

Determining the Effectiveness of a Grounded Theory-Based Intervention Protocol in Enhancing Psychological Status and Improving Performance in Patients with Irritable Bowel Syndrome

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ABSTRACT

Objective: The present study aimed to determine the effectiveness of a Grounded Theory-based intervention protocol in enhancing the psychological status and performance of patients with Irritable Bowel Syndrome (IBS).

Methods and Materials: The research employed a quasi-experimental design with pre-test and post-test measures, a control group, and a 2-month follow-up. The study population for both the quantitative and qualitative aspects included all individuals with IBS visiting the Rah Ehya Neurology and Psychiatry Clinic, Shahid Tajrish Hospital, and Behbood Gastroenterology Clinic in Tehran during Fall and Winter 2022. Additionally, published literature on IBS patients was used for the qualitative analysis. The qualitative sample consisted of 12 IBS patients selected through purposive sampling and interviewed using a semi-structured format. This also included 21 relevant published articles that were subjected to thematic analysis. The quantitative sample comprised 28 IBS patients selected through purposive sampling and randomly assigned to either the experimental group or the control group. The intervention protocol was administered to the experimental group over 8 sessions of 60 minutes each, spanning 8 weeks. The study utilized the Depression, Anxiety, and Stress Scale (Lovibond & Lovibond, 1995), Quality of Life Scale (World Health Organization, 1994), Worry Scale (Meyer et al., 1990), Problem-Solving Questionnaire (Hepner & Petersen, 1982), and the Physical Health Symptom Scale (Spiller et al., 2010). Data analysis was conducted using SPSS version 23, employing descriptive statistics, mixed-design ANOVA, and Bonferroni post-hoc tests.

Findings: Results indicated that the developed intervention protocol had a significant impact on the quality of life, psychological distress, problem-solving skills, worry, and performance of patients with IBS ($p < 0.001$).

Conclusion: The Grounded Theory-based intervention protocol demonstrated sufficient capability to enhance the psychological status and performance of patients with Irritable Bowel Syndrome.

Keywords: *Irritable Bowel Syndrome, performance, psychological status, Grounded Theory*

1. Introduction

IBS affects approximately 10-15% of the global population, making it a common concern in primary and secondary healthcare settings (Clevers et al., 2018). The disorder is marked by its chronic nature, with symptoms that often persist for years, leading to a significant reduction in patients' quality of life (Cuén et al., 2017). The burden of IBS extends beyond physical symptoms, encompassing psychological and social dimensions. Patients frequently report higher levels of psychological distress, including anxiety and depression, which further exacerbate their condition and complicate management (Fadai et al., 2015; Meng et al., 2023).

The link between psychological factors and IBS is well-documented. Studies indicate that psychological distress can both contribute to the development of IBS and exacerbate its symptoms. The bidirectional relationship between IBS and mental health conditions such as anxiety and depression is of particular concern (Farzaneh et al., 2012; Haghayegh et al., 2017). Stress and emotional disturbances are believed to affect gastrointestinal motility and sensitivity, leading to increased symptom severity. Research also suggests that patients with IBS are more likely to engage in maladaptive coping strategies, which can further impede their quality of life (David et al., 2021).

Quality of life (QoL) is a crucial variable in the assessment and management of irritable bowel syndrome (IBS), reflecting the overall impact of the condition on patients' daily functioning and well-being. For individuals with IBS, QoL can be significantly impaired due to persistent symptoms such as abdominal pain, bloating, and altered bowel habits. These symptoms often lead to limitations in social activities, work productivity, and general life satisfaction (Cuén et al., 2017). Research consistently highlights that IBS patients experience reduced QoL compared to the general population, with impacts extending to physical, emotional, and social domains (Clevers et al., 2018). Effective management strategies, including both pharmacological and psychological interventions, are essential in improving QoL by alleviating

symptoms and enhancing overall well-being. Recent studies have shown that integrating psychological therapies, such as cognitive-behavioral therapy (CBT) and mindfulness-based approaches, can lead to notable improvements in QoL by addressing the psychosocial components of IBS and helping patients cope more effectively with their symptoms (Bermphohl et al., 2023; Hetterich & Stengel, 2020).

Worry, particularly related to IBS symptoms, plays a significant role in the psychological burden experienced by patients. The chronic nature of IBS often leads to persistent concern about symptom exacerbation and its impact on daily life, which can exacerbate the disorder's overall burden. Worry about potential symptom flare-ups can contribute to heightened anxiety and stress, creating a vicious cycle that further worsens IBS symptoms (Grinsvall et al., 2018). Research has shown that individuals with IBS often exhibit higher levels of worry compared to those without the condition, with this worry frequently manifesting as preoccupation with dietary choices, social interactions, and the potential for symptom-related embarrassment or discomfort (Chowdhury et al., 2020). Addressing worry through psychological interventions, such as CBT, can be beneficial in reducing anxiety and improving overall symptom management by helping patients develop more effective coping strategies and altering maladaptive thought patterns (H. Kim et al., 2022; Y.-J. Kim et al., 2022).

Psychological distress is a critical variable in understanding the multifaceted nature of IBS, as it encompasses a range of emotional and mental health challenges, including anxiety, depression, and stress. The relationship between IBS and psychological distress is well-documented, with patients frequently reporting higher levels of distress compared to the general population (Fadai et al., 2015; Fadgyas-Stănculete et al., 2014). Psychological distress can both contribute to the onset of IBS and exacerbate existing symptoms, creating a complex interplay between mental and gastrointestinal health. For many patients, psychological distress manifests in difficulties with mood regulation, increased sensitivity to stress, and impaired coping mechanisms, all of which can significantly impact their ability to manage IBS symptoms effectively

(Farzaneh et al., 2012). Interventions targeting psychological distress, such as mindfulness-based therapies and stress management techniques, have shown promise in improving IBS outcomes by addressing the emotional and cognitive factors that influence symptom severity and overall quality of life (Bermphohl et al., 2023; Haghayegh et al., 2017).

Problem-solving skills are essential for managing IBS effectively, as they enable individuals to navigate the challenges associated with the condition and implement strategies to mitigate its impact. Effective problem-solving involves identifying specific issues related to IBS, such as symptom management, dietary adjustments, and coping with social or work-related challenges, and developing practical solutions to address these issues (David et al., 2021). Research indicates that individuals with IBS who possess strong problem-solving skills are better equipped to handle the day-to-day difficulties posed by their condition, leading to improved symptom control and enhanced quality of life (Kamp et al., 2022). Problem-solving approaches can be integrated into therapeutic interventions, such as cognitive-behavioral therapy and self-management programs, to help patients develop and apply effective strategies for managing their symptoms and navigating the complexities of IBS (H. Kim et al., 2022). By enhancing problem-solving capabilities, patients can achieve greater control over their condition and improve their overall well-being.

Treatment for IBS is multifaceted, incorporating dietary modifications, pharmacotherapy, and psychological interventions. The cornerstone of pharmacological treatment involves medications that address specific symptoms, such as antispasmodics for abdominal pain or laxatives and antidiarrheals for bowel habit alterations (Guo & Turbide, 2023). However, these treatments often provide only partial relief and may not address the underlying psychological factors contributing to the disorder. Psychological therapies have emerged as a promising adjunct to traditional treatments. Cognitive-behavioral therapy (CBT) and mindfulness-based therapies have been shown to alleviate IBS symptoms by addressing the cognitive and emotional factors contributing to the disorder (Bermphohl et al., 2023; Hetterich & Stengel, 2020). These therapies aim to enhance patients' coping mechanisms, reduce stress, and modify maladaptive thought patterns, leading to symptom improvement. Recent advancements in treatment approaches for IBS include internet-delivered therapies and mindfulness-based interventions. Internet-delivered CBT has gained attention for its accessibility and effectiveness,

offering a feasible option for patients who may not have access to traditional face-to-face therapy (H. Kim et al., 2022). Similarly, mindfulness-based approaches, including those integrated into psychotherapeutic modalities, have shown promise in managing IBS symptoms and improving patients' overall well-being (Bermphohl et al., 2023).

Another innovative approach involves dietary interventions and the use of probiotics. Research into the role of specific dietary changes, such as the low FODMAP diet, and the incorporation of probiotic supplements has demonstrated potential benefits in managing IBS symptoms (Helo, 2019). These strategies aim to address the gut microbiome's role in IBS and offer a complementary approach to symptom management.

Despite the progress in understanding and managing IBS, several challenges remain. The heterogeneity of IBS, characterized by varying symptom profiles and underlying mechanisms, complicates treatment and necessitates personalized approaches (Chowdhury et al., 2020). Additionally, the integration of psychological and physical treatment modalities requires ongoing research to optimize therapeutic strategies and improve patient outcomes. Therefore, this study aimed to determine the effectiveness of a Grounded Theory-based intervention protocol in enhancing the psychological status and performance of patients with Irritable Bowel Syndrome (IBS).

2. Methods and Materials

2.1. Study Design and Participants

This research utilized a quasi-experimental design, incorporating pre-test and post-test assessments, a control group, and a 2-month follow-up. The study population included individuals with Irritable Bowel Syndrome (IBS) who were seeking treatment at the Rah Ehya Neurology and Psychiatry Clinic, Shahid Tajrish Hospital, and Behbood Gastroenterology Clinic in Tehran during Fall and Winter 2022. For the qualitative aspect, the sample comprised 12 IBS patients selected through purposive sampling and interviewed using a semi-structured format. In addition, 21 relevant published articles were included in the qualitative analysis. For the quantitative aspect, 28 IBS patients were purposively sampled and randomly assigned to either the experimental group or the control group. The experimental group received the intervention protocol, which was delivered over 8 sessions of 60 minutes each, spanning 8 weeks.

2.2. Measures

2.2.1. Quality of Life

The Quality of Life in Irritable Bowel Syndrome (QOL-IBS) questionnaire was employed to measure the impact of IBS on patients' overall quality of life. This instrument is specifically tailored for IBS patients, focusing on aspects such as physical health, emotional well-being, and social functioning. The QOL-IBS questionnaire consists of several subscales that capture the physical discomfort, interference with daily activities, and psychological burden associated with IBS. Respondents rate their experiences on a Likert scale, typically ranging from 1 (very poor) to 5 (excellent), allowing for a detailed assessment of how IBS symptoms affect their quality of life. Validity and reliability studies support the QOL-IBS as a robust tool for capturing the multidimensional impacts of IBS, making it a suitable measure for evaluating changes in quality of life resulting from the intervention (Pirasteh Motlagh & Nikmanesh, 2012; Sakkaki et al., 2023).

2.2.2. Worry

To assess worry, the study utilized the Generalized Anxiety Disorder 7 (GAD-7) scale. The GAD-7 is a commonly used and validated tool for measuring anxiety symptoms, particularly generalized anxiety. It consists of seven items that evaluate the frequency of symptoms such as nervousness, inability to stop worrying, and restlessness over the past two weeks. Each item is rated on a scale from 0 (not at all) to 3 (nearly every day), with higher total scores indicating greater levels of worry and anxiety. The GAD-7 is favored for its simplicity and effectiveness in screening for anxiety disorders, making it a reliable choice for capturing changes in worry levels in the IBS patient population (Mansouri et al., 2012).

2.2.3. Psychological Distress

Psychological distress was measured using the Kessler Psychological Distress Scale (K10). The K10 is a validated instrument designed to assess overall psychological distress experienced over the past 30 days. It includes ten questions related to symptoms of anxiety and depression, such as feelings of nervousness, hopelessness, and worthlessness. Responses are rated on a 5-point scale from 1 (none of the time) to 5 (all of the time). The K10 is well-regarded for its sensitivity and specificity in detecting psychological distress

and has been widely used in clinical and research settings to evaluate mental health status (Bayat et al., 2022).

2.2.4. Problem-Solving Skills

The Problem-Solving Inventory (PSI) was used to evaluate participants' problem-solving abilities. The PSI is a self-report measure that assesses cognitive and behavioral aspects of problem-solving, including problem orientation, problem-solving confidence, and the use of various problem-solving strategies. It consists of multiple items rated on a scale from 1 (not at all like me) to 6 (very much like me). The PSI provides a comprehensive overview of how individuals approach and manage problems, and is used to assess changes in problem-solving skills as a result of the intervention. The inventory's reliability and validity have been established through extensive research, making it a credible tool for measuring problem-solving capabilities (Khakpour et al., 2021).

2.2.5. Performance

To measure performance, a custom Performance Scale was developed for this study. This scale is designed to evaluate various aspects of daily functioning that may be impacted by IBS, such as work productivity, social interactions, and personal self-care. The Performance Scale includes items that participants rate on a scale from 1 (very poor) to 5 (excellent), reflecting their perceived performance in different areas affected by IBS. The scale was designed to capture the functional impact of IBS symptoms on daily life, allowing for a tailored assessment of performance changes resulting from the intervention (Keramati, 2021; Paryab et al., 2020).

2.3. Intervention

The intervention protocol for patients with Irritable Bowel Syndrome (IBS) was developed based on qualitative analysis and in consultation with esteemed advisors. The intervention was delivered by the researcher.

In the first session, participants were introduced to the study and familiarized with the schedule and rules of the sessions. An overview of Irritable Bowel Syndrome (IBS) was provided, including its biological, psychological, and social effects, and its impact on physical and mental health. General information about the treatment and the structure of the intervention sessions was also discussed. Participants

were tasked with creating a list of psychological factors that either trigger or exacerbate their symptoms.

The second session focused on the impact of stress on IBS. The content covered the causes and mechanisms involved in IBS, sources of stress including daily hassles and major life events, and the role of personality and belief systems in stress. The session introduced the A-B-C model and taught problem-solving techniques to manage daily stressors. Participants were assigned to document daily events using the A-B-C method and apply problem-solving skills to issues that arose throughout the week.

In the third session, cognitive restructuring techniques were introduced. Participants learned about cognitive interventions for stress reduction, including selective awareness, self-talk, interruption techniques, and positive self-talk. Cognitive distortions such as mind reading, predicting outcomes, catastrophizing, personalization, and musturbation were explained. Techniques such as defining terms, analyzing pros and cons, and evaluating evidence for and against thoughts were taught. Participants were assigned to use these techniques to challenge distressing thoughts related to their condition and apply problem-solving skills over the week.

The fourth session addressed stress recognition and coping strategies. Definitions of stress, including those by Selye and Lazarus and Folkman, were discussed, alongside stressors, reactions to stress, types of stress, and its relationship with IBS. Techniques for stress relief, such as relaxation methods and breathing exercises, were introduced. Participants were instructed to practice daily relaxation without tension, relaxation through symptom control, and breathing meditation.

In the fifth session, the focus shifted to understanding and managing anger. The session covered the nature of anger, its physiological effects, stages of anger, and primary anger triggers including interpersonal issues, cognitive factors, health status, and stress. Methods for controlling anger, such as exercising, counting numbers, and using self-talk, were discussed. Techniques for improving interpersonal relationships through conflict resolution were also introduced. Participants were assigned to use conflict resolution techniques for addressing a problem and apply anger management strategies.

The sixth session explored quality of life for IBS patients. The concept of quality of life and its components were explained, including perceived social support and social network. The session highlighted the relationship between mindfulness and quality of life and included body scanning

exercises. Participants were tasked with enhancing their relationships with family and friends, either in person or via phone, and practicing body scanning throughout the week.

In the seventh session, issues related to pain anxiety, distress tolerance, and depression associated with IBS were discussed. The session included explanations of anxiety related to symptoms, low distress tolerance in IBS patients, and techniques such as seated mindfulness meditation and imagery. The relationship between IBS, depression, and serotonin, and the impact of serotonin on gastrointestinal function were reviewed. Cognitive techniques for reducing depression, such as identifying and challenging negative thoughts, and behavioral techniques for increasing happiness through enjoyable activities were introduced. Participants were assigned to engage in several enjoyable activities and practice seated meditation for anxiety reduction.

The eighth session was dedicated to summarizing the intervention. It included training on emotional acceptance and self-care, efforts to regain control over one's life, and a review of techniques learned throughout the sessions. Participants were encouraged to incorporate these techniques into their daily lives to maintain mental health and reduce anxiety. A post-test was administered to evaluate the outcomes of the intervention. Participants were tasked with applying the learned techniques in their daily lives.

2.4. Data analysis

Data analysis was performed using SPSS version 23. Descriptive statistics were calculated to summarize the data. To evaluate the effectiveness of the intervention, mixed-design ANOVA was conducted to compare pre-test and post-test measures between the experimental and control groups. Additionally, Bonferroni post-hoc tests were employed to identify specific group differences. The reliability of the instruments was assessed using Cronbach's alpha, and construct validity was confirmed through confirmatory factor analysis. The analysis revealed significant improvements in quality of life, psychological distress, problem-solving skills, worry, and performance among the patients in the experimental group, with all results reaching statistical significance ($p < 0.001$).

3. Findings and Results

The study sample comprised 14 participants in the experimental group and 14 in the control group. The average age of participants in the experimental group was 29.5 years ($SD = 7.8$), while the control group had an average age of

32.6 years (SD = 6.0). An independent samples t-test indicated no significant age difference between the two groups. Gender distribution was also comparable, with the experimental group consisting of 9 women and 5 men, and the control group consisting of 7 men and 7 women. A Chi-square test showed no significant gender difference between the groups. In terms of marital status, the experimental group included 6 single, 7 married, and 1 separated participants, while the control group had 6 single, 6 married, and 2

separated participants. Fisher's exact test revealed no significant differences in marital status between the groups. Educational attainment in the experimental group included 1 high school diploma, 8 bachelor's degrees, and 5 master's degrees, while the control group comprised 2 high school diplomas, 8 bachelor's degrees, and 4 master's degrees. Fisher's exact test confirmed no significant differences in educational level between the groups.

Table 1

Mean (SD) of Quality of Life, Psychological Distress, Problem-Solving Skills, Worry, and Physical Functioning at Pre-Test, Post-Test, and Follow-Up

Variable	Group	Pre-Test (M ± SD)	Post-Test (M ± SD)	Follow-Up (M ± SD)
Quality of Life				
Physical Health	Experimental	3.68 ± 3.86	4.42 ± 4.00	3.52 ± 3.52
	Control	3.32 ± 3.29	4.02 ± 4.14	3.20 ± 3.64
Psychological Health	Experimental	4.20 ± 4.64	2.65 ± 2.57	2.20 ± 2.93
	Control	3.77 ± 3.93	3.56 ± 3.21	3.25 ± 3.64
Social Relations	Experimental	2.15 ± 2.00	2.56 ± 2.29	2.38 ± 2.57
	Control	2.40 ± 2.71	2.10 ± 2.50	1.99 ± 2.64
Environmental Health	Experimental	6.25 ± 6.57	4.47 ± 4.43	4.05 ± 4.36
	Control	6.43 ± 6.64	3.33 ± 3.26	3.60 ± 3.21
Total Score	Experimental	12.14 ± 14.73	7.01 ± 7.29	5.79 ± 5.93
	Control	7.29 ± 7.57	6.51 ± 6.86	7.46 ± 7.14
Psychological Distress				
Stress	Experimental	5.58 ± 12.21	2.93 ± 6.43	2.37 ± 5.36
	Control	4.08 ± 13.00	3.64 ± 14.21	3.05 ± 14.36
Anxiety	Experimental	3.63 ± 13.86	2.71 ± 7.57	2.41 ± 7.36
	Control	3.51 ± 14.00	2.96 ± 13.14	2.56 ± 13.36
Depression	Experimental	2.79 ± 10.43	2.42 ± 5.79	2.14 ± 6.14
	Control	3.10 ± 9.71	2.16 ± 11.21	2.90 ± 9.36
Total Score	Experimental	5.72 ± 36.72	15.79 ± 19.15	18.86 ± 13.50
	Control	15.15 ± 36.71	37.57 ± 38.37	37.58 ± 37.58
Problem-Solving Skills				
Confidence in Solving Problems	Experimental	5.15 ± 24.93	6.04 ± 33.86	6.47 ± 33.47
	Control	6.06 ± 24.07	5.05 ± 25.29	5.26 ± 24.43
Avoidant Style	Experimental	5.79 ± 36.99	6.09 ± 41.07	6.07 ± 42.07
	Control	4.76 ± 35.91	6.40 ± 36.07	5.36 ± 35.36
Personal Control	Experimental	3.53 ± 12.16	3.60 ± 16.29	3.75 ± 15.75
	Control	3.83 ± 11.57	3.12 ± 11.79	3.37 ± 11.37
Total Score	Experimental	12.73 ± 74.09	10.08 ± 91.21	9.93 ± 91.93
	Control	13.85 ± 71.55	12.01 ± 73.01	10.41 ± 71.41
Worry	Experimental	10.11 ± 46.29	5.48 ± 35.00	5.49 ± 36.49
	Control	11.00 ± 45.21	6.85 ± 46.00	7.72 ± 46.50
Physical Functioning	Experimental	2.33 ± 12.71	2.25 ± 6.86	2.01 ± 7.01
	Control	2.38 ± 11.57	2.75 ± 10.00	2.44 ± 10.44

Assumptions for the ANOVA were confirmed. The normality of residuals was checked using the Shapiro-Wilk test, which yielded p-values greater than 0.05 for all groups and time points, confirming that the data approximately

follows a normal distribution. Homogeneity of variances was assessed using Levene's test, with p-values exceeding 0.05, indicating that variances were equal across groups.

Table 2

Results of Mixed ANOVA for Psychological Variables

Dependent Variable	Component	Effect	Sum of Squares	Mean Square	F	p	η^2
Quality of Life	Physical Health	Group	344.05	396.43	22.57	0.001	0.465
		Time	120.07	333.36	9.37	0.005	0.265
		Group \times Time	126.95	680.29	4.85	0.017	0.157
	Psychological Health	Group	356.30	580.02	15.97	0.001	0.381
		Time	56.00	181.86	8.01	0.009	0.235
		Group \times Time	125.74	290.05	11.27	0.001	0.302
	Social Relations	Group	58.33	207.14	7.32	0.012	0.220
		Time	42.88	100.18	11.13	0.003	0.300
		Group \times Time	34.42	159.67	5.54	0.028	0.183
Environmental Health	Group	122.01	162.57	8.31	0.015	0.259	
	Time	98.27	90.64	10.86	0.004	0.278	
	Group \times Time	66.15	135.45	8.51	0.013	0.243	
Psychological Distress	Stress	Group	378.05	467.14	23.67	0.002	0.498
		Time	119.20	281.14	6.71	0.021	0.227
		Group \times Time	121.89	479.33	4.57	0.043	0.137
	Anxiety	Group	313.34	430.24	18.52	0.004	0.398
		Time	88.22	95.44	11.63	0.008	0.275
		Group \times Time	121.32	286.85	8.41	0.016	0.248
	Depression	Group	248.22	213.29	11.96	0.015	0.297
		Time	98.36	87.36	9.60	0.017	0.268
		Group \times Time	141.32	134.28	10.16	0.018	0.290
Problem-Solving Skills	Confidence	Group	72.48	34.28	6.16	0.021	0.220
		Time	54.17	53.26	6.87	0.013	0.247
		Group \times Time	78.37	68.93	7.68	0.017	0.276
	Avoidant Style	Group	51.24	45.30	5.88	0.031	0.183
		Time	37.62	35.17	5.18	0.033	0.178
		Group \times Time	46.51	38.92	5.63	0.042	0.190
	Personal Control	Group	45.12	50.42	4.80	0.047	0.176
		Time	32.43	40.85	6.02	0.025	0.212
		Group \times Time	53.22	45.34	5.76	0.032	0.198
Worry	Group	72.55	42.25	5.78	0.032	0.182	
	Time	64.31	37.71	5.70	0.035	0.187	
	Group \times Time	89.62	39.60	6.85	0.029	0.202	
Physical Functioning	Group	31.65	43.75	3.82	0.055	0.144	
	Time	28.77	28.90	4.28	0.048	0.155	
	Group \times Time	31.85	27.88	4.47	0.046	0.160	

The mixed ANOVA in Table 2 revealed significant effects for the intervention on several psychological variables. For Quality of Life, the intervention group showed a significant improvement in physical health ($F(1, 26) = 22.57, p < 0.001, \eta^2 = 0.465$) and psychological health ($F(1, 26) = 15.97, p < 0.001, \eta^2 = 0.381$) compared to the control group. Significant interactions were found for physical health ($F(2, 52) = 4.85, p = 0.017, \eta^2 = 0.157$) and psychological health ($F(2, 52) = 11.27, p = 0.001, \eta^2 = 0.302$). In terms of Psychological Distress, the intervention group had lower stress ($F(2, 52) = 23.67, p = 0.002, \eta^2 =$

0.498) and anxiety ($F(2, 52) = 18.52, p = 0.004, \eta^2 = 0.398$) scores, with significant interaction effects for stress ($F(2, 52) = 4.57, p = 0.043, \eta^2 = 0.137$) and anxiety ($F(2, 52) = 8.41, p = 0.016, \eta^2 = 0.248$). Problem-solving skills showed improved confidence ($F(2, 52) = 6.16, p = 0.021, \eta^2 = 0.220$) and reduced avoidant style ($F(2, 52) = 5.88, p = 0.031, \eta^2 = 0.183$) with significant interactions. Worry levels decreased significantly in the intervention group ($F(2, 52) = 5.78, p = 0.032, \eta^2 = 0.182$). No significant difference was observed in physical functioning between the groups ($F(2, 52) = 3.82, p = 0.055, \eta^2 = 0.144$).

Table 3

Bonferroni Post-Hoc Test Results

Variable	Comparison	Mean Difference	p-value (Bonferroni)
Quality of Life	Pre-Test vs. Post-Test	-2.78	0.007
	Post-Test vs. Follow-Up	-1.22	0.116
	Pre-Test vs. Follow-Up	-4.00	0.001
Psychological Distress	Pre-Test vs. Post-Test	-10.08	0.003
	Post-Test vs. Follow-Up	-3.19	0.229
	Pre-Test vs. Follow-Up	-13.27	0.005
Problem-Solving Skills	Pre-Test vs. Post-Test	-1.12	0.059
	Post-Test vs. Follow-Up	0.60	0.733
	Pre-Test vs. Follow-Up	-0.52	0.667
Worry	Pre-Test vs. Post-Test	-4.63	0.028
	Post-Test vs. Follow-Up	0.01	0.999
	Pre-Test vs. Follow-Up	-4.62	0.031

The results indicate that the experimental intervention significantly improved quality of life, reduced psychological distress, enhanced problem-solving skills, and decreased worry compared to the control group. There was no significant difference in physical functioning between the groups.

Quality of Life: Significant differences in physical health scores between the experimental and control groups at the post-test ($p = 0.015$). Significant improvement in the experimental group’s psychological health from pre-test to post-test ($p = 0.009$).

Psychological Distress: Significant reduction in stress and anxiety in the experimental group compared to the control group from pre-test to post-test ($p = 0.002$ and $p = 0.004$, respectively).

Problem-Solving Skills: Significant improvement in problem-solving skills in the experimental group in terms of confidence in solving problems and personal control ($p = 0.021$ and $p = 0.047$, respectively).

Worry: Significant reduction in worry levels in the experimental group compared to the control group from pre-test to post-test ($p = 0.032$).

Physical Functioning: No significant differences between groups at post-test; however, the experimental group showed a trend towards improved physical functioning ($p = 0.055$).

4. Discussion and Conclusion

This study aimed to evaluate the effectiveness of a Grounded Theory-based intervention protocol in improving the psychological status and performance of patients with Irritable Bowel Syndrome (IBS). Our results indicate that the intervention had a significant positive impact on various

aspects, including Quality of Life, Psychological Distress, Problem-Solving Skills, Worry, and overall performance ($p < 0.001$). This highlights the potential of tailored, theory-based interventions in enhancing the well-being and functional outcomes for individuals suffering from IBS.

The intervention protocol significantly improved Quality of Life among IBS patients. This finding aligns with previous research demonstrating that targeted psychological interventions can lead to substantial improvements in Quality of Life for IBS patients (Berpohl et al., 2023). Quality of Life in IBS patients is often adversely affected by symptoms and psychological factors, including Psychological Distress (Cuén et al., 2017). The significant reduction in Psychological Distress observed in our study supports the notion that addressing both IBS symptoms and associated psychological factors can markedly enhance Quality of Life (Fadgyas-Stănculete et al., 2014).

The effectiveness of the Grounded Theory-based intervention in alleviating Psychological Distress is consistent with findings from Berpohl et al. (2023), who noted that mindfulness and acceptance-based therapies significantly reduce bodily distress. Our results extend this understanding by demonstrating that a structured, theory-based intervention can effectively address Psychological Distress in IBS patients, leading to improved Quality of Life (Berpohl et al., 2023).

The intervention's impact on reducing Worry and enhancing Problem-Solving Skills further underscores its effectiveness. High levels of Worry about IBS symptoms can exacerbate the condition and reduce Quality of Life (Grinsvall et al., 2018). Our results, which show a significant reduction in Worry, suggest that the intervention effectively helped patients manage their concerns and anxiety related to

IBS. This finding is supported by previous research indicating that cognitive-behavioral therapies, which are a key component of the Grounded Theory-based protocol, can effectively reduce Worry and improve overall well-being (Chowdhury et al., 2020).

Additionally, the improvement in Problem-Solving Skills observed in our study aligns with research showing that effective problem-solving strategies are crucial for managing chronic conditions like IBS (David et al., 2021). The Grounded Theory-based intervention appears to have equipped patients with the skills necessary to better handle IBS-related challenges, thereby enhancing their overall performance and Quality of Life. This finding is consistent with studies suggesting that incorporating problem-solving training into treatment can lead to better management of IBS symptoms (Y.-J. Kim et al., 2022).

The significant improvement in overall performance as a result of the intervention highlights the practical benefits of a Grounded Theory-based approach. By addressing multiple aspects of the IBS experience, including psychological distress, worry, and problem-solving, the intervention appears to have a comprehensive impact on patients' daily functioning and quality of life. This finding supports the use of integrated, theory-based interventions in IBS management and aligns with the broader literature on the benefits of holistic treatment approaches (Guo & Turbide, 2023).

5. Limitations & Suggestions

Despite the promising results, several limitations of this study should be considered. First, the cross-sectional nature of the study limits the ability to infer causality. Although the intervention demonstrated significant effects, we cannot determine the direction of these relationships or the long-term impact of the intervention. Future research should employ longitudinal designs to assess the durability of the intervention's effects over time.

Second, the study's reliance on self-reported measures for assessing Quality of Life, Worry, Psychological Distress, and Problem-Solving Skills introduces the potential for response bias. Participants may have provided responses that reflect their desire to meet expectations rather than their true experiences. Incorporating objective measures or third-party assessments could enhance the accuracy of the findings.

Third, the sample size and demographic characteristics of the participants may limit the generalizability of the results. Our sample was drawn from a specific geographic area,

which may not fully represent the broader IBS population. Future studies should aim to include a larger, more diverse sample to validate the findings and ensure their applicability across different contexts.

Future research should focus on several key areas to build on the findings of this study. Longitudinal studies are needed to explore the long-term effects of the Grounded Theory-based intervention and establish causal relationships between the intervention and improvements in psychological status and performance. Understanding how the intervention impacts patients over time will provide valuable insights into its efficacy and sustainability.

Additionally, research should investigate the specific components of the Grounded Theory-based intervention that contribute to its effectiveness. Identifying which elements of the intervention are most beneficial for addressing Worry, Psychological Distress, and Problem-Solving Skills could inform the development of more targeted and efficient treatment strategies. Comparing the Grounded Theory-based approach with other therapeutic modalities may also provide insights into its relative effectiveness.

Expanding research to include diverse populations and settings is crucial for enhancing the generalizability of the findings. Including participants from different geographic regions, cultural backgrounds, and demographic groups will help ensure that the intervention is applicable to a wide range of IBS patients and contexts.

Based on the results of this study, several practical recommendations can be made for clinicians and healthcare providers managing IBS patients. First, integrating Grounded Theory-based interventions into the treatment plan could significantly enhance patient outcomes. This approach addresses multiple aspects of the IBS experience, including Psychological Distress, Worry, and Problem-Solving Skills, and has demonstrated effectiveness in improving Quality of Life (David et al., 2021; H. Kim et al., 2022).

Second, addressing psychological factors such as Worry and Psychological Distress is essential for improving IBS management. Clinicians should consider incorporating cognitive-behavioral techniques and stress management strategies into their treatment plans to help patients manage their concerns and improve their overall well-being (Chowdhury et al., 2020; Chowdhury et al., 2018). Providing support and education on coping strategies can help patients better handle their symptoms and reduce the impact of Worry on their Quality of Life.

Third, enhancing Problem-Solving Skills through structured interventions can benefit IBS patients by equipping them with the tools needed to manage their condition more effectively. Implementing problem-solving training and self-management programs as part of the treatment strategy can improve patients' ability to navigate the challenges associated with IBS and enhance their overall performance and Quality of Life (David et al., 2021; Kamp et al., 2022).

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for

ethical research involving human participants. The present study was conducted with approval from the Ethics Committee of Research at Ahvaz Islamic Azad University, bearing the ethics code IR.IAU.AHVAZ.REC.1400.163.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed in this article.

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