



Positive and negative affect mediate the bidirectional relationship between emotional processing and symptom severity and impact in irritable bowel syndrome

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ABSTRACT

Introduction: Individuals with IBS report higher levels of psychological distress compared to healthy controls. Distress has been associated with emotional processing difficulties but studies have not explored how the relationship between distress and emotional processing affects IBS. There is little research on the role of positive affect (PA) in IBS.

Aims: (a) If difficulties in self-reported emotional processing are associated with affect and IBS measures (i.e., symptom severity, interference in life roles) (b1) If affect mediates the relationship between emotional processing and IBS measures (b2) Alternative model: if affect mediates the relationship between IBS and emotional processing (c) If PA moderates the relationship between distress and IBS.

Methods: Participants with a confirmed diagnosis of IBS ($n = 558$) completed a questionnaire including measures of emotional processing (i.e., unhelpful beliefs about negative emotions, impoverished emotional experience), distress, PA, and IBS symptoms/interference. Mediation and moderation analyses were conducted with Maximum Likelihood Estimation.

Results: Distress and PA mediated or partly mediated the relationship between unhelpful beliefs about negative emotions/impoverished emotional experience and both IBS measures. The alternative models were also valid, suggesting a two-way relationship between emotional processing and IBS through affect. PA did not moderate the relationship between distress and IBS.

Conclusion: Future interventions in IBS may benefit from not only targeting the management of physical symptoms and their daily impact but also aspects related to the experience of both negative and positive affect, and the acceptance and expression of negative emotions. Longitudinal studies are needed to confirm causal relationships within the explored models.

1. Introduction

Irritable Bowel Syndrome (IBS) is a chronic gastrointestinal disorder affecting between 10 and 25% of individuals in community samples and approximately 11% of the global population [1,2]. IBS is not explained by an organic abnormality and it is defined as a functional disorder (i.e. disorder of the gut–brain interaction), diagnosed through symptom-based criteria [3–5].

It is well established that individuals with IBS report higher levels of anxiety and depression compared to healthy controls [6,7] and preliminary findings support the role of anxiety and depression in the

development of IBS [8]. Furthermore, anxiety and depression have been associated with difficulties in emotional processing [9–11]. Initial research has found that 1) IBS patients report poorer levels of emotional processing compared to healthy controls [12] and 2) difficulty with identifying and describing feelings has been positively associated with IBS symptom severity [13] and poorer treatment outcome [14]. Interestingly, although previous studies have suggested an effect of psychological distress on IBS symptom severity and quality of life through pain catastrophizing [15,16], research has not specifically explored how difficulties in processing emotions relate to affect and IBS severity.

Earlier definitions of emotional processing refer to the process

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through which emotional disturbances are absorbed (i.e. distressed emotional reactions are changed to non-distressed reactions), allowing other experiences and behaviours to continue with minimal disruption [17,18]. This initial concept has evolved to incorporate the underlying psychological, psycho-physiological and psycho-neurological mechanisms that either promote or impede this change or “absorption”. For example, cognitions can be conceived as potential inhibitors of emotional processing, including unhelpful thought patterns, negative appraisals of an event, cognitive biases and catastrophic misinterpretations [10,18,19].

Identifying and measuring the different psychological mechanisms underlying emotional processing through self-reported measures can be problematic as it requires some level of awareness of the diminished emotional experience and expression [20]. Research in conditions such as chronic fatigue syndrome (CFS) and depression has focused specifically on the beliefs about the unacceptability of experiencing negative emotions and beliefs about the adverse consequences of expressing them [21–24]. This cognitive component of emotional processing allows access to conscious beliefs that disrupt both the experience and expression of emotions.

Initial explorations of beliefs about emotions in IBS have shown that people with IBS report more negative beliefs about expressing their emotions than both healthy controls and patients with inflammatory bowel disease (IBD) [25,26]. The relationship between these beliefs and quality of life was serially mediated by emotional suppression and then distress, suggesting that emotional suppression further increases the negative emotions being suppressed in the first place [27]. In line with these findings, written emotional expression has been found to improve IBS symptom severity [28].

Research in other functional disorders such as fibromyalgia replicates these findings [29]; however, the direction of these relationships has not been established yet. It may also be that the experience of psychological distress increases beliefs about the unacceptability of experiencing and expressing the negative emotion [30].

Finally, as noted above, research has extensively studied the association between psychological distress and IBS. Despite findings that positive affect (PA) is linked to better health outcomes in coronary problems and stroke [31,32], little empirical work has been conducted in IBS [33]. PA has been found to have indirect health benefits by buffering the adverse consequences of perceived stress and pain in conditions such as coronary artery disease and chronic pain [34,35]. However, PA also appears to have a direct effect on health independent of stress by shaping physiological responses [36]. Thus, exploring the role of PA specifically in IBS could provide valuable information on new ways to treat IBS and improve treatment outcomes.

In summary, whilst the role of psychological distress in IBS has been consistently studied, emotional processing and PA warrant further exploration. Based on previous findings discussed above, difficulties in emotional processing may have a negative impact on IBS related measures through the increase of distress and the reduction of PA. However, it may also be that IBS increases distress and reduces PA, which in turn may have a negative impact on processing emotions. Additionally, PA may buffer the relationship between distress and IBS measures. It seems relevant to study unhelpful beliefs about negative emotions as well as the difficulty in identifying emotions as they have been associated with poorer IBS outcomes and treatment responses.

1.1. Objectives of the study

The current study sought to expand the available knowledge on the areas of research described above. We aimed to investigate:

- a) If difficulties in self-reported emotional processing are associated with distress, PA, IBS symptom severity and interference with life roles.
- b) How emotional processing is associated with affect and IBS

symptom severity and interference with life: (b1) Is the relationship between emotional processing and these IBS measures mediated by distress? (b2) Is the relationship between emotional processing and these IBS measures mediated by PA? (b3) Due to the cross-sectional nature of the data, we tested the reversed models (i.e. IBS measures as predictors, affect variables as mediators, emotional processing measures as dependant variables).

- c) If PA moderates the relationship between distress and IBS outcomes.

2. Methods

2.1. Study population

Five hundred and fifty-eight participants were recruited to take part in a randomized controlled trial aimed to assess the clinical and cost effectiveness of CBT in IBS (ACTIB study) [37]. Individuals had to meet the following inclusion criteria:

- Being 18 years and over.
- Having refractory IBS (i.e. fulfilling the ROME III criteria for IBS and reporting ongoing clinically significant symptoms determined by an IBS symptom severity score of 75 or more) [38].
- Having ongoing symptoms of IBS for 12 months or more.
- Having been offered first-line therapies.

The main exclusion criteria were: unexplained rectal bleeding or weight loss; diagnosis of IBD, coeliac disease, peptic ulcer disease or colorectal carcinoma.

Participants were identified and invited to the study through GP surgeries and secondary care clinics in two regions (Southampton and London). Those individuals responding to the invitation letter were contacted by the research team and completed a screening telephone interview covering inclusion/exclusion questions as well as the ROME III criteria. Eligible participants consented online through the study website and agreed to have routine blood tests. Participants with normal blood test results (i.e. full blood count, tissue transglutaminase antibodies and C-reactive protein) completed the baseline questionnaires online (see study protocol for further details on the recruitment process and ethics approvals) [37]. The current study was a cross-sectional analysis of these baseline data.

3. Measures

3.1. Emotional processing and affect measures

3.1.1. Beliefs about Emotions Scale (BES)

The BES [24] is a 12-item scale that measures beliefs about the unacceptability of experiencing and expressing negative emotions. Items are answered on a 7-point Likert scale (0 to 6) and higher scores indicate stronger negative beliefs about emotions. The BES has one factor and it showed very good reliability in our study (Cronbach's $\alpha = 0.91$).

3.1.2. Impoverished Emotional Experience (IEE) sub-scale

The IEE factor of the refined Emotional Processing Scale (EPS-25) [19] captures some aspects of the alexithymia construct. Specifically, it is focused on the difficulty in differentiating between feeling ill or emotional and the dissociation from the emotional experience. IEE correlates most highly with the other sub-scales and it had high internal consistency (Cronbach's $\alpha = 0.88$). This sub-scale is composed of 5 items answered on a 10-point Likert scale (0 to 9). Higher scores correspond to poorer emotional experience.

3.1.3. Hospital Anxiety and Depression Scale (HADS)

The HADS [39] is a 14-item, valid and reliable self-report instrument for detecting anxiety and depression in individuals with medical

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