospitals and participants were not included in the information. During July to October 2023, 1,132 individuals with IBD were observed in the statistical population. Hospitals were selected using the cluster sampling method. Initially, all hospitals in Tehran were listed and then 22 districts were identified through sampling. Out of the 22 regions, 10 were chosen at random. One hospital was chosen from every region. Randomization was carried out by the author using a lottery method. After excluding incomplete or distorted questionnaires, which included those questionnaires in which the person did not answer more than 10 questions, 361 patients who fully completed the questionnaires were included in the study. The process of sampling and implementation of the study was done by all the authors. Each of the participants were asked to answer questions on the positive and negative perfectionism scale (PNP), as well as the Multidimensional Fatigue Inventory (MFI) and the Flow State Scale (FSS). Questionnaires were selected based on the fact that they were examined in previous research on patients with similar or related diseases. The implementation process was like this, at first, the researcher gave preliminary explanations to the participants about the introduction of the questionnaires. Then, how to complete the questionnaires was taught. Next, the questionnaires were distributed and the participants had to answer the questions individually. To respect ethical principles, before administering the questionnaire, a willingness to cooperate form was collected from the study participants. The willingness to cooperate form includes the title of the research, the purpose and method of conducting the

research, the benefits of the research, the profile of the project manager, including the address, the phone number where the subject can contact the researcher in case of problems or questions at any time, how to protect the information obtained from the subject, the legal responsibility of the researcher, was to declare that the subject's treatment would not be disturbed if he did not consent and did not participate in the research, how to withdraw the subject from the research, and to declare the subject's final consent to the research. There is no obligation to participate and continue the study. They were informed that participation in the study was completely voluntary and that they could withdraw from the study at any time. It was also explained to them that these tests did not contain any identifying information. SPSS-27 software was used to perform descriptive statistics and SmartPLS 4 software was used to analyze data trends and standard coefficients. Similarly, the Sobel test was used to test the significance of the mediating variable. A significant value in this research was considered 0.05.

The tools used in this study were as follows:

Positive and Negative Perfectionism Scale (PNP): This questionnaire was created in 1995 by Terry-Short et al., to measure people's perfectionism in two dimensions: positive perfectionism and negative perfectionism [27]. The Positive and Negative Perfectionism Scale, or PNP, assesses perfectionism from a functional or behaviorist perspective. The PNP consists of 40 questions on a Likert scale, with responses ranging from "strongly disagree"–1, to "strongly agree"–5. Scores are calculated by adding the answers to 18 questions representing positive perfectionism and 22 questions representing negative perfectionism. Researchers reported the internal consistency of positive and negative perfectionism to be 0.83 and 0.81, respectively [31]. In this study, the author obtained Cronbach's alpha coefficient of this scale in the positive and negative perfectionism dimensions, equal to 0.817 and 0.712, respectively.

Multidimensional Fatigue Inventory (MFI): MFI-20 is a 20-question self-assessment questionnaire that was designed by Smets et al. in 1995, to investigate fatigue [32]. A higher total score is indicative of higher levels of fatigue. It is a five-point Likert scale (1 = yes, that is true to 5 = no, that is not true). MFI-20 has an even proportion of positively and negatively worded items that are rated on a 5-point Likert scale. Subscale scores (range 4–20) are calculated as the sum of item ratings and a total fatigue score (range 20–100) is calculated as the sum of subscale scores. Higher scores indicate a higher level of fatigue. Researchers reported the internal consistency of the scale between 0.85 and 0.96 [33]. In this study, the researcher found the Cronbach's alpha coefficient of this scale was 0.871.

The Flow State Scale (FSS): This scale is a new measure of flow in sports and physical activity settings. The nine FSS scales of the 36-item instrument represent the dimensions of flow developed by Jackson & Marsh [34], and each scale is measured by four items. The development of items was based on (a) past research with

flow state both within and outside of sports settings, (b) qualitative analysis of interviews with elite athletes, and (c) quantitative analyses conducted in the present investigation. This scale is measured on a five-answer Likert scale, and people's scores are obtained from the sum of the individual's answers to the questions. The maximum score of people on this scale is 180 and the minimum score of people is 36. Internal consistency estimates for the nine FSS scales were reasonable ($\alpha M = 33$) for the administration of the scale to 394 athletes. Researchers have reported the scale's internal consistency and test-retest reliability as 0.87 and 0.85, respectively [35]. In this study, the author found that the Cronbach's alpha coefficient of this scale was 0.893.

Results

In the study, participants were divided into two groups, males (50.4%) and females (49.6%). In terms of average age, participants were divided into three groups 25- 35 years old, 36-45 years old, and 45 years old and older. The proportion of participants in these groups was 24.9%, 31.9% and 43.2% respectively. Moreover, descriptive statistics of the variables have been presented in Table 1. According to Table 1, all research variables had a significant relationship with each other. Furthermore, based on the Pearson correlation coefficient, it can be said that the correlation between the research variables is very strong. The researcher also investigated the assumptions of the research. To check the normality of the distribution of the research variables according to Table 2, the Kolmogorov-Smirnov and Shapiro-Wilk tests were used, and since this test was significant for the research variables ($p < 0.001$), as a result, the research variables have distribution were not

normal. For this reason, Smart PLS software was used to run the structural equation model. In addition, since the sampling method was random, this random sample assumption was respected. Likewise, the sample size is sufficient to run the structural equation model using the partial least squares method, and its value was equal to 361 people.

Based on the results presented in Table 3, all path coefficients associated with the final model were significant. Based on the standardized coefficients in Table 3, the negative effect of positive perfectionism on fatigue is significant ($\beta = -0.261$, $P = 0.002$). Negative perfectionism had a positive effect on fatigue ($\beta = 0.30$, $P < 0.001$). Additionally, positive perfectionism had a positive effect on the flow state ($\beta = 0.596$, $P < 0.001$). Similarly, negative perfectionism also had a negative and significant impact on the flow state ($\beta = -0.386$, $P < 0.001$). Finally, the mediating variable State of Flow also had a negative and significant impact on fatigue ($\beta = -0.414$, $P < 0.001$). The structural model of the study was validated by this discovery (Figure 2, 3).

As it can be seen in Table 4, the reliability and validity of the model has been confirmed. Cronbach's alpha reliability of the variables is higher than 0.7. The CR of these variables is also higher than 0.7. Similarly, convergent validity was also checked using the average variance extracted index. The minimum value of ave should be 0.5, which means that the latent variable in question explains at least 50% of the variance of its observables. Since its value is higher than 0.5 for research variables, it can be concluded that the validity of the model is confirmed and it can be concluded that the validity of the model is confirmed (SRMR=0.011; NFI=0.967; Chi-squared=85.475).

Table 1. Descriptive Statistics of Variables and Correlation Matrix between Research Variables

| Row | Variables | Mean ± SD | 1 | 2 | 3 | 4 |
|-----|------------------------|--------------|---------|---------|---------|---|
| 1 | Positive perfectionism | 59.73± 23.17 | - | | | |
| 2 | Negative perfectionism | 49.23± 16.93 | -0.91** | - | | |
| 3 | Fatigue | 53.08± 18.89 | -0.92** | 0.92** | - | |
| 4 | State of Flow | 78.38± 31.25 | 0.94** | -0.92** | -0.94** | - |

$P < 0.01$

Table 2. Tests of Normality

| Variable | Kolmogorov-Smirnov | Shapiro-Wilk |
|------------------------|--------------------|--------------|
| | P | P |
| Positive perfectionism | $p < .001$ | $p < .001$ |
| Negative perfectionism | $p < .001$ | $p < .001$ |
| Mental Fatigue | $p < .001$ | $p < .001$ |
| State of Flow | $p < .001$ | $p < .001$ |

Table 3. Standard Research Coefficients

| Relationship of variables | Path coefficient | P | T-value | Result |
|---|------------------|-------------|---------|--------------|
| Positive perfectionism -> Fatigue | -0.26 | $P = 0.002$ | 3.17 | confirmation |
| Negative perfectionism -> Fatigue | 0.30 | $P < 0.001$ | 4.65 | confirmation |
| Positive perfectionism -> State of Flow | 0.59 | $P < 0.001$ | 15.91 | confirmation |
| Negative perfectionism -> State of Flow | -0.38 | $P < 0.001$ | 10.25 | confirmation |
| State of Flow -> Fatigue | -0.41 | $P < 0.001$ | 3.50 | confirmation |

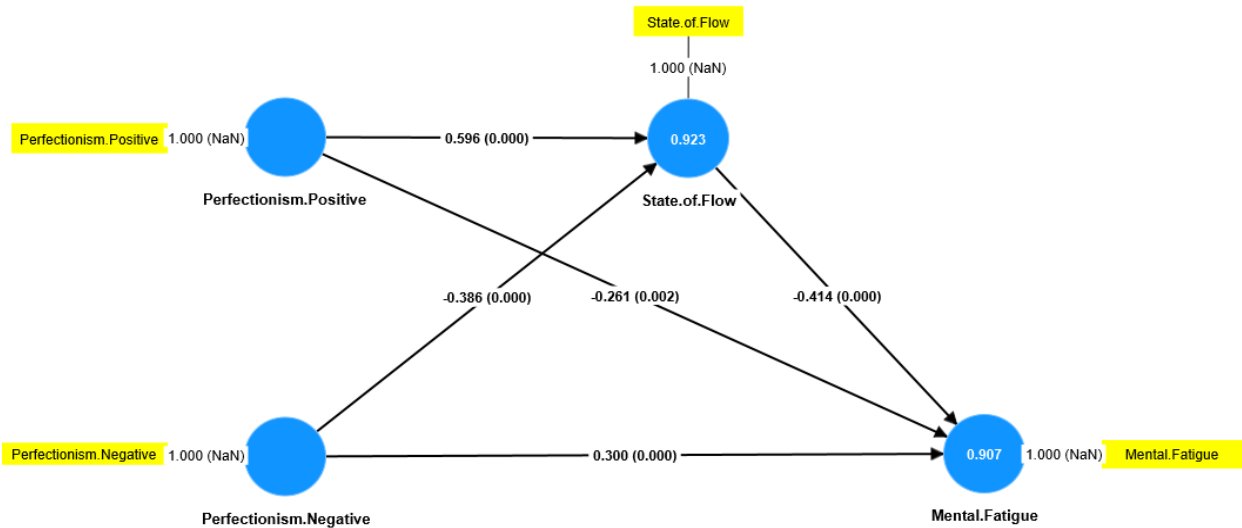


Figure 2. Path coefficients between variables and significance level.

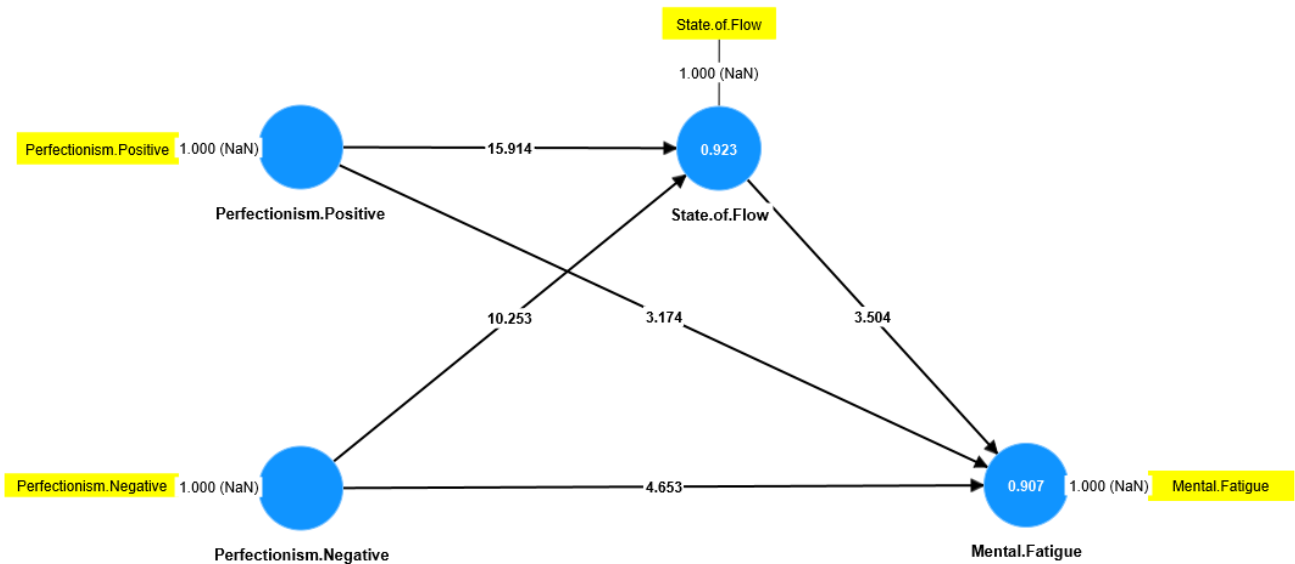


Figure 3. T-value between variables and significance level.

Table 4. Reliability and Validity of Model

| Variable | Cronbach's Alpha | Composite Reliability | AVE |
|------------------------|------------------|-----------------------|------|
| Positive Perfectionism | 0.81 | 0.82 | 0.67 |
| Negative Perfectionism | 0.71 | 0.73 | 0.78 |
| Fatigue | 0.87 | 0.88 | 0.77 |
| State of Flow | 0.89 | 0.912 | 0.86 |

Table 5. Predictive Communication Q²

| Variable | SSO | SSE | Q ² (=1-SSE/SSO) |
|------------------------|--------|--------|-----------------------------|
| Positive Perfectionism | 361.00 | 361.00 | 0.0001 |
| Negative Perfectionism | 361.00 | 361.00 | 0.0001 |
| Fatigue | 361.00 | 35.85 | 0.90 |
| State of Flow | 361.00 | 29.77 | 0.91 |

In the same way, the researcher checked the goodness of fit of the model using an index called GOF based on the following formula.

The number obtained was equal to 0.838. As this value was higher than 0.36, it can be concluded that the model has a good fit.

$$GOF = \sqrt{\text{average (AVE)} \times \text{average (R}^2\text{)}}$$

Discussion

This study aimed to evaluate the relationship between perfectionism and fatigue with the mediating role of flow state in IBD patients. According to the results obtained from this study, positive perfectionism was negatively, and negative perfectionism was positively related to fatigue in IBD patients. Furthermore, according to the results, positive perfectionism had a positive effect on the flow state, and negative perfectionism had a negative and significant effect on the flow state. Additionally, the results showed that the flow state had a negative and significant impact on fatigue.

The results of this study, in the areas of perfectionism and fatigue, are entirely consistent with previous research on [15][Bredero, 2023 #16, 16]. In addition, a research study in this domain suggests that perfectionism may be responsible for fatigue [11][Banovic, 2012 #13, 13]. Similarly, a study showed that positive perfectionism was significantly and negatively related, and negative perfectionism was positively and significantly associated with fatigue [36]. Moreover, another examination revealed that self-compassion and perfectionism strategies can predict psychological well-being and fatigue [37]. This finding indicates that people who exhibit negative perfectionism experience more depression, emotional exhaustion, and poorer mental health than those who display positive perfecting behavior. When an individual tries to be perfect in every aspect but fails to acknowledge their potential and overemphasize it in their thoughts and judgments, they exhibit negative perfectionism. Thus, these individuals are more exposed to stress and psychological pressure. Such a person may face many psychological problems such as anxiety and depression. Due to their negative perfectionism, individuals may display less resistance and stubbornness in challenging circumstances (such as sickness), which can result in emotional fatigue [14].

Perfectionism is also associated with negative health effects through a lack of control, negative self-esteem, high levels of secrecy, and social disconnection. These processes increase stress and its symptoms. Increased perceived stress leads to increased mental fatigue, resulting in an inability to effectively cope with chronic stress, which is a hallmark of chronic disease [6]. In addition, people who suffer from irreconcilable perfectionism have low self-esteem and a pervasive fear of making mistakes, a problem that leads to the cessation of effort and work. Additionally, excessive doubts about the quality of performance can lead to loss of energy and abilities, and people suffering from burnout usually experience symptoms such as apathy, meaninglessness, and helplessness [12].

Furthermore, this study's findings on perfectionism and flow states align with earlier research [26-29]. In this context, the study by Shakri et al. showed an indirect effect of perfectionism on the flow state [15]. In another study, perfectionism had a significant effect on the flow state [25].

To explain this finding, the experience of the flow state is associated with improved performance and increased

creativity, and people experience the flow state when they are operating at the highest possible level and have little awareness of the passage of time. When the flow state experiences occur, individuals are motivated to complete similar tasks in the future due to a sense of accomplishment and fulfillment. Those experiencing feeling overwhelmed feel less reliant on external rewards and more self-sufficient. People are in a flow state, engaged in an activity that is so conducive that it does not disturb them [26]. Positive perfectionism is a mindset that seeks to achieve positive outcomes by striving for high levels of success and progress. Positive perfectionists are so focused on success that they can increase their levels of overwhelm. Engaging in an activity while simultaneously exhibiting intense concentration, interest, and pleasure results in a feeling of flow state. However, negative perfectionists do not have sufficient motivation to engage in work and a flow state due to symptoms such as discouragement, discouragement, and psychomotor slowing [14]. Another finding of this study, which is the influence of flow state on fatigue, is completely consistent with further studies. In a study conducted by Hassasi et al. there was a negative and significant relationship between flow state and fatigue [22]. In addition, another study conducted in this direction found that flow state-related fatigue is a strong predictor of avoidance strategies [23]. When explaining this problem, it can be said that fatigued IBD patients, don't have high energy, don't have mental ease of flow smoothly at work, and don't want to persevere when facing difficulties and obstacles. Additionally, fatigued people pay little attention to homework and do not feel enthusiastic or inclined to do homework, so they avoid doing it; ultimately, tired people cannot fully focus on their work and mission and feel happy. People suffering from fatigue face problems such as low motivation to progress, mental health, academic performance, physical health, and social relationships, leading to a decrease in their flow state and they do not show much enthusiasm [35].

The present study included some limitations, for example, the research community was limited and caution must be exercised when generalizing results to other communities. Additionally, self-report and quantitative scales were used to collect data, as there is a possibility of bias in these instruments, and participants may have a subjective bias in their answers. The large number of questions in the questionnaires and the tendency of some subjects to exaggerate their answers to certain questionnaire items to create a favorable image of themselves are other limitations of this study. Therefore, other methods to collect information such as observations and interviews (structured and semi-structured) should be used in future research. It is also proposed that the results of this study will be conducted in other groups in the future and the results will be compared with other sample groups.

Conclusion

The results of this study approved a relationship between fatigue and perfectionism with a mediating role of flow state in IBD patients. Fatigue can have a significant impact

on patients' lives, as it is associated with lower quality of life, functional impairment, absenteeism, and mood disorders. Additionally, according to the study results, negative perfectionism has a negative and significant impact on the flow state in IBD patients.

Conflict of interest

There are no conflicts of interest, according to the authors' statement.

Ethical Approval

The research proposal was approved by Shahre-Qods Branch, Islamic Azad University, Tehran. (IR.IAU.REC 1402.046).

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