

# Reactivity to images in health and irritable bowel syndrome

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## SUMMARY

### Background

We have been using a medical artist to record and paint the images patients have of their irritable bowel syndrome (IBS) and have hypothesized that the reaction to such images might differ in health and IBS, which could have practical implications for future research.

### Aim

To examine reactivity to images in health and IBS.

### Methods

Twelve paintings of IBS were shown to 70 patients to determine the four most evocative images. The spontaneous response to these images and four 'non-IBS painful' and four neutral paintings was assessed in another 100 IBS patients and 100 controls. The prompted reaction in terms of whether an image evoked the notion of pain, bloating or discomfort and to what degree was also recorded.

### Results

Four images depicting bloating and pain scored the highest. These IBS images triggered significantly different reactivity between patients and controls in terms of their spontaneous and prompted responses. Even 'non-IBS painful' and neutral images resulted in exaggerated and frequently significantly different responses in patients than in controls.

### Conclusions

Visual hypersensitivity appears to be another manifestation of the tendency of IBS patients to react adversely to a variety of endogenous and exogenous stimuli. Identifying how individuals relate to different images might also give useful insights into understanding gastrointestinal symptoms.

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## INTRODUCTION

We have been recently studying the imagery of irritable bowel syndrome (IBS) by using an artist to make paintings of how patients picture their illness. The initial aim of this project was to ascertain whether imagery could in any way predict the outcome to treatment with hypnosis as visualization is so frequently used in this form of therapy. It emerged that patients with an image of their illness were more likely to respond to treatment;<sup>1</sup> but, from the images described, it became apparent that the study of imagery might have a variety of other applications. These could include the assessment of the reaction of individuals to these images as well as seeing if they give any insight into the symptomatology or pathophysiology of IBS. Furthermore, they might have utility in assessing whether there is a visual component to the phenomenon of hyper-reactivity to exogenous stimuli in IBS.

It is becoming increasingly well recognized that patients with IBS appear to process sensory information differently to healthy controls although the 'level' or 'levels' at which this occurs may differ between individuals. The most enduring observation, first described by Ritchie in 1973,<sup>2</sup> is that the sensory threshold to balloon distension of the rectum is reduced in a proportion of patients with IBS compared to controls. Subsequently, the central control of sensory information from the gut has become the focus of much attention with evidence from studies using functional magnetic resonance imaging or positron emission tomography suggesting that the processing of such inputs by the brain in IBS may be altered.<sup>3, 4</sup> It also seems likely that concerns over their symptoms result in a state of hypervigilance in many of these IBS patients.<sup>5</sup>

The perception of sensory inputs from outside the gut also seems to be distorted and, for instance, it has been shown that in IBS patients, the response to auditory stimuli is exaggerated compared to controls.<sup>6-8</sup> Furthermore, it has also been shown that patients with IBS subjectively assess their sleep as less satisfactory than controls, although when their sleep patterns are measured objectively with polysomnography, there is no significant difference between the two groups.<sup>9</sup>

It was hypothesized that compared to controls, there would be no difference in the way IBS patients react to neutral images or those associated with pain unrelated to the gut, but that they would show an exagger-

ated response to IBS images and this study aimed to answer this question.

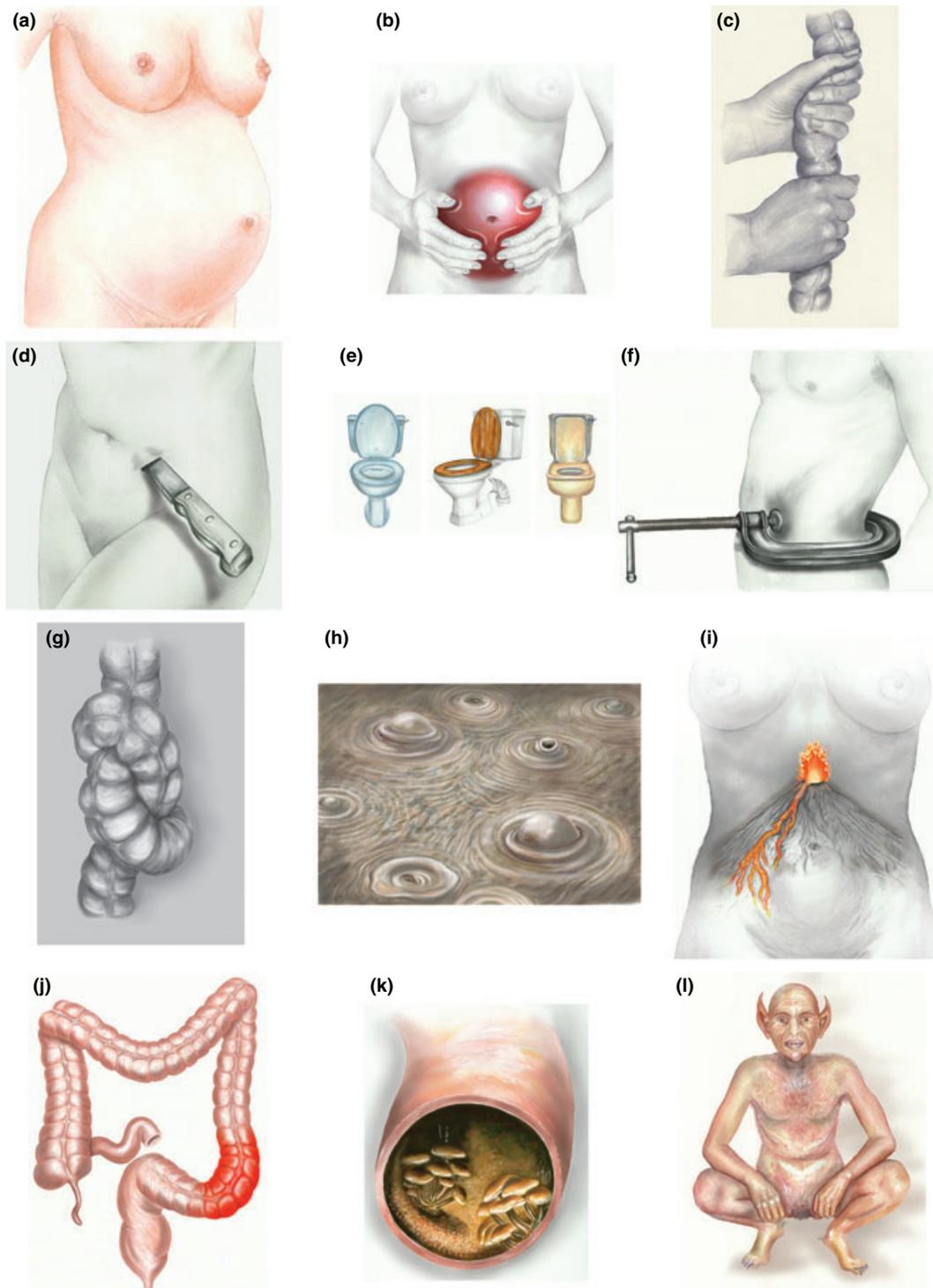
## METHODS

### Part 1

In a previous study,<sup>1</sup> 109 patients with IBS were asked to describe any image they had of their illness prior to treatment with hypnotherapy. The 12 most popular images (Figure 1) were painted in watercolour by HRC with the patients verifying their accuracy. These 12 images were then used in this study to ascertain the four that a further group of patients most identified with which could then be used in the second part of the study. Seventy patients [aged 14–76 years, mean age 40.1 years, 62 (89%) women, 8 (11%) men] fulfilling the Rome II criteria<sup>10</sup> for IBS who were consecutive attenders at Withington Community Hospital were shown 29.7 × 21.0 cm (A4) laminates of each of the 12 images spread out on a table and asked to rank them in order of relevance to their IBS. The most relevant image for a particular individual was given a score of 4, the second most popular image 3, third 2 and fourth 1 with the remainder scoring zero. By summing the scores for all the patients, a total score for each image was obtained. The four images with the highest score were then selected for the second part of the study. In addition, patients were asked to say spontaneously a word to describe any feelings, thoughts, emotions or symptoms each of the four paintings evoked as well as being shown a page containing 53 words from which they were asked to choose as many as they liked to describe their reaction to the paintings. From these responses, the three most commonly used words were chosen to assess the prompted reaction to the images in the second part of the study. All patients also completed the IBS Symptom Severity Scoring Questionnaire.<sup>11</sup>

### Part 2

For the second part of the study, it was necessary for HRC to paint four neutral images and four pictures depicting a painful experience that anyone might encounter on a day-to-day basis. The subject matter of these paintings was discussed by a focus group of artists and photographers who decided that the neutral images should be 'a sunset', 'fluffy clouds', 'a landscape' and 'an abstract purple landscape'. These neutral



**Figure 1.** Twelve irritable bowel syndrome (IBS) images: (a) 'pregnancy', (b) 'red balloon inside the tummy', (c) 'hands squeezing the colon', (d) 'knife stabbing the side of the stomach', (e) 'toilets', (f) 'vice tightly clenching the stomach', (g) 'knotted colon', (h) 'volcanic bubbles', (i) 'volcano inside tummy', (j) 'sore intestines', (k) 'rotting moss, mushrooms and fungi in the colon', (l) 'laughing gremlin in the squat position'. The first four images (a, b, c and d) were selected in part 1 of the study and used in comparison with four neutral images (Figure 2) and four 'non-IBS painful' images (Figure 3) in part 2 of the study.

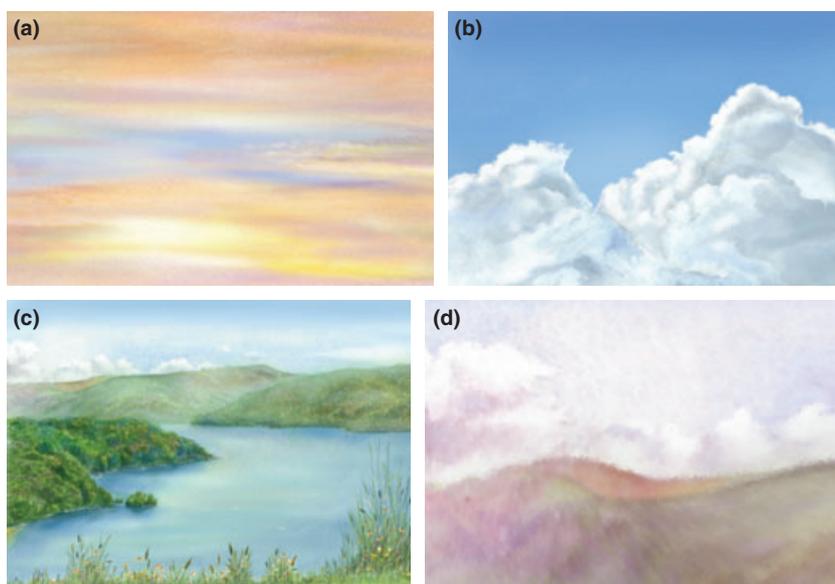
images were rendered in colours, which were considered to be associated with positive and calming feelings (Figure 2). The 'non-IBS painful' images were 'a person accidentally hitting their finger with a hammer', 'a person standing on a piece of broken glass', 'a person accidentally trapping their finger in a drawer' and 'a person scalding their fingers with boiling water' (Figure 3). Each image was randomly numbered, printed on 29.7 × 21.0 cm (A4) paper and laminated in order that the participants could be shown them in an assorted sequence with two of these images (Figures 1d and 3d) repeated a second time to assess the reproducibility and fatigue-ability of their responses. A total of 100 IBS patients [aged 23–76 years, mean age 45.0 years, 88 (88%) women, 12 (12%) men] fulfilling the Rome II criteria for IBS who were consecutive attenders at Withington Community Hospital were studied as well as 100 healthy volunteers [aged 20–74 years, mean age 43.2 years, 89 (89%) women, 11 (11%) men]. For each image, participants were asked for their spontaneous reaction to the image which was recorded verbatim. These descriptions were subsequently classified by PJW as either positive, negative or gastroenterologically orientated (related to the gastrointestinal system) with the latter two not being mutually exclusive (Table 2). To reduce the subjectivity of this process to a minimum, it was undertaken blind as to whether the descriptions were from patients or controls and thus any subjectivity was equally distributed between the two groups. Participants were also asked whether any of the words derived in Part 1

(bloating, pain and discomfort) applied to any of the IBS, 'non-IBS painful' or neutral images (Figure 4) and in those able to relate to an image, the strength of this association was recorded on a visual analogue scale of 0–100 (Figure 5). Each patient also completed the IBS Symptom Severity Scoring Questionnaire.<sup>11</sup>

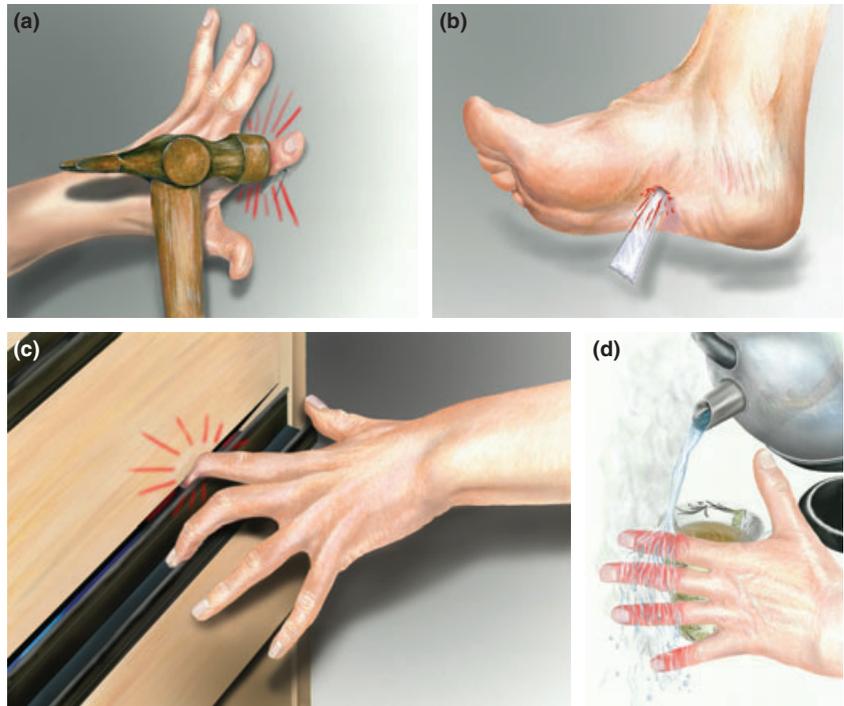
### Statistical analysis

The statistical package spss 11.5 (SPSS Inc., Chicago, Illinois, USA) was used for the analysis of the data. The relationship between patients and healthy volunteers with regard to their spontaneous and prompted responses to the images was assessed using the Pearson chi-squared test and the Fisher's exact test where the patient numbers were small. Comparisons between the normally distributed data of the individual groups assessing the relationships between the strength of association of bloating, pain and discomfort to each image were carried out using the two-sample *t*-test.

The data were then analysed using a bivariate correlation to establish whether there was a relationship between the individual pain or bloating scores, derived from the IBS Symptom Severity Score, and the strength of association with each of the images in terms of pain or bloating (Figure 5). The data were also analysed using a one-way ANOVA to establish whether there was any relationship between the strength of association with a particular image in terms of bloating, pain or discomfort (Figure 5) and IBS bowel habit subtype. Multiple comparisons were



**Figure 2.** Four neutral images: (a) 'sunset', (b) 'fluffy clouds', (c) 'landscape', (d) 'abstract purple landscape' used in part 2 of the study for comparison with the four irritable bowel syndrome (IBS) images (Figure 1a–d) and four 'non-IBS painful' images.



**Figure 3.** Four 'non-IBS painful' images: (a) 'person accidentally hitting their finger with a hammer', (b) 'person standing on a piece of broken glass', (c) 'person accidentally trapping their finger in a drawer', (d) 'person scalding their fingers with boiling water' used in Part 2 of the study for comparison with the four IBS images (Figures 1a–d) and four neutral images. IBS, irritable bowel syndrome.

carried out using the Scheffé *post hoc* test on the same data.

Ethical approval was sought and obtained from South Manchester Local Research Ethics Committee and all subjects gave written consent before participating.

## RESULTS

### Part 1

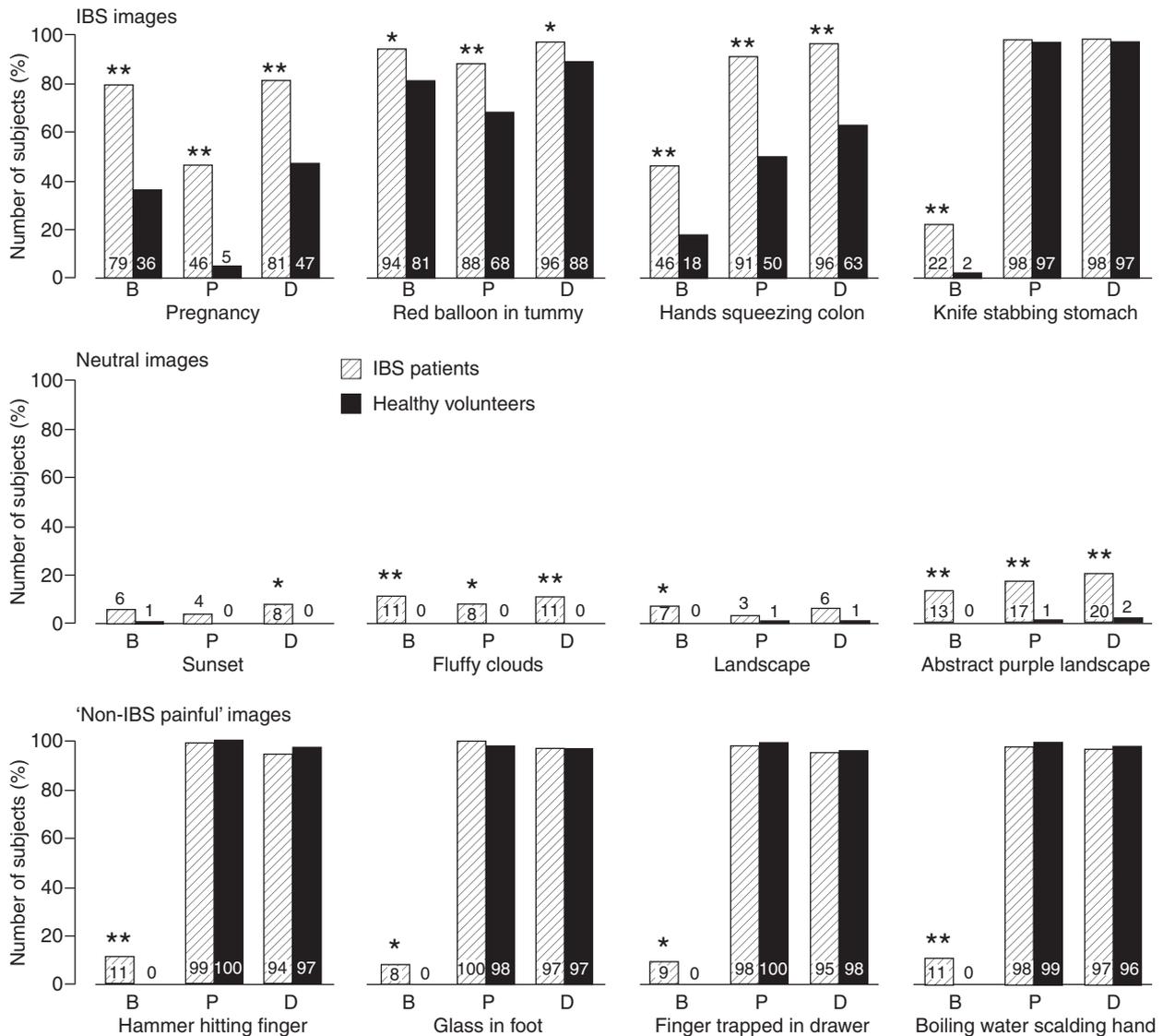
The total score for each of the 12 images is shown in Table 1. As can be seen, images 1a and 1b scored the highest by far and it is clear that these are related to bloating. The next two images were 1c and 1d respectively, which were presumed to be related to spasm and pain. Images 1a, 1b, 1c and 1d in Figure 1 were therefore chosen for part 2 of the study. The Symptom Severity Scores of this group of patients indicated that 10% were mild, 32% were moderate and 58% were severe cases; 45% were constipation-predominant, 23% were diarrhoea-predominant and 32% had an alternating bowel habit. The three words that were most commonly used in reaction to the four images were bloating, pain and discomfort and these three words were therefore used in the second part of the study to assess the prompted reaction to the images.

### Part 2

A total of 104 patients and 101 healthy volunteers were approached to obtain 100 participants in each group for this part of the study. There were no significant differences between the two groups in terms of age and gender distribution.

#### Spontaneous reactions

Table 2 shows the distribution of the spontaneous verbatim reactions in patients and controls to the four IBS images, the 'non-IBS painful' images and the neutral images after they had been classified as positive, negative or gastroenterologically orientated. The majority of individuals gave a response to each image and it is possible to calculate the number of non responders to each image by summing the positive and negative reactions to each image and subtracting this figure from 100. As can be seen, there were significant differences between patients and controls for all the IBS images in terms of their negative or gastroenterological connotations. This was most marked for the 'pregnancy' and the 'hands squeezing colon' images. The 'pregnancy' image was largely perceived negatively [ $\chi^2(1) = 29.325$ ;  $P < 0.001$ ; IBS patients = 44% vs. healthy volunteers = 10%] by patients who related it to the symptom of bloating in contrast to the



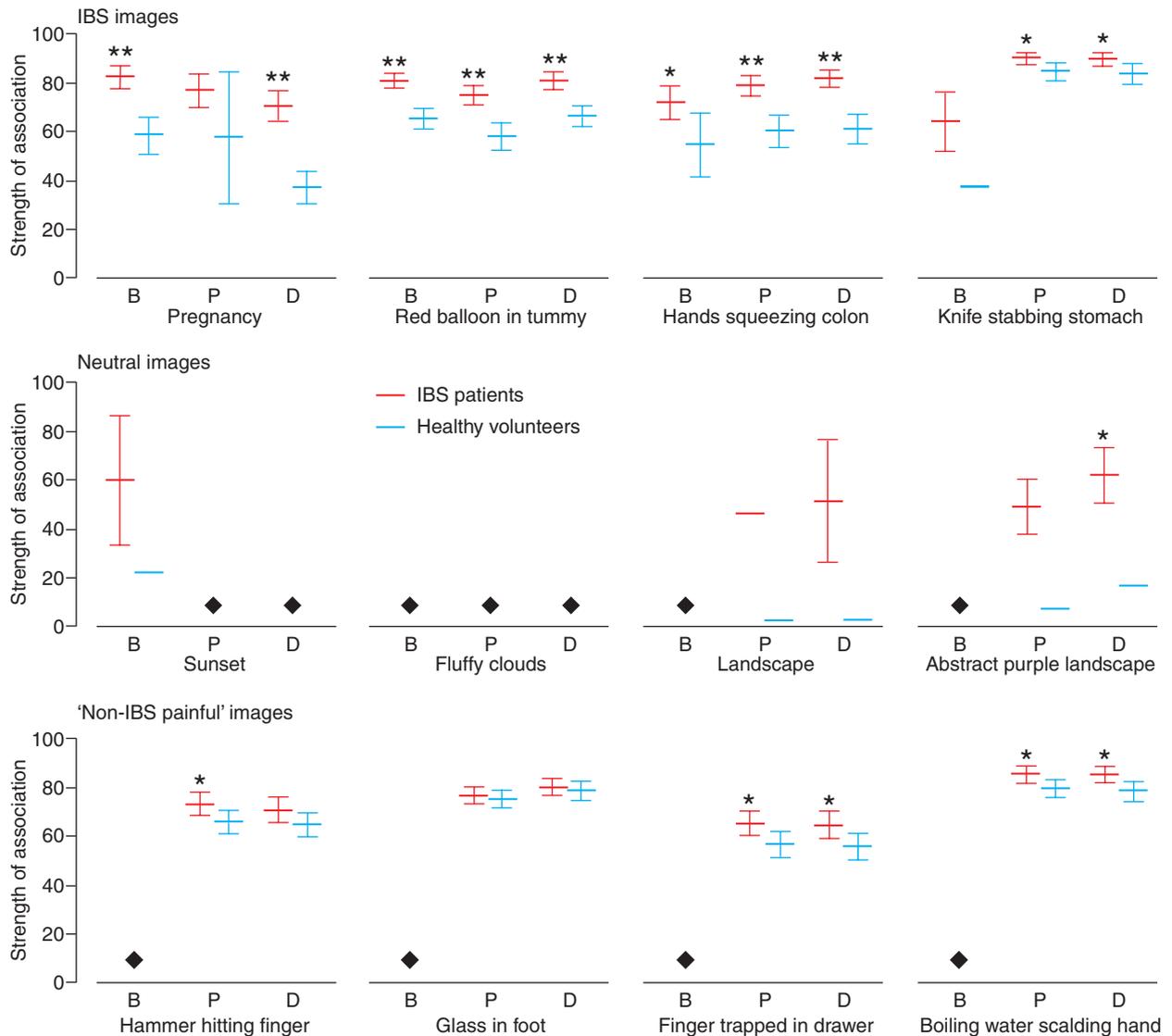
**Figure 4.** Number of irritable bowel syndrome (IBS) patients and healthy volunteers (actual numbers incorporated into bars) relating to a particular IBS image, 'non-IBS painful' image and neutral image in terms of whether it suggested bloating (B), pain (P) or discomfort (D). Asterisks indicate statistically significant differences between patients and healthy volunteers (\*  $P < 0.05$ , \*\*  $P \leq 0.001$ ).

healthy volunteers who viewed the pregnancy in a positive way [ $\chi^2(1) = 29.451$ ;  $P < 0.001$ ; IBS patients = 53% vs. healthy volunteers = 88%]. Some patients even viewed two of the neutral images, 'fluffy clouds' and the 'abstract purple landscape', negatively or in terms of their gastroenterological problem relating the former to bloating and flatulence and latter to bloating, pain and discomfort. There were no significant differences between patients and controls with respect to their reaction to the 'non-IBS painful' images, although there were some differences in the

strength of this reaction when it was measured in terms of their prompted reaction (vide infra).

### Prompted responses (bloating, pain and discomfort)

With respect to the IBS images, the 'non-IBS painful' images and the neutral images, the number of patients and controls who were able relate to a particular image in terms of whether it suggested bloating, pain or discomfort are shown in Figure 4. In those patients



**Figure 5.** Comparison of patients and healthy volunteers relating to an image in Figure 4 in terms of the strength of their association with a particular image. The strength of association was recorded as the degree to which they associated the descriptors, bloating (B), pain (P) and discomfort (D), with an image on a 0–100 scale expressed as a mean and 95% confidence interval. Asterisks indicate statistically significant differences between patients and healthy volunteers (\*  $P < 0.05$ , \*\*  $P \leq 0.001$ ). Healthy controls failed to associate with some images and therefore statistical comparisons could not be made with irritable bowel syndrome (IBS) patients for that particular image (♦).

able to relate to an image, the strength of the association with the words bloating, pain and discomfort, with a particular image is shown in Figure 5.

**Bloating.** As can be seen, there were striking and highly statistically significant differences between patients and controls with regard to bloating in reaction to all the IBS images. The strength of association was most marked for the ‘pregnancy’ [ $t(113) = 5.494$ ;

$P < 0.001$ ; IBS patients: mean = 81.7 and healthy volunteers: mean = 57.9] and the ‘red balloon inside the tummy’ [ $t(173) = 5.825$ ;  $P < 0.001$ ; IBS patients: mean 80.4 and healthy volunteers: mean 64.9]. Even in the ‘non-IBS painful’ images and the neutral images, a significant proportion of patients saw bloating.

**Pain.** With regard to the IBS images, patients associated all of them, except the ‘knife stabbing the side of

**Table 1.** Responses to 'which painting best illustrates your irritable bowel syndrome?'

Painting no.	Painting description	Score
1a	Pregnancy	157
1b	Red balloon inside the tummy	109
1c	Hands squeezing colon	66
1d	Knife stabbing the side of the stomach	63
1e	Toilets	62
1f	Vice tightly clenching stomach	59
1g	Knotted colon	57
1h	Volcanic bubbles	46
1i	Volcano inside tummy	42
1j	Sore intestines	30
1k	Rotting moss, mushrooms and fungi in colon	9
1l	Laughing gremlin in the squat position	0

the stomach', with significantly more pain. The strength of association was higher in all and reached significance in all except the 'pregnancy' with the most dramatic differences being seen for the 'hands squeezing the colon' [ $t(139) = 4.912$ ;  $P < 0.001$ ; IBS patients: mean = 78.5 and healthy volunteers: mean = 60.1] and 'red balloon inside the tummy' [ $t(154) = 5.115$ ;  $P < 0.001$ ; IBS patients: mean = 74.7 and healthy volunteers: mean = 57.8]. When the 'non-IBS painful' images were considered, patients and controls equally associated them with pain, but the strength of the association was significantly greater in all except for 'the person standing on a piece of broken glass'. Even for neutral images, a proportion of patients related them to pain and this reached significance for the 'abstract purple landscape' (Fisher's exact test:  $P < 0.001$ ; IBS patients = 17% vs. healthy volunteers = 1%) and the 'fluffy clouds' (Fisher's exact test:  $P < 0.007$ ; IBS patients = 11% vs. healthy volunteers = 0%).

**Discomfort.** For discomfort, the results were similar to pain with IBS patients rating the strength of the association more than controls for all images with the difference reaching significance for all the IBS images and half the 'non-IBS painful' images.

### Reproducibility

'A person scalding their fingers with boiling water' (Figure 3d) and 'a knife stabbing the side of the

stomach' (Figure 1d) were repeated at the end of the viewing sequence to assess reproducibility and to ascertain whether the process induced fatigue. The IBS and control data were pooled resulting in 200 responses, which could then be compared with the original 200 responses as to whether or not the images were suggestive of bloating, pain or discomfort and if so, the degree of association.

*Person scalding their fingers with boiling water.* With regard to bloating, pain and discomfort, 189 (94.5%), 197 (98.5%) and 194 (97%) respectively gave exactly the same response to this image. With respect to the strength of association of bloating, pain and discomfort to the image, 71–87% of individuals gave a rating within 20 mm of their original response.

*Knife stabbing the side of the stomach.* With regard to bloating, pain and discomfort, 191 (95.5%), 198 (99%) and 197 (98.5%) respectively gave exactly the same response to this image. With respect to the strength of association of bloating, pain and discomfort to the image, 86–95% of individuals gave a rating within 20 mm of their original response.

### Symptom severity

It was observed that 8% of IBS patients were mild, 28% moderate and 64% severe. The data were then analysed to establish whether there was a relationship between the individual pain and bloating scores, derived from the IBS Symptom Severity Score and the strength of association with each of the images in terms of pain or bloating (Figure 5). This revealed a significant positive correlation between bloating severity and strength of association for the 'pregnancy' image only ( $r = 0.421$ ,  $P < 0.001$ ) and a significant correlation between pain severity and the 'hands squeezing the colon' image only ( $r = 0.284$ ,  $P = 0.007$ ).

### IBS bowel habit subtype

It was observed that 38% were constipation-predominant, 28% were diarrhoea-predominant and 34% had an alternating bowel habit. The data were analysed to establish whether there were any differences in the strength of association with a particular image in terms of bloating, pain or discomfort (Figure 5) and

**Table 2.** Spontaneous reactions by irritable bowel syndrome (IBS) patients and healthy volunteers (HV) to IBS, 'non-IBS painful' and neutral images

Painting description	IBS	HV	P-value
Person standing on a piece of broken glass			
Negative (gastro)	87 (1)	94 (0)	n.s. (n.s.)
Positive	0	0	
Red balloon inside the tummy			
Negative (gastro)	90 (74)	80 (44)	$P = 0.048$ ( $P < 0.001$ )
Positive	8	6	
Fluffy clouds			
Negative (gastro)	8 (6)	2 (0)	$P = 0.052$ ( $P = 0.029^*$ )
Positive	70	85	
Person scalding their fingers with boiling water			
Negative (gastro)	99 (2)	95 (0)	n.s. (n.s.)
Positive	0	0	
Knife stabbing the side of the stomach			
Negative (gastro)	99 (17)	91 (1)	$P = 0.009$ ( $P < 0.001$ )
Positive	0	0	
Sunset			
Negative (gastro)	6 (4)	0 (0)	$P = 0.029^*$ (n.s.)
Positive	68	83	
Person accidentally trapping their finger in a drawer			
Negative (gastro)	99 (2)	97 (0)	n.s. (n.s.)
Positive	0	0	
Pregnancy			
Negative (gastro)	44 (37)	10 (2)	$P < 0.001$ ( $P < 0.001$ )
Positive	53	88	
Abstract purple landscape			
Negative (gastro)	19 (11)	5 (0)	$P = 0.002$ ( $P = 0.001$ )
Positive	48	66	
Person accidentally hitting their finger with a hammer			
Negative (gastro)	96 (3)	98 (0)	n.s. (n.s.)
Positive	0	0	
Hands squeezing colon			
Negative (gastro)	90 (61)	69 (38)	$P < 0.001$ ( $P = 0.001$ )
Positive	1	0	
Landscape			
Negative (Gastro)	7 (4)	0 (0)	$P = 0.014^*$ (n.s.)
Positive	85	97	

Response classified as either positive, negative or gastroenterologically orientated with the latter two not being mutually exclusive (i.e. 'gastro' responses are included in the 'negative' category). The primary statistical analysis compared 'negative' vs. any other response between IBS patients and healthy volunteers. As a secondary analysis, 'gastro' responses were compared with all other responses combined.

\* Fisher's exact test.

whether the patient had constipation, diarrhoea or an alternating bowel habit subtype. There were no differences between the different bowel habit subtypes except for the strength of association with the 'pregnancy' and pain and 'pregnancy' and discomfort.

**'Pregnancy' and pain.** The mean values of the strength of association in the patients with constipation, diarrhoea and alternating bowel habit in

'pregnancy' and pain were 77.69, 48.50 and 83.86 respectively, with diarrhoea being much lower than the other two types,  $P = 0.003$ . The Scheffé *post hoc* test revealed a significant difference between constipation and diarrhoea ( $P = 0.022$ ) and alternating bowel habit and diarrhoea ( $P = 0.003$ ).

**'Pregnancy' and discomfort.** The mean values of the strength of association in the patients with

constipation, diarrhoea and alternating bowel habit in 'pregnancy' and discomfort were 71.00, 57.05 and 78.26 respectively, with diarrhoea being much lower than the other two types,  $P = 0.032$ . The Scheffé *post hoc* test revealed a significant difference between diarrhoea and an alternating bowel habit ( $P = 0.033$ ).

## DISCUSSION

The results of this study indicate that, compared to controls, patients with IBS appear to be 'hypersensitive' to visual stimuli. It was anticipated that the main differences in reaction to the images would be that IBS patients would 'identify' with the IBS images, but would not differ in their reaction to the other two groups of images. However, it was found that with respect to their spontaneous reaction, not only did significantly more IBS patients react to the IBS images, but some also perceived neutral images in a negative way or even related them to their abdominal symptoms. Similarly, when prompted, IBS patients exhibited an exaggerated reaction to IBS images and a significant proportion of IBS patients even related the 'non-IBS painful' images to bloating and some of the neutral images to their gastrointestinal problem. Interestingly, even when patients and controls equally related an image to pain or discomfort, the degree to which they related it was without exception higher in the IBS group.

These results lend support to the concept that there is a more generalized sensitivity to endogenous and exogenous stimuli in IBS rather than these individuals just having sensitivity confined to the gastrointestinal tract. One possible way of explaining this is that it occurs at a level where sensory information converges, namely the central nervous system. It would therefore be of considerable interest to assess the response to images such as these using brain scanning techniques, especially as it has recently been shown that reactivity to images is dependent on the beliefs of an individual. In a study comparing brain reactivity to a religious or non religious image, Wiech *et al.*<sup>12</sup> have reported that activation is dependent on the religious conviction of the person being scanned. Thus, it could be hypothesized that the 'mindset' of the IBS patient might dictate that they would react differently to IBS images than controls as has been suggested in the present study. In the future, a comparison of the reaction of patients with other abdominal or pelvic disorders to the images described in this study would be worth

undertaking to determine whether any differences emerge. Alternatively, generating further paintings of the imagery of such patients may be of interest to establish whether their imagery differs in any way from that of IBS.

In both parts 1 and 2 of the study, it was apparent that bloating, as opposed to other symptoms, seemed to feature strongly in the responses of the IBS patients compared to the controls. The 'pregnancy' image was awarded nearly twice as many points as those suggesting pain, discomfort or bowel dysfunction and even male patients identified with it. This was despite the fact that bloating did not score more highly than the other symptoms on the Symptom Severity Score. An additional striking finding was that IBS patients consistently viewed the 'pregnancy' image negatively in contrast to the healthy volunteers who overwhelmingly regarded it as a positive image ( $P < 0.001$ ). There are several possible explanations why bloating should feature in this way. It has been shown that bloating is often ranked by IBS patients as their most bothersome symptom<sup>13</sup> and it is notoriously difficult to treat. In contrast, there are at least some medications that may help improve pain or bowel dysfunction. Another characteristic of bloating is that patients often experience this problem on a nearly daily basis<sup>14</sup> unlike pain, which is not necessarily experienced so frequently, even when severe. In addition, many patients comment that their bloating is so severe that they have to have different sizes of clothes to accommodate their change in girth. This phenomenon has been studied objectively and it has been shown that the girth of some IBS patients can increase by up to 12 cm during the course of the day.<sup>15</sup> Thus, it may be that because bloating has so many different dimensions that can adversely affect an individual that it features so strongly in this study.

One of the major challenges of undertaking research into IBS is the critical importance of ensuring that the population under study is as homogenous as possible. To achieve this goal, especially in the clinical trial setting, it is often traditional to subgroup patients according to their bowel habit even though this can vary over time in many patients, especially those with constipation or a mixed bowel habit.<sup>16</sup> An alternative way of selecting patients would be very useful and it is possible that this might be facilitated by subgrouping together those who identify with a particular image, especially if a picture or series of pictures were thought to mirror the potentially desired activity of a

medication. For instance, it could be conceived that the 'vice tightly clenching the stomach' (Figure 1f), the 'knotted colon' (Figure 1g), the 'hands squeezing the colon' (Figure 1c) and the 'knife stabbing the side of the stomach' (Figure 1d) would all be indicative of spasm and could possibly be used to select patients for a trial of an antispasmodic medication. Conversely, Figure 1e,h,k would be expected to relate more to bowel dysfunction. For any future use of IBS images, it would be reasonable to show patients much larger numbers of images from which to choose, as the number was limited to only four in this study for the practical reason that similar numbers of comparator images were required and it was important not to overwhelm participants with too many images.

Rectal hypersensitivity is a consistent finding in up to two-thirds of patients with IBS.<sup>17</sup> However, its detection is dependent on the relatively invasive technique of some form of balloon distension of the rectum<sup>18</sup> and a non-invasive way of identifying this physiological abnormality would have considerable utility for a variety of research purposes. The Visceral Sensitivity Index<sup>19</sup> is a questionnaire that has been developed to measure gastrointestinal symptom-specific anxiety and it would be of interest to ascertain whether any particular image from Figure 1 correlated with rectal hypersensitivity as determined by a barostat. Alternatively, it may be necessary to ask patients during a barostat examination what imagery this evokes so that specific imagery related to rectal hypersensitivity can be painted as opposed to the images used in the present study, which were more related to how patients with IBS perceive their illness as a whole.

We have previously shown that recording imagery can be useful in predicting outcome to hypnotherapy and that these images can change substantially follow-

ing successful treatment.<sup>1</sup> In particular, images were very symptom-specific before successful treatment, but thereafter became abstract with no obvious gastrointestinal connotations. This observation suggests that imagery is a dynamic process dependent on symptoms, which actually reflects what the patient is feeling. The results of this study suggest that these images and perhaps ones specifically created for a particular purpose could also be used in another way. That is to be shown to individuals so that their reaction can be assessed. The potential of such an approach has already been confirmed by the now widespread use of the Bristol Stool Form Scale<sup>20</sup> as a method of documenting stool consistency, which saves the patient the embarrassment of having to find words for something that is difficult to describe. Similarly, it is often difficult for patients with functional gastrointestinal disorders to put into words how they feel and this may be a simple way of overcoming this barrier. The use of these and similar images could have application in helping the understanding of functional gastrointestinal disorders as well as opening up possible new avenues of future research.

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