

Coping Strategies and Irritable Bowel Syndrome: A Systematic Review

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ABSTRACT

Background & Aims: Irritable bowel syndrome (IBS) is associated with a high prevalence of psychiatric comorbidities. While psychosocial determinants were intently studied, coping strategies with stress used by IBS patients were never comprehensively reviewed. Therefore, this systematic review aimed to summarize the coping strategies used by IBS patients and to identify which tools are frequently used to measure coping strategies.

Methods: According to PRISMA guidelines, we searched for articles indexed in PubMed, EBSCOhost, EMBASE and Cochrane Library. The search terms included: (coping OR coping strategies OR coping mechanism) AND (irritable bowel syndrome OR IBS). The initial search identified 756 articles. After applying all filters (human filters, excluding conference abstracts and conference papers), 96 studies remained. Finally, a total of 21 articles were included in this systematic review.

Results: Twenty-one articles using fifteen coping instruments and six measures of quality of life were found. One was interventional, one longitudinal, and the rest were cross-sectional studies. One study was qualitative, while the rest used quantitative measures. Emotion-focused coping was associated with worse psychological outcomes, while the effect of problem-focused coping was not regularly associated with better psychological outcomes. Catastrophizing was negatively associated with health-related quality of life. Psychological distress (anxiety, depression) was significantly related to the impairment of health-related quality of life.

Conclusion: Patients with IBS cope in different ways when confronted with health and daily-life stressors. The maladaptive strategy of coping is associated with poor health-related quality of life and psychiatric comorbidities but methodological problems limit conclusions regarding the strength and nature of this association. Future research needs to focus on which strategies are most effective at reducing psychological distress in IBS patients.

Key words: Irritable bowel syndrome – IBS; coping strategies – coping mechanisms – systematic review.

Abbreviations: CISS: coping inventory for stressful situations; CSI: coping strategy indicator; HC: healthy controls; HRQOL: health related quality of life; IBD: inflammatory bowel disease; IBS: irritable bowel syndrome; PFC: problem focused coping; QOL: quality of life; WCQ: ways of coping questionnaire.

INTRODUCTION

Irritable bowel syndrome (IBS) is a chronic functional gastrointestinal disorder that affects 9-23% of the general population, with a significant impact on the quality of life (QOL) and health care costs [1-3]. Genetic and epigenetic factors, psychological stress, adverse life events, gastrointestinal infections, food hypersensitivity,

immune dysregulation, dysbiotic gut microbiota, and the brain-gut axis seem to be implicated in the pathogenesis of IBS [4-6]. Quality of life has also been shown to correlate with physical and psychological impairments, healthcare resource utilization, and response to treatment.

Notwithstanding a significant amount of available pharmacological and non-pharmacological treatment options, IBS patients' management is challenging since a tailored approach is required, frequently with unsatisfactory results [4-6]. There is an increasing interest in the role and importance of coping strategies in health, illness, and healthcare practice. The importance of coping is reflected in its incorporation into models of stress and illness.

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Coping in IBS is defined as the cognitive and behavioral efforts that IBS patients use in the situations they consider to be stressful. Coping is influenced by early life events, biological, psychological, and sociocultural factors. High levels of pain intensity and pain catastrophizing, impairments in functionality, anxiety, or depression act as factors that impede adaptation to symptoms [7].

Problem-focused coping strategies (seeking information, planning, and setting goals, and assertive confrontation) are intended to modify the stressful situation. Emotion-focused coping strategies (seeking emotional support, relaxation or meditation, and wishful thinking) deals with the emotional distress associated with the situation. Avoidance coping includes psychological (e.g., cognitive distancing) and behavioral (e.g., removing self from the situation) strategies to detach from a stressful situation. A precise classification of coping strategies, such as problem-solving versus emotion-focused, or active versus avoidant, has a narrow perspective in the field of research. For this reason, the objective quantification of the coping strategies progressed to a complex taxonomy [8, 9].

Some of the coping scales are measuring dispositional coping styles, and other scales state measure coping styles. When conducting a study, researchers typically modify the time of reference when measuring coping responses to be able to distinguish dispositional coping styles from situational coping strategies. Two of the scales coping inventory for stressful situations (CISS) and the COPE inventory, were constructed to assess specific coping strategies in addition to dispositional coping styles. When adopting a dispositional perspective, researchers try to see how people respond to stressful events in general. When adopting a situational perspective, researchers ask about how people respond to a specific stressful event. The COPE inventory separated coping into emotion-focused, problem-focused, and maladaptive strategies.

Coping strategy indicator (CSI) and the ways of coping questionnaire (WCQ) assess individuals' situational coping strategies to respond to a specific stressful event. These measures provide a complement to dispositional scales. The WCQ is the most frequently used situational measure in coping research because it evaluates a broader range of coping strategies.

Generally, task-oriented coping is associated with greater wellbeing and positive adjustment to stress, while emotion-oriented and avoidance-oriented coping tend to be associated with more significant distress and maladaptive adjustment.

Studies from the past three decades demonstrate that coping strategies can influence both illness-related behaviors and the outcome of IBS; less effective forms of coping with IBS symptoms are correlated with an adverse health outcome [8, 9]. While psychosocial determinants were intently studied, coping strategies used by IBS patients were never comprehensively reviewed. Therefore, this systematic review aimed to summarize the coping strategies used by IBS patients and identify which tools are used most frequently to measure coping strategies.

Moreover, the relationship between coping strategies used in IBS and health related QOL (HRQOL) is not well understood. We systematically reviewed studies addressing the association between coping and HRQOL. Studies were

included if coping styles and HRQOL were measured with a validated scale, and the association between them was assessed quantitatively. Variability in coping behavior and in coping efficacy or skill may contribute to differences in QOL. Reliable data regarding mediational mechanisms and relevant moderating factors must be obtained before implementing interventions to help patients cope with IBS symptoms. We were particularly interested in whether coping strategies would moderate the association between IBS symptoms and QOL.

METHODS

This systematic review was written according to the updated guideline for the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 [10]. We searched for articles indexed in PubMed, EBSCOhost, EMBASE and Cochrane Library from inception till April 2021. The search terms included: (coping OR coping strategies OR coping mechanism) AND (irritable bowel syndrome OR IBS) AND (quality of life OR QOL). The review included all quantitative studies measuring coping strategies in adults using validated scales. Exclusion criteria were case reports, articles without abstracts, conference presentations, letters to the editor, studies written in languages other than English, and editorials (Fig.1).

Titles and abstracts were screened for eligibility independently by two investigators (L.D. and S.L.P.), followed by evaluating full texts of the articles that fulfilled the inclusion and exclusion criteria. We also performed a manual search of the reference lists of pertinent articles, in order to minimize the results bias and identify any missed publications that were relevant to our review topic. In case an article was considered eligible for inclusion in our review, but the full text was not retrieved, an email was sent to the authors in order to request the full text. Eligible studies were assessed, and data extraction performed by the same reviewers, and all the discrepancies in extracted data were resolved by mutual consensus. Extracted data were the authors' names, year of publication, country or study population, sample size, study design, the coping strategy used in IBS.

Quality assessment

Two investigators (S.L.P. and L.D.) used the Newcastle-Ottawa Scale and the National Heart, Lung and Blood Institute (NHLBI) to assess the quality of included studies and evaluate the bias risk. A total of four quality assessment tools were used. According to the study design, observational studies were evaluated using two Newcastle-Ottawa Scale quality assessment tools for case-control and cross-sectional studies. Interventional studies were evaluated using the NHLBI tool for Quality Assessment of Controlled Intervention Studies. Moreover, the NHLBI tool for Quality Assessment of Before-After Studies with no control group has used to determine the quality of before-after studies without a control group. Overall, twenty one separate assessment forms were conducted, out of which 13 were for cross-sectional studies, four of them addressed the quality of case-control studies, three analyzed interventional studies and one a before-after type of study.

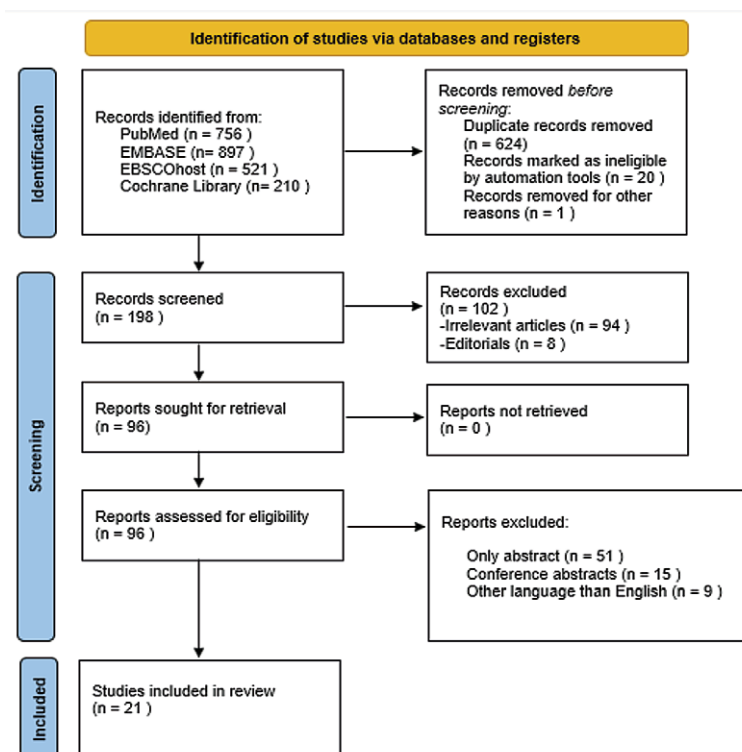


Fig. 1. PRISMA flow diagram for study selection

Regarding the Newcastle-Ottawa Scale quality assessment tools, evaluated studies were rated based on the number of stars they obtained, as well as the selection, comparability, the assessment of the outcome, and statistical methods used in the study. Studies were graded with stars, receiving a number of stars from 0-9, with studies obtaining seven or more stars being considered as “Good.” For the NHLBI quality assessment tool, interventional studies and before-after studies with no control group were further assessed, and the evaluation criteria were answered either by “Yes,” “No,” “CD” (cannot determine), or “NR” (not reported) upon completion of the evaluation. Subsequently, studies were given a final evaluation, being graded as “poor,” “fair,” or “good” according to the assessment findings. Any discrepancies regarding the quality assessment between the two evaluators were further solved by discussion. The rating of the included studies did not affect their eligibility in our systematic review.

RESULTS

The initial search identified 756 articles in PubMed, 897 articles in EMBASE, 521 articles in EBSCOhost and 210 articles in Cochrane Library. After using human filters in the searched electronic databases, the search was left with 198 articles. After applying all filters (human filters, while excluding conference abstracts and conference papers), 96 studies remained. Fig. 1 outlines the search strategy using the PRISMA flow diagram. Finally, a total of 21 articles were included in this systematic review as outlined in Table I.

Studies' Characteristics

The characteristics of the included studies are presented in Table I. Articles were published between 1998 and 2019. Most studies were cross-sectional (n=20), with one study

using a prospective research design and focusing on a sample with a mean age <50 years. Most participants were women. Fifteen studies examined small sample sizes between 9 and 100 participants; two were between 101 and 200, three were between 200 and 350, and one had >1000 participants.

Coping Scales

We identified 15 different measurement tools to assess coping in IBS. Studies of how patients cope with IBS symptoms have typically employed coping instruments intended for use in the chronic pain population or measures of general coping skills. As shown in Table I, there is significant variability in the tools used to assess coping during IBS and the number and types of subscales included in each measure. Three studies used Brief-COPE, and one study used COPE. Together with the WCQ, they are well-validated for use in the general population. Four studies used different scales for assessing coping with pain: Pain Coping Style Questionnaire, Pain Coping, and Cognition List, West Haven Yale Multidimensional Pain Inventory, Pain Response Inventory. Other scales used were: Jalowiec coping scale (also evaluate the perceived efficiency for each coping strategy), Sense of Coherence scale (reflects a person's resources and dispositional orientation), Coping Resources Inventory (useful in predicting the emotional distress generated by illness), Coping Strategies Questionnaire, Stress Coping Inventory (evaluate participants' appraised resources to deal with stress), Brief Scale for Coping Profile, Pressure Management Indicator (coping strategies of problem focus).

One study proposed a new coping strategy specific for Chinese culture: Symptoms-Related Social Hypervigilance (SSH) [27]. SSH is characterized by heightened social consciousness, increased symptoms-hiding behavior, and pursuit of total symptoms control or elimination.

Table I. Summaries of the studies evaluating coping strategies in IBS.

Author (year)	Study design and participant characteristics	Coping measures/other outcome measures	Impact on QOL	Findings
Grodzinsky et al. [11]; (2015)	Case-control study; 140 IBS pts, male/female: 24/116, mean age: 46.7 yrs. 213 HC male/female: 40/173 mean age: 51.4 yrs.	SOC, SASB	Not evaluated	IBS pts. significantly more negative self-esteem ($p<0.001$), lower scores for positive self-esteem ($p<0.001$), and lower sense of coherence ($p<0.001$)
Wilpart et al. [12]; (2017)	Cross-sectional study; 216 IBS pts; female/male: 151/65 mean age: 40.4 yrs.	CRI, GSRS, VSI, somatization subscale SCL-90R, HADS	Not evaluated	Quality of coping resources correlates with the intensity of gastro-intestinal and extraintestinal symptomatology with levels of anxiety and depressive symptoms as mediators
Jones et al. [13]; (2006)	Comparative analysis 74 IBS pts; male/female: 11/63, mean age: 35 yrs. 48 IBD pts. male/female: 20/28, mean age: 39 yrs. 55 HC male/female: 16/39, mean age: 40 yrs.	WCQ, ISE, SCL-90 R, IBS- QOL, IBD-QOL, TAS, SAS	QOL scores were similar between pts with IBS and IBD	Planful solving problems prevailed as coping strategy in HC. Passive coping strategies prevailed in IBS and IBD pts. No differences between IBS and IBD patients. Progression of the disease determines the use of more coping items.
Fadgyas Stanculete et al. [14, 15]; (2015)	Cross-sectional study 70 IBS pts. male/female: 21/49, mean age: 48.02 yrs. 55 HC male/female: 23/32, mean age: 46.12 yrs.	B-COPE, DAS, SF-36	QOL mediated by irrational beliefs and AOC	PFC and AOC are enforced more by IBS pts together with levels of dysfunctional attitudes are predictors of IBS
Torkzadeh et al. [16]; (2019)	Cross-sectional study 95 IBS pts male/female: 33/62, mean age: 37.1 yrs.	JCS, IBS-QOL, HADS	Palliative and fatalistic coping strategies were negatively correlated with QOL	Fatalistic coping strategies and psychological dysfunction are predictors of IBS severity
Popa et al. [17]; (2018)	Cross-sectional study; 39 IBS pts, male/female: 16/23 mean age: 31 yrs. 37 HC male/female: 13/24 mean age: 37 yrs.	PMI	Lower scores in the IBS group compared to HCs for all the socio-professional pressure effects scales, including mental wellbeing, physical wellbeing, and occupational satisfaction	Significant link between occupational stress and IBS
Pinto et al. [18]; (2000)	30 IBS patients 30 HC	PSLES, MCS	Not evaluated	IBS pts. and definite depression: predominantly negative coping styles as compared to IBS patients without anxiety or depression.
Roohafza et al. [19]; (2016)	Cross-sectional study 4,763 subjects (21.5% with IBS) female: male: 1.	SLE, MSPSS, B-COPE	Not evaluated	IBS patients have less social support, less-adapted coping strategies and perceive life stressors as more intense and frequent.
Rutter and Rutter [20]; (2002)	209 IBS pts.	COPE, HADS, IPQ, self-evaluation of QOL and health-satisfaction	Reporting of serious consequences was associated with lower QOL lower satisfaction with health, and with higher scores for anxiety and depression. Weaker control beliefs were related to lower QOL, lower satisfaction with health, and higher depression scores.	Coping mediated the link between representation and outcome. When predicting depression, coping strategies predicted independently of representation dimensions.
Knowles et al. [21]; (2017)	131 IBS pts. male/female: 29/102, mean age 37.85 yrs.	IBS-SSS, B-COPE, VSI, BIPQ, DASS, IBS QOL	QOL correlates negatively with the severity of the disease	Maladaptive coping and visceral sensitivity mediate the relationships between illness perceptions, and psychological distress and IBS-QoL.
Crane and Martin [22]; (2004)	33 IBD pts male/female:12/11 mean age: 42.63 yrs 25 IBS pts male/female: 3/22 38.12 yrs.	VPMI, HADS	Not evaluated	In IBS pts. parental reinforcement of illness behavior and low mood associated with an increased use of behavioral passive coping strategies total passive coping score was significantly associated with both anxiety and depression

Table I (continued)

Sugawara et al. [23]. (2017)	58 IBS pts. male/female: 19/39 mean age: 49.9 yrs.	BSCP, CES-D	Not evaluated	Active solution" coping behaviors were significantly associated with somatic symptoms. "Avoidance and suppression" coping behaviors were also significantly associated with the CES-D total score, depressed affect, somatic symptoms, and (lack of) positive affect.
Sirois and Molnar [24]; (2014)	564 HC mean age: 31.1 yrs. 316 pts.: 79 CFS pts, mean age: 32.8 yrs. 85 IBS pts. mean age 37.5 70 FM/arthritis pts. mean age: 38.9 yrs.	B-COPE; RAPS	Not evaluated	Maladaptive perfectionism was significantly correlated with maladaptive coping in the CFS, IBS, and FM/arthritis groups
Seres et al. [25]; (2008)	88 IBS pts. mean age: 41.59 yrs. 66 UC pts mean age: 38.89 yrs.	IBS-QOL, pain severity scale of WHYMPI, SCL-90-R, CSQ	Variance of QOL IBS: catastrophization (15%), psychological distress (8%), pain severity (5%). UC pain severity 21%, psychological distress 8%, catastrophization 3%	IBS group with significantly higher levels of psychological distress, pain severity and maladaptive pain coping strategies- (catastrophization), and lower QOL than UC
Frølund Pedersen et al. [26]; (2016)	Randomized controlled trial 120 pts FSS 71 pts CFS 78 pts FM, 43 IBS, 62 for non-cardiac chest pain, 22 hyperventilation syndromes, 89 tension-type headache mean age: 35.8 yrs.	TCI-R, CSQ, SF-36	High neuroticism among patients with FSS was indirectly associated with poor physical health through symptom catastrophizing	Higher levels of neuroticism than healthy controls, cognitive-behavioural therapy with positive impact on symptoms catastrophization.
Ng and Chow [27]; (2012)	Cross-sectional 309 IBS pts. male/female :1/2.2 mean age: 36.8 yrs.	SSH, IBS SSS; catastrophizing subscale CSQ, physical discomforts subscale BMSWB, HADS, SF-12	Catastrophization was found to show partial mediating effects between symptoms severity and illness outcome in terms of HRQOL	SSH: strong predictor of "proactive" illness behavior
van Tilburg et al. [28]; (2015)	189 IBD pts. girls: 48.7% mean age:13.76 yrs. 200 AP pts: 30.5% IBS Girls:72.5% Mean age: 11.20 yrs.	PRI, IBDS, gastrointestinal symptom severity subscale CSI, FDI, CDI	Not evaluated	AP pts scored higher on all forms of coping, both adaptive and maladaptive, except social support and massage/guard GI symptom severity and catastrophizing were significantly positively associated with depression while seeking social support was negatively associated with depression symptom severity and rest were positively associated with disability while catastrophizing showed a trend towards significance
Longstreth et al.[29]; (1998)	19 female subjects molested in the childhood almost 50% IBS mean age: 42.3 16 weekly group psychotherapy sessions	SCL-90-R	Not evaluated	Group psychotherapy by social workers for women victims may have long-lasting psychological and somatic symptom benefits.
Zhao et al. [30]; (2019)	57 IBS-D pts. male/female:14/43 mean age: 33.75 yrs. 30 HC male/female:7/23 mean age: 35.30 yrs. CBT+E	ATQ, DAS, PCS, IBS-SSS	Improved by combination therapy	IBS-D patients have significant negative automatic thinking Compared with the HC group, IBS-D patients chose more often catastrophization and prayer ($P < 0.01$), and fewer other coping styles, such as diversion of attention combination therapy useful for correcting the negative automatic thinking, forming appropriate coping styles, and effectively improving symptoms.

Table I (continued)

van der Veek PP et al. [31]; (2008)	101 IBS pts. 73% female Mean age : 42 yrs. 40 HC 63% female Mean age : 39.7 yrs.	SCL-90, MMPI, CSFBD, SAS, PCCL, SF-36	Significantly worse in IBS patients	Pain coping in IBS pts. significantly worse psychological parameters did not predict the occurrence of visceral hypersensitivity
Peter J et al. [32]; (2018)	38 IBS pts. Male/patients: 11/27 Mean age: 44yrs	Gut-directed Hypnotherapy	Improved after hypnotherapy	Microbial alpha diversity remained the same before and after hypnotherapy. Important reduction in the severity of symptoms and psychological distress was recorded, together with an overall greater state of well-being

AOC: avoidant oriented coping; AP: abdominal pain; ATQ: Automatic Thoughts Questionnaire; B-COPE: Brief Coping Inventory; BIPQ: Brief Illness Perceptions Questionnaire; BMSWBI: Body-Mind-Spirit Well-Being Inventory; BSCP: Brief Scale for Coping Profile; CBT+E cognitive behavioral therapy combined with exercise; CES-D Center for Epidemiologic Studies Depression Scale; CDI: Children Depression Inventory; CFS: chronic fatigue syndrome; CRI: Coping Resources Inventory; CSFBD: Cognitive Scale for Functional Bowel Disorders; CSI: Children's Somatization Inventory; CSQ: Coping Strategies Questionnaire; DAS: Dysfunctional Attitudes Scale; DASS: Depression, Anxiety and Stress Scale; FDI: Functional Disability Inventory; FM: fibromyalgia; FSS: functional somatic syndromes; GSRS: Gastrointestinal Symptoms Rating Scale; HADS: Hospital Anxiety and Depression Scale; HC: healthy controls; IBD-QOL: Inflammatory Bowel Disorders-Quality of Life scale; IBDS: Inflammatory Bowel Disease Symptom Questionnaire; IBS-D Irritable Bowel syndrome diarrhea predominant; IBS-QOL: Irritable Bowel Syndrome-Quality of Life scale; IBS-SSS: IBS Severity Scoring System; ISE: Interpersonal Support Evaluation; JCS: Jalowiec coping scale; MMPI: Minnesota Multiphasic Personality Inventory; MSPSS: Multidimensional Scale of Perceived Social Support; PCCL: Pain Coping and Cognition List; PCS: Pain Coping Style Questionnaire; PFC: problem-focused coping; PMI: Pressure Management Indicator; PRI: Pain Response Inventory; PSLES: Presumptive Stressful Life Events Scale; RAPS: Revised Almost Perfect Scale; SAS: Somatosensory Amplification Scale; SASB: Structural Analysis of Social Behavior; SCL-90R: Symptom-Check List 90 Revised; SF-12: 12-item Short Form Health Survey scale; SF-36: Short-Form Health Survey; SLE: stressful life event scale; SOC: Sense of Coherence; SSH: Symptoms-Related Social Hypervigilance scale; TAS: Toronto Alexithymia Scale; TCI-R Temperament and Character Inventory Revised; UC: ulcerative colitis; VSI: Visceral Sensitivity Index; WCQ: Ways of Coping Questionnaire; WHYMPI: West Haven Yale Multidimensional Pain Inventory.

Other than SSH, there are no coping measures explicitly developed for IBS. Even though there is a large variety of instruments assessing coping, no study directly compared coping instruments.

Quality of Life Measurements

A variety of instruments were used to assess QoL (Table I). The IBS-QOL was used in four studies. It is a 34-item instrument developed and validated for measurement of HRQOL in non-subtyped IBS patients. SF-36 was used as a measure of QOL in three studies and one study used the SF-12. Both versions provide subscale scores for eight health concepts as well as summary scores for physical and mental health. One study used a self-assessment of QOL of life and another study used Pressure Management Indicator as a measure for mental wellbeing and for physical wellbeing.

Specifically, coping has been found to correlate with disease severity, depression, anxiety, QOL, and other closely related psychosocial constructs (self-esteem and sense of coherence) in IBS patients, although these data are not always consistent. Increasing condition severity was accompanied by endorsement of a greater number of coping items. The severity of IBS symptomatology was significantly correlated with fatalistic coping strategies and psychological dysfunction [16] and negatively correlated with optimistic and confrontive coping strategies. Coping strategies were associated with gastrointestinal, extraintestinal symptom severity and were fully mediated by levels of anxiety and depressive symptoms [12].

IBS Patients versus Healthy Controls

Patients with IBS reported higher depressive symptoms and psychological distress associated with disengagement and emotional coping styles than healthy controls (HC). Also, they

showed more negative self-esteem and lower sense of coherence [11]. As shown in Table I, coping approaches were utilized differently by the IBS patients and HC. The dominant coping strategy for healthy controls was planful solving problems and emotion-oriented coping and passive coping strategies were the dominant coping strategies for IBS patients [13, 14, 24, 30]. Only two studies showed that IBS patients used more problem-focused coping (PFC) strategies than HC [15, 23]. Patients with IBS have less social support, less-adapted coping strategies, and perceived life stressors as more intense and frequent [19]. A study performed by van der Veek et al. [31] analyzed the relation between visceral hypersensitivity and psychological factors in IBS. The results showed that pain coping and QOL were significantly worse in IBS patients compared with healthy controls [31].

Emotion versus Problem Focused Coping in IBS

Even though PFC were generally reported as very helpful and associated with more positive outcomes in IBS patients, IBS patients reported using fewer positive strategies and relied less on PFC than EFC in most of the studies included in the analysis. We found two studies where PFC was associated with worse outcomes. The studies used the B-COPE and BSCP, but the sample sizes of this studies were small (under 100 patients) [15, 23]. Problem-focused coping was significantly associated with somatic symptoms. Some of these strategies were represented by the use of social support, effectively planning activities, frequently attend healthcare services to increase a sense of control communicating with others.

Emotion- focused coping strategies such as distraction and suppression behaviors were significantly associated with somatic symptoms, and depressed affect [12, 19, 20, 22, 30, 31]. This type of coping behaviors was associated with increased self-blame and poor psychological outcome.

Avoidance-oriented Coping

The studies included in the analysis showed that IBS patients that used more avoidance and passive resignation coping reported more depressive symptoms [22, 23, 25, 28]. These types of strategies are aimed at diverting people from the stressor and/or its related emotions. Maladaptive coping strategies have been positively linked, for both men and women, with negative health variables such as anxiety, depression. The psychological distress, as measured mainly on the Hospital Anxiety and Depression Scale, was positively correlated with increased use of maladaptive coping strategies (passivity, escape-avoidance, and fatalism) in stressful situations.

Coping Strategies

Patients with IBS have QOL scores significantly lower than those of HC. Five studies in total examined QOL in relation to coping strategies [14, 16, 25, 26, 27], all of which demonstrated a statistically significant relationship between coping strategies and participants' QOL. The complex relation between coping strategies, irrational beliefs, HRQOL, and IBS symptomatology was analyzed in a cross-sectional study. The impact of IBS symptoms on HRQOL distress (both the physical and mental component) was mediated by irrational beliefs and avoidant oriented coping [14]. Also, another study showed that significant predictors of IBS diagnosis were found to be PFC, avoidant-focused coping, and levels of dysfunctional attitudes [15].

Recently, catastrophizing has been reframed as an unsuccessful problem-solving strategy characterized by a negative amplification interpretation of an expected or actual experience of symptoms. It consists of an overemphasis of the potential negative aspects of symptoms, a feeling of helplessness in coping with symptoms, and an inability to disengage from thoughts about symptoms in anticipating, during, or after experiencing pain or other symptoms. Four studies evaluated the use of catastrophizing in IBS patients [25-28].

Ng et al. [27] showed that catastrophizing partially mediated effects between symptoms severity and illness outcome in terms of HRQOL. Also, Frølund Pedersen et al. [26] demonstrated that high neuroticism among patients with FSS was indirectly associated with poor physical health through symptom catastrophizing. Similarly, Seres et al. [25] showed that in IBS patients, the variance of QOL was explained by catastrophizing (15%), psychological distress (8%), pain severity (5%). Also, maladaptive coping and visceral sensitivity mediate the relationships between illness perceptions, and psychological distress and IBS-QOL [25].

Across the 21 studies included in the review, four cross-sectional studies examined coping strategies as a potential mediator of the association between disease severity or psychological distress and QOL of IBS patients [14, 20, 21, 27].

Fadgyas Stanculete et al. [14] demonstrated that irrational beliefs and avoidant-oriented coping mediate the impact of IBS symptoms on HRQOL distress, helping to explain how maladaptive coping might influence QOL.

Rutter et al. [20] found that coping (behavioral disengagement and restrained coping) mediated the link between illness representation and outcome (perceived QOL, satisfaction with their health, and anxiety and depression).

Knowles et al. [21] showed that the severity of IBS indirectly impacted psychological distress and IBS-QOL, and the indirect influence occurred via illness perceptions and consequent coping strategies, and visceral sensitivity. In the study conducted by Ng et al. [27], symptoms catastrophizing was found to show partial mediating effects between symptoms severity and illness outcome in terms of HRQOL measured by SF-12.

None of the reviewed studies examined coping strategies as a potential moderator of the association between disease severity or psychological distress and QOL.

Interventions Aiming to Modify Coping Strategies

Studies that investigate the efficacy of psychotherapeutic interventions aiming at improving coping styles in those with IBS are limited. A survey by Longstreth et al. [29] found that, even after 16 weeks of group psychotherapy sessions held once a week, molested women continued to present in ambulatory because of physical symptoms with the same frequency as before, even if the somatization score decreased. Almost 50% of the participants suffered from IBS. The authors were not keen on generalizing their findings, as the number of subjects was small.

Zhao et al. [30] explored the outcome of cognitive-behavioral therapy together with exercise on coping styles and cognitive bias in patients with IBS primarily manifesting with diarrhea and concluded that this approach could remove the unfortunate coping mechanisms and perfect the cognitive prejudice. They recommended the endorsement of the combination therapy for IBS and psychosomatic disorders.

Gut-directed hypnotherapy successfully reduced symptoms of IBS and psychological burden after ten weekly group sessions, as observed by Peter et al. [32]. Regarding the intestinal microbiota composition, only small effects were noted, suggesting that hypnosis acts via central nervous impact and other elements regulating the brain-gut axis that does not depend on microbiota composition.

Studies' Quality Assessment

The quality assessment of included studies is outlined in Supplementary File. Overall, nine studies were rated as "good" [14-16, 19, 20, 25, 26, 31, 32], nine studies were considered "fair" [11, 12, 17, 21, 23, 27, 28, 29, 30], while three were labeled as "poor" [13, 22, 24]. Moreover, all the studies addressed the coping mechanisms of patients diagnosed with IBS, while several studies also analyzed the impact of coping mechanisms and disease on the individual's QOL [13-17, 20, 21, 25-27, 30, 31].

Most cross-sectional studies included in the quality assessment using the Newcastle-Ottawa Scale had proper sample representativeness, except for two [22, 28], and sample size, except for two [12, 22]. However, most studies did not sufficiently analyze the relationship between respondents and non-respondents or provided insufficient information regarding the percentage of participants that did not complete the study. All studies considered had proper statistical methods, comparability and adequately assessed the outcome using questionnaires.

When it comes to case-control studies assessed using the Newcastle-Ottawa Scale tools, almost half of them had

an adequate definition [11, 31] and a proper selection of controls [24, 31], while most of them elected representative cases for their study, properly defined their controls and used the same method of ascertainment for cases and controls, except for a couple of studies [11, 13, 31]. Nevertheless, none of the included case-control studies revealed the non-response rate.

The quality of controlled interventional studies was assessed using the NHLBI Quality Assessment Tool, revealing that only one study was rated as “good” with adequate randomization of participants [26]. Moreover, the other two studies were rated as “fair,” providing little or no information regarding the randomization of participants in their studies [29, 30]. Our systematic review also included a before-after study with no control group, whose quality was assessed using the corresponding NHLBI Quality Assessment tool for Before-After Studies with no Control Group, being rated as “good”.

DISCUSSIONS

In this systematic review, a comprehensive search was done through multiple electronic databases for published evidence regarding coping strategies in patients with IBS. In IBS, both biological and psychosocial factors contribute to the development and severity of GI symptoms. The relevance of coping in IBS is illustrated by the annual increase of publications evaluating coping strategies over the last decade. Understanding coping mechanisms is crucial in choosing the best approach to build an effective doctor-patient relationship [31]. The need to monitor the patient's distress and coping mechanisms occur because patients who use maladaptive coping styles are more likely to perceive their doctors as disinterested and less supportive [33].

Most studies report that coping is associated with specific psychological outcomes, with a stronger negative effect for avoidance-oriented than PFC. Among adults, active problem-oriented and avoidant coping strategies were reported more often than emotion-focused coping strategies. Furthermore, most negative life events seem to elicit active and emotion-oriented coping strategies. However, more personal, and environmental resources may rely more on approach and active problem-oriented coping and less on avoidance emotional coping [34-36].

Avoiding strategies were found to be related to a higher level of psychological distress and more inadequate adjustment to IBS. Nevertheless, the use of active coping strategies was also related to the development of depressive symptoms. This may indicate that patients who use more coping strategies (both adaptive and maladaptive) may have more stress that elicits coping strategies. Previous research has demonstrated that coping strategies influence patients' compliance to therapy and the disease outcomes by lifestyle changes. Also, coping with stressors generated by symptoms and limitations imposed by disease has been determined to be partially influenced by the age of participants. Decreased HRQOL of IBS patients could be a consequence of different factors such as impact in daily life activities and work productivity, given the consequences of the disease on social and interpersonal functioning (body image satisfaction, intimacy, sexual satisfaction) [37-41].

The relation between maladaptive coping mechanisms (mainly catastrophizing and decreased self-perceived ability to alleviate symptoms) and psychiatric comorbidities has been established. High levels of catastrophizing influences neurotransmitters' activities that act on CNS structures involved in processes of attention, emotion, and motor activity in response to pain. Many studies have documented the association between depression and coping behaviors in IBS (mainly passive behavioral coping and avoidance strategies). Irrational beliefs and avoidance-oriented coping strategies mediate the relationship between coping styles and depression. The less adaptive coping strategy has been associated with more unsatisfactory outcomes.

Regarding the coping strategies identified in this review, reduced QOL was associated with greater catastrophizing and greater use of emotion-focused coping, and palliative coping.

Not all patients with IBS need psychotherapy; only IBS patients with psychiatric comorbidities or refractory symptoms after medication should be considered for this type of intervention [4]. Because coping could be modified over time, strengthening coping resources or modifying them using psychotherapy could improve patients' symptoms. Thus, attention must be paid to training healthcare professionals in providing appropriate support and referrals for their patients. Furthermore, clinicians should identify stressors and help patients with coping techniques that target their particular concerns; gastroenterologists need to be aware of possible high psychological distress, psychiatric comorbidities, and additional counseling needs of their patients.

We identified only four studies that examined the role of coping strategies as an intermediate variable of the association between *ca* IBS symptoms and QOL, all cross-sectional. These findings suggest that while coping strategies could play an important role in mediating the association between IBS symptoms and QOL, prospective research is needed to clarify the nature of these relationships.

It is essential to have a greater understanding of coping in IBS for planning more effective strategies for managing the symptoms and improving the QOL. The summary of the coping research findings could provide future research ideas and formulate psychological intervention guidelines.

Our findings are consistent with the extensive chronic illness literature, demonstrating a solid interrelationship between coping strategies, cognitive/emotional representations of illness, presence of psychological impairments, and QOL in IBS patients.

The quality assessment of the included studies revealed that many of the studies were regarded as “fair” (nine studies), with eight studies being considered “good” and the remaining three being evaluated as “poor.” Moreover, the results and interpretations of the studies labeled as “poor” and “fair” should be interpreted with caution due to the increased risk of bias and other possible methodological flaws. When it comes to assessing interventional studies using the NHLBI tools, only one study was regarded as “good” [26] due to the adequate randomization of patients.

Several limitations were present in many of the studies included in this review: small-to-modest sample sizes and questionable generalizability of many cohorts (e.g., referral

centers, a small percentage of lower educated patients, predominant female sample). Definitions of coping and the theoretical frameworks that support operational coping models are heterogeneous or absent in some studies.

Variability in research design and coping instruments used resulted in an inconsistency in the IBS-coping literature. Many studies were cross-sectional and used mixed IBS groups at different stages of their illness. Due to the observational design in many of the included studies in our systematic review, we cannot confirm or negate a causal association between the assessed parameters. In the case of cross-sectional studies, the temporal relationship cannot be proven. At the same time, case-control studies can be prone to selection bias.

Furthermore, several studies did not correct for confounding factors, possibly leading to bias risk.

Although we conducted a comprehensive search strategy including several electronic databases, it is possible that articles that fit the aim of our review but were not indexed in the assessed databases were not included in our qualitative assessment. Further research on coping with IBS should be longitudinal in design and explore the dynamic of coping strategies.

Future studies need to study which coping strategies are most effective at reducing distress in the IBS patient. Cross-sectional studies have questionable utility; they are helpful only when directly comparing coping scales in predictive capability. More longitudinal and interventional studies are required, along with an IBS-specific coping tool. A comprehensive understanding of the determinants of coping can be of pragmatical value in identifying elements for therapeutic interventions aimed at stimulating more adaptive coping efforts. It also would be appropriate to extend this research by exploring if varying levels of resilience generate differences in coping patterns in people with IBS.

CONCLUSIONS

IBS patients utilize a wide variety of coping strategies, and the types of strategies used may have implications for their psychological well-being. Our results suggest that among patients with IBS, the use of avoidance-oriented coping and catastrophizing predict a poor health outcome. The results regarding active coping strategies are inconclusive. As the biopsychosocial approach to managing IBS symptoms evolves, untangling the role of coping strategies will become more relevant.

Conflicts of interest: None to declare.

Authors' contribution: L.D. conceived the paper, collected data and drafted the manuscript. S.L.P. suggested the methodology. G.C. made substantial contributions to the methodology of the manuscript. M.F.S., M.B., S.L.P. searched the literature, analyzed the results and revised the manuscript. A.R.B. and G.C. critically revised the manuscript. All the authors approved the final version of the manuscript.

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