

## Cognitive change in patients undergoing hypnotherapy for irritable bowel syndrome

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### Abstract

**Objective:** Impaired quality of life and psychological distress are common in irritable bowel syndrome (IBS) and may be associated with unhelpful cognitions. Hypnotherapy (HT) is effective in improving both symptoms and quality of life in patients with IBS, and this study was designed to determine whether this improvement is reflected in cognitive change using a validated scale recently developed for use in such patients. **Method:** A total of 78 IBS patients completed a validated symptom-scoring questionnaire, the Hospital Anxiety and Depression (HAD) Scale and the Cognitive Scale for Functional Bowel Disorders (FBDs), before and after 12 sessions of gut-focused HT. **Results:** HT resulted in improvement of symptoms, quality of life and scores for anxiety and depression (all  $P$ 's < .001). IBS-related cognitions also improved, with reduction in the total cognitive

score (TCS;  $P$  < .001) and all component themes related to bowel function (all  $P$  < .001). Cognitions were related to symptom severity because the most abnormal cognitive scores were observed in patients with the highest symptom scores ( $P$  < .001). Furthermore, a reduction in symptom score following treatment correlated with an improvement in the cognitive score ( $P$  < .001). Regression analysis confirmed that the cognitive score had independence from the other scores and did not serve solely as a proxy for symptom improvement. **Conclusion:** This study shows that symptom improvement in IBS with HT is associated with cognitive change. It also represents an initial step in unravelling the many possible mechanisms by which treatments such as HT might bring about improvement.

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### Introduction

Irritable bowel syndrome (IBS) is a common condition that is estimated to affect around 15% of the general adult population at any one time [1] and, although the majority of individuals with symptoms do not seek medical help, those who do account for approximately half of the workload in the gastroenterology clinic [2–4]. The main symptoms of IBS are abdominal pain, distension and altered bowel habit, and these are often accompanied by a number of extracolonic

symptoms, which include nausea, lethargy, backache and urinary symptoms [5].

For some individuals, symptoms can be sufficiently severe and troublesome as to impair the person's quality of life and may affect the ability to cope with work [5,6]. The socioeconomic impact of IBS is therefore considerable, and IBS patients represent a significant drain on healthcare resources [7]. Treatment is often unsatisfactory with symptoms failing to respond to an array of currently available medications [8]. As a consequence, less conventional but often more effective approaches such as hypnotherapy (HT) [9–14] and cognitive and/or behavioural therapies [15–19] have been increasingly adopted to treat this condition.

IBS is classified as a functional bowel disorder (FBD), and its cause is probably multifactorial in origin, and it has been proposed that IBS is best conceptualised within a biopsychosocial framework [20]. Psychological influences may play a complex role in that they may act as predisposing or precipitating factors which contribute to the generation or

*Abbreviations:* FBD, functional bowel disorder; HAD, Hospital Anxiety and Depression; HT, hypnotherapy; IBS, irritable bowel syndrome; TCS, total cognitive score.

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expression of symptoms and/or as perpetuating factors that exacerbate or maintain the problem [21–24]. In addition, the symptoms and their consequences, real or potential, may be a source of psychological distress. For instance, symptoms may make patients feel out of control and therefore helpless, or patients may feel anxious about going out, fearing that they may not find a toilet in time.

Psychological distress is reflected in a person's stream of thoughts (automatic thoughts or cognitions), and these, in turn, may act to exacerbate symptoms. Identification and reformulation of any unhelpful or self-defeating cognitions in order to help improve the patient's condition form the basis of cognitive therapy, originally developed for the treatment of emotional disorders [25,26] and later adapted for use with functional illnesses [27]. Studies using cognitive and/or behavioural interventions [15–19] have reported reduction in IBS symptoms and psychological distress. These have used measures such as the Beck Depression Inventory [28] to assess mood, and the Automatic Thoughts Questionnaire [29] for cognitions. To date, however, there has been no validated cognitive measure available to assess cognitions specific to patients with functional bowel symptoms. To address this need, therefore, a cognitive scale has recently been developed by Toner et al. [30], designed for use in this patient group, as a valid and reliable instrument to assess the cognitions of patients diagnosed with FBD and also to assess the efficacy of different forms of treatment or psychotherapeutic interventions. The scale was devised from the automatic thought diaries from FBD patients, which were formulated into statements reflecting cognitions. The authors identified several a priori themes that were relevant to people with FBD, and the scale is organised into themes relating to symptoms, such as bowel performance anxiety and pain, and to common personal themes, such as perfectionism and self-nurturance.

Gut-focused HT is a particular treatment approach, originally developed by Whorwell et al. [9], that has been found to be extremely effective in the treatment of IBS with up to 80% of patients having improvement in symptoms and overall well-being, an effect that is usually sustained [10,11] and has been supported by independent studies [12,13]. A further study has shown that HT improves extracolonic symptoms and quality of life, and it has also been shown to reduce HAD scores for anxiety and depression. It also helps patients return to work, and it reduces the need for medication and repeated consultation [11]. This work led to the establishment several years ago of a HT unit in the UK staffed by six therapists, which is devoted to the treatment of IBS, and a recent audit on a large number of patients receiving treatment through this service has confirmed the earlier research findings [14].

Gut-focused HT is based on the use of hypnotic techniques directed towards control and normalisation of gut function, along with 'ego-strengthening' interventions, but without the use of formal methods to reformulate unhelpful cognitions. Because of this, we were interested in monitoring

patients' IBS-related cognitions before and after a course of HT using the Cognitive Scale for FBD to determine whether or not these cognitions change after treatment.

The aims of this study, therefore, were to establish whether patients' cognitions are related to severity of symptoms, whether these cognitions change after HT, and if so, whether this change is related to improvement in symptoms.

## Method

### *Patients*

A total of 78 patients with IBS (16 male, age 17–69 years) undergoing a course of HT took part in the study. Patients had been referred from gastroenterology clinics at this hospital and other centres in the region having had symptoms of at least 2 years in duration, which were unresponsive to previous conventional treatment, i.e., laxatives, antidiarrhoeals, antispasmodics and even antidepressants, as deemed clinically appropriate. IBS was defined as the presence of abdominal pain, distension and altered bowel habit according to the Rome I Criteria, after full evaluation by a gastroenterologist and normal findings on haematological and sigmoidoscopic examination.

### *Procedure*

Patients were seen in consecutive order on a one-to-one basis by the next available therapist. At the first visit, patients completed questionnaires to measure severity of IBS symptoms, associated features and psychological status over the preceding month as well as IBS-related cognitions. Patients then attended for 12 sessions of HT, over a 3-month period, usually at weekly intervals, after which they completed questionnaires identical to those before treatment to reflect symptom severity and cognitions after finishing therapy.

### *Hypnotherapy*

HT was based on techniques previously described [9,11,14]. Briefly, this involved hypnotic induction using progressive relaxation and other procedures to deepen the hypnotic state. This was followed by suggestions for 'ego-strengthening,' as judged by the therapist to be relevant to the individual. (Therapists were unaware of cognitive scale ratings, so that no information from these could influence the treatment approach.) From the third session, interventions directed towards control and normalisation of gut function were incorporated. These included direct suggestion and other techniques appropriate to the individual, such as inducing warmth through the patient's hands on the abdomen. Patients were also encouraged to develop and use any imagery that they found meaningful to represent their gut and the changes that needed to take place, e.g., a patient with diarrhoea might use the idea of the gut as a

rushing river and then slowing it down to a calmly moving one. Patients were asked to practise these hypnotic skills on a daily basis with the help of an audio-tape as well as to use them as needed to help relieve symptoms. At each session, interventions were reinforced or modified according to the patient's needs. After the last session, all patients were asked to contact the Unit at any time for an additional session if they felt they needed further help.

#### Questionnaires and analysis of data

Questionnaires completed both before and at the end of the course of HT included a validated IBS questionnaire [31] recording IBS symptoms, extracolonic features and quality of life measures, the Hospital Anxiety and Depression (HAD) Scale [32] and the Cognitive Scale for FBDs [30].

#### IBS questionnaire

Items in the IBS questionnaire [31] were scored using a visual analogue scale of 0–100 mm. Increased severity of IBS symptoms and extracolonic features was indicated by a higher score, whereas increased impairment of quality of life measures was denoted by a lower score. Overall scores were calculated as the sum of the following individual items, adjusted as necessary to give a maximum score as indicated:

Overall IBS score (maximum 500; sum of five items): pain severity, pain frequency, distension, bowel habit dissatisfaction and life interference (extent to which symptoms interfere with life).

Overall extracolonic score (maximum 500; sum of 10 items divided by 2): nausea/vomiting, early satiety, headaches, backache, excess wind, heartburn, bodily pains, urinary symptoms, thigh pain and lethargy.

Overall quality of life score (maximum 500; sum of five items):

- Psychic well-being (coping with problems, confidence, usefulness, security);

- Physical well-being (sleep, energy levels, aches and pains, feeling physically well);
- Mood (irritability, worrying, hopefulness, enjoyment of life);
- Locus of control (feeling in control of life, helplessness, ability to make decisions); and
- Social/relationships (relationships with family/partner, ability to maintain friendships, inferiority, feeling wanted, enjoyment of leisure).

The value of each quality of life category was derived from the mean of the individual items shown indicated in parentheses, to give a maximum score of 100.

#### HAD Scale

The HAD Scale [32] consists of 14 statements, 7 for anxiety and 7 for depression, rated on a 0–3 integer scale, to give anxiety and depression scores each a maximum value of 21, with higher scores reflecting increasing severity of distress.

#### Cognitive Scale for FBDs

The Cognitive Scale is a previously validated scale [30], which contains statements, derived from typical thoughts of IBS patients, subdivided into themes relating to bowel function and personal characteristics relevant to IBS, as shown in Table 1. Patients rated the extent to which each statement applied to them on a seven-point scale, ranging from *Strongly Disagree* (scoring 1) to *Neither Agree/Disagree* (scoring 4) to *Strongly Agree* (scoring 7). The final version of the scale contains 25 statements, but an additional 6 alternative statements that were available were also included, making 31 items in all, in order to leave open the option of using these if any of the original 25 items were unresponsive to treatment. A total cognitive score (TCS) was derived from the sum of scores from these statements, having a maximum value of 217 and a minimum value of 31, with higher scores indicating more marked IBS-related cognitions. Scores for the individual themes were also

Table 1  
Cognitive Scale for FBDs

Theme	No. of statements	Examples
Bowel performance anxiety	9	"I often worry there might not be a toilet available when I need it" "I worry that if I go on a trip I will have bowel problems"
Pain	3	"I often feel this abdominal pain will never go away "
Control	2	"My bowel symptoms make me feel out of control"
Self-efficacy	6	"I cannot function normally when I get bowel symptoms" "I feel my bowel symptoms are too much for me to handle"
Embarrassment/shame	2	"I often worry that other people will hear my stomach make noises"
Anger/frustration	1	"I am constantly frustrated by my bowel symptoms"
Disease conviction	1	"I feel I am always sick with bowel problems"
Perfectionism	1	"It's important to do my absolute best at everything I try"
Social approval	3	"I hate the thought of making a fool of myself in front of other people"
Social rules/norms	1	"The idea of being late upsets me"
Self-nurturance	2	"I often give up my own wishes in order to make other people happy"

calculated as the mean value of scores for statements making up that theme.

#### Calculation of improvement in scores after HT

Improvement in scores after HT was calculated as the percentage (%) change in score as follows:

$$\frac{(\text{Pre} - \text{HT score} - \text{Post} - \text{HT score})}{\text{Pre} - \text{HT score}} \times 100$$

with positive values representing improvement and negative values representing deterioration of symptoms. (NB: Improvement in quality of life measures would have negative values and this was changed to a positive value in order to ease handling of data.)

#### Data handling and statistical analysis

Mean values (plus standard deviation, S.D.) were calculated for pre- and post-HT scores of groups of variables considered to follow a reasonably normal distribution, otherwise, median values (plus interquartile range, IQR) were used. Changes in pre- and post-HT scores were calculated as mean (95% CI) or median (95% CI) of differences. Thus, intraindividual pre- and post-HT scores were compared either using the paired *t* test or the Wilcoxon pairs test, as appropriate. Pearson (*r*) correlation coefficients were calculated to assess relationships between variables.

Multiple regression analysis was performed to identify the factors affecting TCS before HT and improvement in this score posttreatment. In order to limit the number of predictor variables examined at any one time, a stepwise analysis was carried out using a series of variable blocks, each block relating to IBS symptoms, extracolonic features, quality of life and HAD scores, respectively.

Scores in the Cognitive Scale were also subdivided in order to give a binary response, i.e., whether patients had a

Table 2  
IBS symptom scores before and after HT

	Pre-HT <sup>a</sup>	Post-HT <sup>a</sup>	Intraindividual difference <sup>b</sup>
Overall score <sup>c</sup>	329.2 (76.7)	165.4 (94.2)	159.7 (139.2–180.2)***
Pain severity <sup>d</sup>	64.2 (24.4)	31.8 (22.1)	32.1 (27.1–37.1)***
Pain frequency	52.9 (32.3)	27.1 (27.7)	25.8 (19.5–32.1)***
Bloating	66.4 (23.1)	32.5 (22.4)	33.6 (28.1–39.0)***
Bowel habit dissatisfaction	72.5 (24.8)	38.5 (24.6)	34.0 (28.0–40.0)***
Life interference	73.1 (17.2)	38.2 (23.7)	34.3 (28.8–39.7)***

Overall score was treated as primary outcome. Individual measures were only assumed to show true difference (at the 5% level) if *P* < .001.

<sup>a</sup> Data are shown as mean (S.D.).

<sup>b</sup> Intraindividual differences in pre- and post-HT scores, expressed as mean (95% CI).

<sup>c</sup> Overall score = sum of individual measures shown (maximum score 500).

<sup>d</sup> Individual measures — rated by VAS (0–100 mm).

\*\*\* *P* < .001 (paired *t* test).

Table 3  
Extracolonic symptom scores before and after HT

	Pre-HT <sup>a</sup>	Post-HT <sup>a</sup>	Intraindividual difference <sup>b</sup>
Overall score <sup>c</sup>	217.5 (87.2)	146.4 (88.7)	70.7 (55.5–85.8)**
Nausea/vomiting <sup>d</sup>	22 (3.50)	7 (0.25)	5 (1.7)***
Early satiety	18 (3.50)	9 (0.33)	1 (0.11)***
Heartburn	15 (3.50)	7 (2.28)	3 (0.10)***
Excess wind	75 (65.93)	49 (25.71)	21 (14.39)***
Headaches	40 (9.69)	25 (5.53)	3 (0.8)***
Backache	60 (25.75)	34 (11.69)	11 (4.20)***
Lethargy	74 (50.88)	46 (23.75)	14 (8.21)***
Urinary frequency	50 (23.75)	30 (5.64)	12 (5.22)***
Thigh pain	5 (0.50)	4 (0.24)	1 (0.8)***
Bodily aches	55 (23.85)	31 (6.62)	14 (5.23)***

Overall score was treated as primary outcome. Individual symptoms were only assumed to show true difference (at the 5% level) if *P* < .001.

<sup>a</sup> Data are shown as: overall score — mean (S.D.); individual items — median (IQR).

<sup>b</sup> Intraindividual differences in pre- and post-HT scores: overall score — mean (95% CI); individual measures — median (95% CI).

<sup>c</sup> Overall score = sum of individual measures/2 (maximum score 500).

<sup>d</sup> Individual measures — rated by VAS (0–100 mm).

\*\* *P* < .001 (paired *t* test).

\*\*\* *P* < .001 (Wilcoxon pairs test).

‘positive’ or ‘negative score’ for the individual themes of IBS-related cognitions. (A ‘positive score’ was defined as a score of 5 or more, which denoted that patients agreed overall with statements in that theme, and a ‘negative score’ defined as a score of 4 or less, denoting that patients did not agree with these statements.) The percentages of patients before and after HT with a positive score for each theme were compared using McNemar’s test.

Binary logistic regression was performed to identify the factors affecting whether patients had a positive score for the individual themes. This was carried out as a stepwise analysis as described above for multiple regression analysis.

Overall scores for IBS symptoms, extracolonic features, quality of life measures and the TCS were treated as the primary outcomes, and, therefore, no adjustment was made for multiple comparisons. However, for the purpose of comparing secondary endpoints (i.e., individual measures making up overall scores), only differences at the 0.1% level (*P* < .001) were interpreted as showing reasonable evidence of a true difference (at the 5% level) because of the large number of multiple comparisons made.

## Results

### IBS symptoms and associated features

As can be seen in Table 2, IBS symptoms before HT were at least moderately severe, as reflected in the overall IBS score and in the individual measures, namely pain severity, pain frequency, bloating, bowel habit dissatisfaction and life interference. Following HT, improvement was

Table 4  
Quality of life scores before and after HT

	Pre-HT <sup>a</sup>	Post-HT <sup>a</sup>	Intraindividual difference <sup>b</sup>
Overall score <sup>c</sup>	276.1 (94.5)	351.5 (86.5)	– 75.4 (– 59.5, – 91.2)***
Psychic well-being <sup>d</sup>	54.8 (21.7)	72.6 (18.3)	– 17.9 (– 13.7, – 22.0)***
Physical well-being	44.6 (22.7)	64.5 (22.2)	– 19.9 (– 15.7, – 24.1)***
Mood	49.3 (19.9)	64.2 (17.0)	– 14.8 (– 10.7, – 19.0)***
Locus of control	56.8 (24.2)	69.2 (22.2)	– 12.3 (– 7.7, – 17.0)***
Social/relationships	68.7 (19.4)	76.2 (18.7)	– 7.5 (– 4.4, – 10.5)***

Overall score was treated as primary outcome. Individual measures were only assumed to show true difference (at the 5% level) if  $P < .001$ .

<sup>a</sup> Data are shown as mean (S.D.), with higher values representing better quality of life rating.

<sup>b</sup> Intraindividual differences in pre- and post-HT scores, expressed as mean (95% CI).

<sup>c</sup> Overall score = sum of individual categories (maximum score 500).

<sup>d</sup> Values for each category = mean of individual items used in each category—see Methods (maximum score 100).

\*\*\*  $P < .001$  (paired  $t$  test).

seen in the overall score and in all of the individual features (all  $P < .001$ ).

Similarly, while the prevalence of extracolonic symptoms varied, with lethargy, excess wind, backache and bodily aches being the most common and severe, all individual extracolonic symptoms, as well as the overall extracolonic score improved significantly after HT (all  $P < .001$ ; Table 3).

#### Quality of life and psychological well-being

HT significantly improved the overall quality of life score and all individual measures (all  $P < .001$ ), as shown in Table 4. There was also a reduction in both anxiety [HAD 'A' (anxiety) score: pre- vs. post-HT, mean (S.D.): 10.2(4.4) vs. 7.2(4.1); mean difference (95% CI): 2.95 (2.19–3.70),  $P < .001$ ] and depression [HAD 'D' (depression) score: 6.6(3.8) vs. 4.1(3.5); mean difference (95% CI): 2.48 (1.74–3.22),  $P < .001$ ]. In addition, following treatment, fewer patients were significantly anxious (HAD 'A' score  $\geq 10$ : pre- vs. post-HT (% patients): 53% vs. 27%,  $P < .001$ ) or depressed (HAD 'D' score  $\geq 10$ : pre- vs. post-HT (% patients): 22% vs. 8%,  $P = .006$ ).

#### IBS-related cognitions

Mean values for Cognitive Scale scores before and after HT are shown in Table 5, while the percentage of patients with a 'positive score' (i.e., scoring 5 or more for each theme, indicating overall agreement with the statements in that theme) pre- and posttreatment are given in Table 6. These indicate that, prior to HT, levels of IBS-related cognitions were high, with the majority of patients identifying with statements within the individual themes. Cognitions improved after HT, seen as a reduction in the TCS, reflecting a lower level of IBS-related cognitions and in all individual themes (all  $P < .001$ ), apart from perfectionism, self-nurturance and social rules/norms (Table 5). Moreover, fewer patients had a 'positive score' for IBS-related cognitions of these individual themes after treatment (Table 6).

#### Association between IBS-related cognitions and IBS symptoms

IBS-related cognitions were associated with severity of symptoms, as evidenced from the direct correlation between the TCS score and the overall IBS and extracolonic scores both before (TCS vs. overall IBS score,  $r = .612$ ; TCS vs. extracolonic score,  $r = .568$ , both  $P < .001$ ) and after HT (TCS vs. IBS score,  $r = .628$ ; TCS vs. extracolonic score,  $r = .636$ , both  $P < .001$ ). The TCS score also correlated directly with HAD scores for anxiety and depression (TCS vs. HAD 'A': pre-HT:  $r = .494$ ; post-HT:  $r = .583$ , both

Table 5  
Cognitive Scale scores before and after HT

	Pre-HT <sup>a</sup>	Post-HT <sup>a</sup>	Intraindividual difference <sup>b</sup>
Total score <sup>c</sup>	151.2 (36.2)	114.5 (38.8)	36.5 (29.0–44.0)***
Bowel performance anxiety <sup>d</sup>	4.83 (1.62)	3.71 (1.49)	1.18 (0.87–1.49)***
Pain	5.13 (1.54)	3.55 (1.65)	1.65 (1.28–2.01)***
Control	4.99 (1.61)	3.66 (1.69)	1.30 (0.93–1.67)***
Self-efficacy	5.27 (1.33)	3.63 (1.45)	1.59 (1.24–1.95)***
Anger/frustration	5.97 (1.45)	4.03 (1.91)	1.97 (1.53–2.42)***
Embarrassment/shame	4.77 (1.60)	3.80 (1.46)	0.97 (0.63–1.31)***
Disease conviction	4.62 (1.97)	3.00 (1.66)	1.65 (1.15–2.16)***
Social approval	4.73 (1.26)	4.05 (1.24)	0.67 (0.38–0.96)***
Social rules/norms	5.41 (1.54)	4.93 (1.61)	0.65 (0.26–1.05)**
Self-nurturance	4.57 (1.46)	4.08 (1.48)	0.51 (0.00–0.92)*
Perfectionism	5.71 (1.40)	5.55 (1.29)	0.13 (– 0.19–0.45)****

Total score was treated as primary outcome. Individual measures were only assumed to show true difference (at the 5% level) if  $P < .001$ .

<sup>a</sup> Data are shown as mean (S.D.).

<sup>b</sup> Intraindividual differences in pre- and post-HT scores, expressed as mean (95% CI).

<sup>c</sup> Total score = sum of individual statements (maximum 217, minimum 31).

<sup>d</sup> Values for each theme = mean of individual statements in theme (max = 7, min = 1).

\*  $P < .05$  (paired  $t$  test).

\*\*  $P < .05$  (paired  $t$  test).

\*\*\*  $P < .001$  (paired  $t$  test).

\*\*\*\* Not significant (paired  $t$  test).

Table 6  
Proportion of patients with 'positive score' for each theme in the Cognitive Scale

Cognitive Scale theme	Pre-HT (%)	Post-HT (%)	<i>P</i> value <sup>a</sup>
Bowel performance anxiety	66 <sup>b</sup>	29	<.001
Pain	70	28	<.001
Control	64	33	<.001
Self-efficacy	81	24	<.001
Anger/frustration	87	44	<.001
Embarrassment/shame	65	31	<.001
Disease conviction	57	22	<.001
Social approval	65	39	.002
Social rules/norms	82	64	.007
Self-nurturance	54	40	.143
Perfectionism	78	79	.810

Individual measures were only assumed to show true difference (at the 5% level) if  $P < .001$ .

<sup>a</sup> McNemar's test.

<sup>b</sup> Data are shown as the percentage of patients with a 'positive score' (scoring 5 or more in each theme, denoting patients agreeing or identifying with statements in theme).

$P < .001$ ; TCS vs. HAD 'D': pre-HT:  $r = .559$ ; post-HT:  $r = .595$ , both  $P < .001$ ) and was inversely associated with the overall quality of life score (TCS vs. overall QOL: pre-HT:  $r = -.557$ ; post-HT:  $r = -.586$ ; both  $P < .001$ ). Multiple regression analysis on all pre-HT variables (individual IBS and extracolonic symptoms, quality of life and HAD scores) identified life interference and bowel habit dissatisfaction as having a positive independent relationship with the TCS, i.e., an increase in these scores leading to an increase in the TCS, while physical well-being and psychic well-being had a negative relationship, i.e., a decrease in these scores would increase the TCS [ $R^2 = 62\%$ ; coefficient (S.E.): life interference: 0.73 (0.17),  $P < .001$ ; bowel habit dissatisfaction: 0.36 (0.12),  $P = .003$ ; physical well-being:  $-0.40$  (0.15),  $P = .008$ ; psychic well-being:  $-0.39$  (0.15),  $P = .01$ ].

By subdividing the TCS into its component themes, it was found that those themes most closely related to symptoms correlated with the relevant symptom scores. Thus, bowel performance anxiety correlated most strongly with ratings for bowel habit dissatisfaction (pre-HT:  $r = .629$ ; post-HT:  $r = .575$ ; both  $P < .001$ ) and pain cognitions were most strongly associated with pain frequency (pre-HT:  $r = .625$ ; post-HT:  $r = .594$ , both  $P < .001$ ) and severity (pre-HT:  $r = .598$ ; post-HT:  $r = .568$ , both  $P < .001$ ). Binary logistic regression on all pre-HT scores showed bowel habit dissatisfaction and life interference as independent predictors of bowel performance anxiety cognitions [odds ratio (95% CI): bowel habit dissatisfaction: 1.05 (1.02–1.09),  $P = .003$ ; life interference: 1.07 (1.02–1.12),  $P = .004$ ] and pain frequency and life interference as independent predictors of pain cognitions [odds ratio (95% CI): pain frequency: 1.08 (1.04–1.13),  $P < .001$ ; life interference: 1.12 (1.03–1.25),  $P = .004$ ], such that an increase in these scores increased the risk of a 'positive score' in that cognitive theme.

Following HT, improvement (% reduction) in the TCS after HT also correlated directly with improvement in both

the overall IBS and extracolonic scores ( $r = .569$  and  $r = .548$ , respectively, both  $P < .001$ ) as well as improvement in HAD scores for anxiety and depression ( $r = .493$  and  $r = .414$ , respectively, both  $P < .001$ ). Multiple regression analysis revealed that improvement in physical well-being and life interference were significant independent predictors of improvement in the TCS score [ $R^2 = 54\%$ ; coefficient (S.E.): physical well-being:  $-0.36$  (0.05); life interference 0.24 (0.06), both  $P < .001$ ].

## Discussion

HT reduced both symptoms of IBS and its associated extracolonic manifestations, leading to an improvement in quality of life and psychological well-being. This is in keeping with the earlier reports from our group [9–11] as well as others [12,13] and with a recent large-scale audit of patients treated within our Unit [14]. However, this is the first study to assess the impact of an effective treatment for IBS on patients' cognitions using a previously validated Cognitive Scale [30] designed specifically for use in this group of patients. Our results showed, firstly, that these IBS-related cognitions were associated with symptom severity and rating of life interference, and, more importantly, that cognitions improved with HT and that this improvement correlated with improvement in symptoms.

No control (i.e., no treatment or placebo) group was included in this study, and one might argue that cognitive change would have occurred with time and that this was unrelated to treatment. However, the fact that change in cognitions was related to the degree of symptomatic improvement after treatment and that there was generally little or no change seen in the absence of such improvement would support the view that a control group was not necessary for the purposes of this study.

An association of the TCS with the rating of life interference due to bowel symptoms was originally reported by Toner et al. [30], thus giving high concurrent criterion validity to the scale. In our study, regression analysis identified that cognitions, in terms of the TCS and individual themes of bowel performance anxiety and pain, were predicted by severity of IBS symptoms (bowel habit dissatisfaction and pain severity) and quality of life measures (physical and psychic well-being) as well as with life interference. However, while cognitive scores were related to symptom severity, they cannot be considered as another measure of symptoms, because they were also predicted by nonsymptom variables.

Bowel-related cognitions improved after HT, but, interestingly, there was little change in cognitions relating to the personal themes of perfectionism, self-nurturance and social rules/norms. Salient areas identified in patients with IBS include a tendency to be perfectionistic and, especially for women, lack of self-nurturance and heightened sensitivity to perceived social norms and social acceptance [33], all of

which can be contributory factors in IBS for a number of reasons. For instance, being perfectionistic could cause added pressure through the high demands that patients place on themselves, which, in turn, can exacerbate symptoms. A need for social approval leads to pleasing others, often at the expense of negating one's own needs, which, in turn, can add to stresses and thereby trigger symptoms. The fact that HT did not significantly alter these cognitions would suggest that such change was not essential for symptomatic improvement to occur.

The cognitive change that occurred after HT was found almost exclusively in those themes relating to bowel function, indicating that patients had changed the way that they thought about their bowels after treatment and there are at least two possible explanations for this, which are not mutually exclusive. The particular hypnotherapeutic approach used, although not specifically identifying or reformulating cognitions, incorporated relevant 'ego-strengthening' and suggestions directed at increasing the patient's ability to control the gut, and this could be regarded as a form of 'cognitive restructuring' in a less direct way. An internal locus of control and marked sense of self-efficacy have been shown to be important for the successful treatment for chronic pain and other medical problems [34,35] and if these were enhanced as a result of positive hypnotic suggestions, then one would expect there to be a beneficial effect on symptoms. In addition, imagery and other interventions practised by patients were aimed at influencing the functioning of the gut, an effect that could be mediated via altered signalling from the brain to change physiological mechanisms centrally and/or peripherally [36], and thus resulting in symptom improvement. This would lead to patients becoming less concerned about gastrointestinal function and therefore their minds becoming less dominated by negative thoughts about their bowels. It is possible, therefore, that HT brings about cognitive change partly through directly influencing cognitions, which then help improve symptoms and partly through directly influencing gut functioning and perception of pain, which then leads to change in cognitions.

In conclusion, this study indicates that HT is associated with a change in cognitions and is an initial step in helping to unravel the many mechanisms by which treatments such as HT or psychotherapy might bring about improvement. It also emphasises that it is important for healthcare professionals to think about functional disorders not only in terms of symptomatology but also in the way that patients think about these symptoms.

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