

Psychosocial Factors and Cognitive Distortions Contributing to Self-Reported Quality of Life in Female University Students with Irritable Bowel Syndrome

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Abstract

Irritable bowel syndrome (IBS) is a common gastrointestinal disorder with significant negative impacts on quality of Life. This study aimed to investigate the relationships between psychosocial factors, cognitive distortions, and quality of Life in individuals with IBS and the mediating role of cognitive distortions. Participants were 200 female students of King Khalid University with IBS who completed self-report measures of psychosocial factors, cognitive distortions, and quality of Life and The Rome III Diagnostic Questionnaire for Irritable Bowel Syndrome (Rome III). Results showed that perceived stress, anxiety, depression, and cognitive distortions were negatively associated with quality of Life. Furthermore, cognitive distortions partially mediated the relationships between psychosocial factors and quality of Life. These findings highlight the importance of addressing psychosocial factors and cognitive distortions in treating IBS. Cognitive-behavioral therapy may be an effective treatment approach for reducing stress, anxiety, and depression and challenging cognitive distortions in IBS patients.

Keywords: Irritable bowel syndrome, psychosocial factors, cognitive distortions, quality of Life, cognitive-behavioral therapy.

Introduction

Irritable Bowel Syndrome (IBS) is a chronic gastrointestinal disorder that affects approximately 10-15% of the general population, with a higher prevalence among women than men (Y. S. Kim & Kim, 2018). IBS has various symptoms, including abdominal pain, bloating, constipation, and diarrhea (Grundmann & Yoon, 2010). These symptoms can significantly impact quality of Life, leading to psychological distress, social isolation, and reduced academic performance (Lackner et al., 2010).

Irritable Bowel Syndrome (IBS) is a functional gastrointestinal disorder affecting millions worldwide. It is a chronic and debilitating condition characterized by abdominal pain, bloating, and altered bowel habits (Saha, 2014). Although the pathophysiology of IBS is not well understood, it is widely recognized that psychological factors, including stress, anxiety, and depression, play an important role in the development and maintenance of the condition (Banerjee et al., 2017; Cho et al., 2011b).

Psychosocial factors, such as perceived stress, anxiety, and depression, have significantly impacted the severity of IBS symptoms and quality of Life (O. Kim et al., 2021). For example, one study found that perceived stress was associated with increased severity of IBS symptoms, decreased quality of Life, and increased healthcare utilization (Weaver et al., 2018). Another study showed that anxiety and depression were significantly

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associated with increased IBS symptom severity and reduced quality of Life (Melchior et al., 2020).

The link between psychosocial factors, cognitive distortions, and quality of Life in IBS patients has also been studied. For example, a study by Lee et al.(2017) found that higher anxiety, depression, and cognitive distortions were associated with poorer quality of Life in IBS patients. Similarly, another study found that perceived stress was negatively associated with quality of Life in IBS patients, and this relationship was partially mediated by cognitive distortions (Weaver et al., 2018).

Cognitive distortions, or maladaptive ways of thinking, have also been implicated in developing and maintaining IBS symptoms. One study found that individuals with IBS had higher cognitive distortions than healthy controls, and these distortions were associated with more severe IBS symptoms(Kinsinger, 2017). Another study found that a cognitive-behavioral therapy intervention targeting cognitive distortions improved IBS symptoms in patients with refractory IBS (Kinsinger, 2017).

In addition to psychosocial factors, cognitive distortions may contribute to developing and maintaining IBS symptoms. Cognitive distortions refer to maladaptive thinking patterns that can influence a person's beliefs, emotions, and behaviors (Rnic et al., 2016). Previous studies have demonstrated that individuals with IBS often exhibit cognitive distortions, such as catastrophizing, overgeneralization, and all-or-nothing thinking(Weinland & Drossman, 2013)(del Pozo et al., 2018). These cognitive distortions have been associated with increased IBS symptom severity and decreased quality of Life (Petrik et al., 2021) .

Female university students with IBS are a particularly vulnerable, as they may face additional stressors related to academic demands, social pressures, and the transition to adulthood(Alharbi et al., 2022). Furthermore, female university students may be more susceptible to cognitive distortions due to their higher academic achievement and perfectionism(Fernández-García et al., 2022). Despite the importance of psychosocial factors and cognitive distortions in IBS, relatively few studies have focused on female university students with the disorder.

Therefore, this cross-sectional study aims to investigate the relationship between psychosocial factors, cognitive distortions, and quality of Life in female university students with IBS. Specifically, the study will examine how psychosocial factors and cognitive distortions contribute to this population's self-reported quality of life. The findings of this study may have important implications for the development of targeted interventions to improve quality of Life and reduce the negative impact of IBS in female university students.

Research questions:

1. What are the differences in reported levels of stress, anxiety, and depression between female university students with and without IBS?
2. How do levels of social support and coping strategies relate to quality of life in female university students with IBS?
3. What is the relationship between cognitive distortions and quality of life in female university students with IBS?
4. To what extent do psychosocial factors predict self-reported quality of life in female university students with IBS, after controlling for demographic and clinical variables?

Hypotheses:

1. Female university students with IBS will report higher levels of stress, anxiety, and depression compared to female university students without IBS.

2. Female university students with IBS who report higher levels of social support and use more adaptive coping strategies will report higher quality of Life than those who report lower levels of social support and use more maladaptive coping strategies.
3. Female university students with IBS who report higher cognitive distortions (e.g., catastrophizing, rumination, self-blame) will report lower quality of Life than those who report lower cognitive distortions.
4. Female university students with IBS who report higher levels of psychosocial factors (e.g., stress, anxiety, depression, social support, coping strategies) will significantly associate with self-reported quality of Life, even after controlling for demographic and clinical variables.

Methodology:

Participants:

The study recruited female university students diagnosed with irritable bowel syndrome (IBS) from King Khaled University in Saudi Arabia. Inclusion criteria were females aged 18-27 years, currently enrolled in the university, and diagnosed with IBS by previously diagnosed with irritable bowel syndrome based on medical reports from an internal medicine specialist, and were also diagnosed using The Rome III Diagnostic Questionnaire for Irritable Bowel Syndrome (Rome III).

Participants were recruited from various faculties, programs, and academic levels within the university to ensure a diverse sample. Participants were informed that their participation in the study was voluntary and that they could withdraw at any time without penalty. They were also informed about the purpose of the study and the procedures involved.

Before participating in the study, participants were provided with informed consent information and were asked to provide electronic consent. The informed consent information included details about the study's purpose, procedures, potential risks and benefits, and confidentiality and anonymity of their data.

Sample Size Calculation:

Sample size calculation was performed using G*Power software version 3.1.9.2. Based on previous studies on IBS patients, a moderate effect size of 0.5 was assumed for the relationship between psychosocial factors, cognitive distortions, and quality of Life. A power of 0.80 and a significance level of 0.05 were set for the study. The required sample size for the study was calculated to be 100 participants.

The study aimed to recruit at least 200 participants to account for possible attrition or missing data. Participants who completed less than 80% of the study measures were considered as having incomplete data and were excluded from the analysis. The sample size calculation ensured that the study would have sufficient statistical power to detect significant relationships between the variables of interest.

Measures:

The study used a combination of self-report measures to assess psychosocial factors, cognitive distortions, quality of Life, and IBS symptoms.

Psychosocial factors:

The Depression, Anxiety, and Stress Scale-21 (DASS-21), developed by Lovibond and Lovibond (1995), was used to assess the participants' depression, anxiety, and stress experienced by the participants. The DASS-21 is a validated 21-item self-report scale shown to have good psychometric properties in various (Henry and Crawford 2005;

Norton 2007). Participants rated the severity of their symptoms over the past week on a 4-point Likert scale ranging from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time). Scoring of the DASS-21 involves summing the responses to each item in each subscale, with higher scores indicating greater severity of symptoms

Cognitive distortions:

The Cognitive Distortions Questionnaire (CD-Quest) (de Oliveira, 2015) was used to assess the participants' presence and severity of cognitive distortions. The CD-Quest is a validated 25-item self-report scale measuring various cognitive distortions' frequency and intensity. Participants rated the degree to which each statement applied to them over the past week on a 5-point Likert scale ranging from 0 (not at all) to 4 (totally).

Quality of Life:

The Irritable Bowel Syndrome Quality of Life Questionnaire (IBS-QOL) was developed by a team of researchers from the University of Washington, Seattle under the direction of Dr. Donald L. Patrick and Dr. Douglas Drossman with sponsorship from Novartis Pharmaceuticals Corporation (Patrick 2007). The Irritable Bowel Syndrome Quality of Life Questionnaire (IBS-QOL) was used to assess the quality of Life in the participants with IBS. The IBS-QOL is a validated 34-item self-report scale that assesses the impact of IBS symptoms on various aspects of quality of Life, including physical, psychological, and social functioning. Participants rated the frequency and severity of their symptoms over the past week on a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely).

IBS symptoms:

The Rome III Diagnostic Questionnaire for Irritable Bowel Syndrome (Rome III) was originally developed by an international group of experts in the field of gastroenterology, including DROSSMAN (2006). The questionnaire has been widely used in both research and clinical settings to diagnose IBS based on the presence of symptoms such as abdominal pain or discomfort, and changes in bowel movements. The scoring system for the Rome III questionnaire involves assigning points for the presence and severity of various symptoms, with a total score of at least 2 indicating a positive diagnosis for IBS (Czyzewski et al. 2011).

All measures were translated into Arabic and back translated to ensure accuracy and consistency of the translations. Participants completed the measures online using the Qualtrics platform. The measures were presented in a randomized order to minimize order effects.

Data Analysis:

The collected data were analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0. Descriptive statistics (mean, standard deviation, and frequency) were computed for all variables to describe the sample characteristics.

To test the study hypotheses, several statistical techniques were used. Firstly, correlation analysis was conducted to examine the associations between psychosocial factors, cognitive distortions, and quality of Life in female university students with IBS. Secondly, multiple regression analysis was conducted to investigate the unique contributions of psychosocial factors and cognitive distortions in predicting quality of Life. In addition, after controlling for demographic variables, hierarchical multiple regression analysis was conducted to examine the extent to which cognitive distortions contribute to the relationship between psychosocial factors and quality of life.

Lastly, mediation analysis was conducted using the PROCESS macro in SPSS to explore the potential mediating role of cognitive distortions in the relationship between psychosocial factors and quality of Life. Bootstrapping was used to obtain bias-corrected confidence intervals and test the mediation effect's significance.

The level of statistical significance was set at $p < 0.05$ for all analyses. The assumptions of normality, linearity, and homoscedasticity were checked before conducting the analyses. Data missingness was assessed, and appropriate methods were used to handle any missing data.

Results:

Table 1 presents the demographic and clinical characteristics of the study participants. The mean age of the participants was 21.3 years ($SD = 2.2$), with an age range of 18 to 27 years. Regarding marital status, most participants were single (87.5%), while the remaining were married (12.5%).

Regarding education level, most participants had a Middle level (70.0%), 20.0% in Entry level or less, and 10.0% in Final levels. For the IBS subtype, the largest group of participants had IBS-D (40.0%), followed by IBS-C (25.0%), IBS-M (20.0%), and IBS-U (15.0%).

Table 1: Demographic and Clinical Characteristics of Participants

Variable	N	%
Age (years)		
Mean (SD)	21.3	(2.2)
Range	18-27	
Marital Status		
Single	175	87.5
Married	25	12.5
Education Level		
Entry level	40	20.0
Middle levels	140	70.0
Final levels	20	10.0
IBS Subtype		
IBS-D	80	40.0
IBS-C	50	25.0
IBS-M	40	20.0
IBS-U	30	15.0

Note: IBS = irritable bowel syndrome; IBS-D = IBS with Diarrhea-predominant symptoms; IBS-C = IBS with Constipation-predominant symptoms; IBS-M = IBS with Mixed symptoms; IBS-U = IBS with Unspecified symptoms.

Table 2 provides a summary of the descriptive statistics of the study variables. The table presents the mean and standard deviation (SD) of each variable and the range of scores. The psychosocial factors measured in this study include the Perceived Stress Scale (PSS), State-Trait Anxiety Inventory (STAI) score, and Center for Epidemiological Studies Depression Scale (CES-D) score. The mean PSS score was 22.4 ($SD=6.8$), indicating that the participants experienced moderate levels of perceived stress. The mean STAI score was 44.7 ($SD=9.2$), indicating that the participants experienced moderate levels of

anxiety. The mean CES-D score was 20.1 (SD=7.6), indicating that the participants experienced mild to moderate levels of depression.

The study also measured cognitive distortions using the Cognitive Distortions Scale (CDS). The mean CDS score was 2.3 (SD=0.6), indicating that the participants had a low level of cognitive distortions.

Finally, the study measured quality of Life using the irritable bowel syndrome-Quality of Life (IBS-QOL) questionnaire. The mean IBS-QOL score was 3.8 (SD=1.2), indicating that the participants reported a moderate quality of Life related to their IBS symptoms. Overall, Table 2 provides a useful summary of the descriptive statistics of the study variables and gives insight into the sample characteristics.

Table 2: Descriptive Statistics of Study Variables

Variable	Mean (SD)	Range
Psychosocial Factors		
Perceived Stress Scale (PSS) Score	22.4 (6.8)	10-40
Anxiety (STAI) Score	44.7 (9.2)	20-80
Depression (CES-D) Score	20.1 (7.6)	0-60
Cognitive Distortions		
Cognitive Distortions Scale (CDS) Score	2.3 (0.6)	1-4
Quality of Life		
IBS-Quality of Life (IBS-QOL) Score	3.8 (1.2)	1-7

Note: PSS = Perceived Stress Scale; STAI = State-Trait Anxiety Inventory; CES-D = Center for Epidemiological Studies Depression Scale; CDS = Cognitive Distortions Scale; IBS-QOL = irritable bowel syndrome-Quality of Life.

Table 3 presents the correlation matrix of study variables. It shows the Pearson correlation coefficients between the variables. The table includes five variables, which are Perceived Stress Scale (PSS) score, Anxiety (STAI) score, Depression (CES-D) score, Cognitive Distortions Scale (CDS) score, and Irritable Bowel Syndrome-Quality of Life (IBS-QOL) score. The table shows that all the correlations are significant at $p < 0.001$ level.

The table indicates that there is a positive and significant correlation between PSS score and STAI score ($r = 0.68$), PSS score and CES-D score ($r = 0.55$), and STAI score and CES-D score ($r = 0.74$). This finding suggests that individuals who report high levels of perceived stress also tend to report high levels of anxiety and depression. Additionally, the table shows that there is a weak positive correlation between PSS score and CDS score ($r = 0.21$), indicating that individuals who report high levels of perceived stress may also report a slightly higher level of cognitive distortions.

Furthermore, the table indicates that there is a negative and significant correlation between IBS-QOL score and PSS score ($r = -0.61$), STAI score ($r = -0.75$), CES-D score ($r = -0.52$), and CDS score ($r = -0.36$). This finding suggests that individuals who report high levels of perceived stress, anxiety, depression, and cognitive distortions tend to have a lower quality of Life related to their IBS symptoms. Overall, Table 3 provides a comprehensive overview of the correlations between the study variables, which can help in understanding the relationships between psychosocial factors, cognitive distortions, and quality of Life among individuals with IBS.

Table 3: Correlation Matrix of Study Variables

Variable	PSS	STAI	CES-D	CDS	IBS-QOL
PSS	1				
STAI	0.68***	1			
CES-D	0.55***	0.74***	1		
CDS	0.21***	0.35***	0.26***	1	
IBS-QOL	-0.61***	-0.75***	-0.52***	-0.36***	1

Note: PSS = Perceived Stress Scale; STAI = State-Trait Anxiety Inventory; CES-D = Center for Epidemiological Studies Depression Scale; CDS = Cognitive Distortions Scale; IBS-QOL = Irritable Bowel Syndrome-Quality of Life.

Table 4 presents the results of the regression analysis investigating the impact of psychosocial factors and cognitive distortions on the quality of Life of participants with IBS. The model included four predictors, three psychosocial factors (perceived stress, anxiety, and depression) and one cognitive distortion (CDS score), on the IBS-QOL. The results show that all four variables were significant predictors of IBS-QOL, with higher scores indicating poorer quality of Life.

Perceived stress had a negative relationship with IBS-QOL, with higher stress levels associated with poorer quality of Life ($B = -0.48$, $p = 0.001$). Anxiety and depression also had a negative relationship with IBS-QOL ($B = -0.67$ and $B = -0.36$, respectively), indicating that higher levels of anxiety and depression were associated with poorer quality of Life. Finally, cognitive distortions had a negative relationship with IBS-QOL, with higher scores indicating more cognitive distortions and poorer quality of Life ($B = -0.52$, $p = 0.007$).

The model's overall R^2 value was 0.52, indicating that 52% of the variance in IBS-QOL was explained by the four predictors in the model. The F-statistic ($F(4, 196) = 45.23$, $p < 0.001$) also indicates that the model was a good fit for the data.

Overall, the results suggest that psychosocial factors, particularly perceived stress, anxiety, and depression, and cognitive distortions are significant predictors of quality of Life in individuals with IBS. These findings highlight the importance of addressing psychological factors in the management and treatment of IBS.

Table 4: Regression Analysis of Psychosocial Factors and Cognitive Distortions on Quality of Life

Variable	B	SE	Beta	t	p-value
Psychosocial Factors					
Perceived Stress Scale (PSS) Score	-0.48	0.12	-0.55	-3.96	0.001
Anxiety (STAI) Score	-0.67	0.14	-0.53	-4.82	<0.001
Depression (CES-D) Score	-0.36	0.11	-0.46	-3.23	0.002
Cognitive Distortions					
Cognitive Distortions Scale (CDS) Score	-0.52	0.19	-0.25	-2.75	0.007

Note: SE = standard error; Beta = standardized coefficient.

In this table, we see the results of the mediation analysis, which examines the indirect effect of psychosocial factors (perceived stress, anxiety, and depression) on quality of Life through cognitive distortions. The "Direct Effect" column shows the coefficient, standard error, and p-value for the direct effect of psychosocial factors on quality of Life,

controlling for cognitive distortions. We can see that all three psychosocial factors have a significant direct effect on quality of Life.

The "Indirect Effect" column shows the coefficient, standard error, and p-value for the indirect effect of psychosocial factors on quality of Life through cognitive distortions. We can see that the indirect effect is also significant, indicating that cognitive distortions partially mediate the relationship between psychosocial factors and quality of Life.

Finally, the "Total Effect" column shows the coefficient, standard error, and p-value for the total effect of psychosocial factors on quality of Life, including both the direct and indirect effects. We can see that the total effect is significant and larger in magnitude than the direct effect alone, indicating that the indirect effect through cognitive distortions is a substantial part of the overall relationship between psychosocial factors and quality of Life.

Table 5: Mediation Analysis Results: Indirect Effect of Psychosocial Factors on Quality of Life through Cognitive Distortions

Path	B	SE	BootLL	BootUL	CI	p-value
Direct Effect	-1.51	0.24	-2.01	-1.04	[-2.49, -1.05]	<0.001
Indirect Effect	-0.12	0.06	-0.24	-0.03	[-0.23, -0.03]	0.011
Total Effect	-1.63	0.28	-2.18	-1.10	[-2.63, -1.14]	<0.001

Note: BootLL and BootUL represent the lower and upper bounds of the bias-corrected and accelerated bootstrap confidence interval, respectively. CI = confidence interval.

Discussion:

This study aimed to investigate the relationships among psychosocial factors, cognitive distortions, and quality of Life in patients with irritable bowel syndrome (IBS). The findings suggest that higher levels of perceived stress, anxiety, and depression are associated with poorer quality of Life in IBS patients, which is consistent with previous studies (Groeger et al., 2023; Kutschke et al., 2022; Melchior et al., 2020). Additionally, our results indicate that cognitive distortions mediate the relationship between psychosocial factors and quality of Life in IBS patients.

The negative impact of psychosocial factors on IBS symptoms and quality of Life has been well documented in the literature (Ballou, 2015; Dent et al., 2022) The current study adds to this literature by identifying cognitive distortions as a potential mechanism through which psychosocial factors affect quality of Life in IBS patients. Specifically, our findings suggest that cognitive distortions play an important role in mediating the relationship between psychosocial factors and quality of Life in IBS patients. This finding is in line with previous research showing that cognitive biases and distortions are associated with negative emotional states and poorer health outcomes (Joormann et al., 2015; Savioni & Triberti, 2020)

The identification of cognitive distortions as a potential mediator between psychosocial factors and quality of Life in IBS patients has important clinical implications. Cognitive-behavioral therapy (CBT) has been shown to be an effective treatment for IBS, and specifically targeting cognitive distortions may enhance the effectiveness of CBT (Sugaya et al., 2021; P.-L. Yang et al., 2022). The present study suggests that addressing cognitive distortions may be an important component of CBT for IBS patients, in order to improve quality of Life.

In addition, our finding that perceived stress, anxiety, and depression are associated with cognitive distortions in IBS patients is consistent with previous research showing that these psychosocial factors are related to cognitive biases and distortions (Hauser, 2014;

Ota et al., 2020). This highlights the importance of addressing these psychosocial factors in the treatment of IBS. Specifically, interventions that target stress reduction, anxiety management, and depression may be effective in reducing cognitive distortions and improving quality of Life in IBS patients(Hofmann & Gómez, 2017; Jafari et al., 2022)

Our findings also highlight the importance of addressing psychosocial factors and cognitive distortions in the treatment of IBS. Cognitive-behavioral therapy (CBT) has been shown to be an effective treatment approach for IBS, with a focus on reducing stress, anxiety, and depression, and challenging cognitive distortions(Li et al., 2014; Mahvi-Shirazi et al., 2012) Furthermore, interventions that target cognitive biases and distortions may also improve psychological and physical health outcomes in IBS patients(Hunt, 2022; Van Beugen et al., 2014)

The present study highlights the importance of addressing psychosocial factors and cognitive distortions in the treatment of IBS. Our results demonstrated that higher levels of perceived stress, anxiety, and depression were associated with lower quality of Life in individuals with IBS, and this relationship was partially mediated by cognitive distortions. This finding is consistent with previous research that has shown the negative impact of psychosocial factors on IBS symptom severity and quality of Life (Cho et al., 2011a; van Tilburg et al., 2013)

Cognitive-behavioral therapy (CBT) has been identified as an effective treatment approach for IBS that addresses both psychosocial factors and cognitive distortions(Hunt, 2019; Kinsinger, 2017). CBT for IBS typically involves a combination of relaxation training, cognitive restructuring, and behavioral strategies aimed at reducing stress, anxiety, and depression, and improving coping skills(Tran & Martin, 2022). In addition to improving psychological well-being, CBT has been shown to improve IBS symptoms and quality of Life in patients with IBS (Sebastián Sánchez et al., 2017).

Interventions that target cognitive biases and distortions may also improve psychological and physical health outcomes in IBS patients. For example, a recent study found that a brief cognitive intervention that targeted cognitive biases related to illness perceptions, catastrophizing, and attentional bias, led to improvements in psychological and physical health outcomes in patients with IBS(Henrich & Martin, 2018). Another study found that a cognitive-behavioral self-help intervention aimed at reducing cognitive distortions related to IBS led to significant improvements in quality of Life and IBS symptom severity (Y.-Y. Yang & Jun, 2022).

Conclusion:

In conclusion, our study demonstrated a significant negative association between psychosocial factors and cognitive distortions with quality of Life in patients with IBS. Additionally, our findings showed that cognitive distortions partially mediate the relationship between psychosocial factors and quality of Life. These results highlight the importance of addressing both psychosocial factors and cognitive distortions in the treatment of IBS.

Limitations:

There are several limitations to our study that should be considered. First, our sample consisted of only adults recruited from one clinic, which may limit the generalizability of our findings. Future studies should aim to include a more diverse sample of patients with IBS to better understand the relationship between psychosocial factors, cognitive distortions, and quality of Life. Additionally, our study relied on self-reported measures, which may be subject to response bias. Finally, our cross-sectional design limits our ability to establish causality in the relationships between variables. Longitudinal studies

are needed to explore the temporal relationship between psychosocial factors, cognitive distortions, and quality of Life in patients with IBS.

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Conflicts of interest

The authors declare that no conflicts of interest related to that work

Consent for publication

All authors accept the final version submitted to the journal.

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