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A cross-cultural investigation of attachment style, catastrophizing, negative pain beliefs, and symptom severity in irritable bowel syndrome

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Key Messages

- Main conclusion: Psychological features of patients with IBS, including attachment style, never before studied in IBS and found to differ between patients and controls, may vary significantly depending on geographical location.
- Aims of the research: To determine whether attachment style differed between IBS patients and healthy controls, whether attachment, catastrophizing and negative pain beliefs varied by geographic location, and how these variables correlated with IBS symptom severity.
- Basic methodology: 50 IBS patients (463 patients) and 20 healthy controls (192 controls) in nine sites across the globe completed the IBS symptom severity scale, attachment, catastrophizing and negative pain belief questionnaires and questions regarding health visits.
- Results: Attachment style (secure vs insecure) differed significantly between patients and controls. All three psychological measures varied significantly by geographic site, correlated with symptom severity and attachment style affected number of health visits and consultations.

Abstract

Background *Little information exists regarding whether psychosocial variables in irritable bowel syndrome (IBS) vary by geographic location. Adult attachment is an important psychological concept rooted in childhood relationship experience that has not been previously studied in IBS. Catastrophizing and negative pain beliefs have been described in IBS and may be affected by attachment. Aims: In this cross-cultural study, we determined: (i) whether attachment differs between IBS patients and controls, (ii) whether geographic location has a significant effect on attachment style, catastrophizing and negative pain beliefs, and (iii) how all three variables correlate*

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with IBS symptom severity. ***Methods*** *463 IBS patients, with moderate to severe symptom scores, and 192 healthy controls completed validated questionnaires about attachment, catastrophizing, negative pain beliefs and IBS-SSS in nine locations, USA (New York, Los Angeles), Mexico, Italy (Rome, Bari), Romania, Iran, India, and China.* ***Key Results*** *Attachment anxiety and avoidance scores were significantly higher in IBS patients than in controls ($p < 0.001$). This was particularly true for the fearful-avoidant attachment category, especially in China and Romania. Path analysis showed that attachment anxiety and avoidance had indirect effects on IBS-SSS through catastrophizing ($p < 0.0001$) and negative pain beliefs ($p = 0.005$). All three psychosocial measures varied significantly depending on location.* ***Conclusions & Inferences*** *In the IBS population studied, attachment style was significantly different in IBS compared to a control population. Geographic differences in attachment, catastrophizing and negative pain beliefs were documented and their correlation with symptom severity and thus, research of psychosocial variables in IBS should take into account the location of the population studied.*

Keywords *attachment, catastropohizing, cross-cultural, irritable bowel syndrome, negative pain beliefs.*

Abbreviations: CSQ, Coping Strategies Questionnaire; ECR, Experience in Close Relationship; IBS, irritable bowel syndrome; IBS-SSS, Irritable Bowel Syndrome-Symptom Severity Scale; INTRP, Inventory of Negative Thoughts in Regard to Pain.

INTRODUCTION

This cross-cultural research study focuses on three psychological variables in irritable bowel syndrome (IBS) patients, attachment style, never previously investigated in IBS, catastrophizing, and negative pain beliefs. The attachment paradigm is a major focus of psychological research today including its relevance to health maintenance and chronic pain syndromes.[1] In several recent reviews, attachment insecurity in adulthood was related to negative health behaviors, health outcomes, and problematic health conditions.[2,3] Further research was recommended, including study of chronic illness, pain conditions, and mediating processes. Conceptually, attachment has an evolutionary origin, enabling children to feel safe from predators and other dangers through their relationship with a protective parent or primary caregiver.[4–7] On the basis of empirical studies, the experience of threat, whether external danger, internal discomfort, or perceived absence of caregiving, can elicit an attachment style that either is well-regulated (secure), hyperactivated (anxious-preoccupied), deactivated (dismissing-avoidant), or a combination of both (fearful-avoidant).[8]

Adults who have a secure attachment style are capable of identifying attachment figures who can provide support and comfort in times of need, shown to be helpful to patients with IBS.[9] Anxious-preoccupied attachment represents a strong desire for closeness and protection compromised by worry about availability of a support figure and one's value to that person. Dismissing-avoidant attachment includes discomfort with closeness and a need to maintain emotional distance and self-reliance. Fearful- avoidant attachment indicates a desire for closeness compromised by fear.[8] While attachment has been extensively studied in the psychological literature and in relation to some chronic medical illness such as diabetes and asthma[10–12] it has never been assessed in IBS.

An essential component of the definition of IBS is abdominal pain. Attachment anxiety has been linked to lower somatic pain thresholds, diminished perceptions of control over pain and a negative view of one's ability to cope with pain.[13,14] Negative beliefs about pain, e.g. its interminability, have been correlated with increased symptom severity in IBS.[15] McWilliams and Asmundson have reported that individuals with anxious or avoidant attachment have negative models of self and others, and report greater levels of negative pain beliefs.[16] Pain catastrophizing, also a feature of difficult attachment, has been found to significantly correlate with pain intensity and maladaptive coping.[17–21]

Irritable bowel syndrome has a world-wide distribution.[22] Most studies of IBS have been restricted to one locale or region of the world.[23] Comparisons of different locations have mostly focused on incidence rates. While early surveys reported a higher incidence in Europe and North America, more recent reports describe a rising incidence in rapidly developing areas such as Asia.[24] There have been only a few investigations of IBS on a global scale. In one eight country report,[25] symptoms such as constipation, diarrhea, and bloating showed significant differences among geographic sites. In the same investigation, there were also significant differences in the effect of some psychological variables on symptom severity.[8]

This study was designed to compare attachment, catastrophizing, and negative pain beliefs in IBS patients at nine sites, to compare attachment in patients and in healthy controls, to correlate psychological variables with each other and with IBS

symptom severity. We hypothesized that IBS patients would have an insecure attachment style and that the psychological variables that we measured would vary geographically, representing cross-cultural differences.

SUBJECTS

Patients with IBS and healthy controls were recruited from nine different sites around the globe, the USA (New York and Los Angeles), Mexico (Mexico City), Italy (Rome and Bari), Romania (Cluj), Iran (Teheran), India (Lucknow), and China (Beijing). At each site, approximately 50 IBS patients and 20 healthy controls, matched by gender and age, were asked to complete questionnaires. Patients were recruited consecutively with few exceptions and were felt by the investigators to be representative of the IBS population at their location. IBS patients met Rome III criteria[26] and were mainly seen at tertiary care centers, though the concept of tertiary may vary somewhat according to site. There were a few exceptions. Patients in Bari had been referred to a hospital-based psychosomatic unit, some patients in Los Angeles had responded to ads and some patients in India, while seen by an IBS specialist, were self-referred directly to the specialist. Patients with evidence of organic gastrointestinal disease such as inflammatory bowel disease, peptic ulcer, diverticulitis, and colorectal cancer were excluded.

In addition to gender and age, subjects recorded number of years since diagnosis of IBS, years of education, number of specialists seen, number of health care visits in the previous year, and current predominant bowel pattern. The only exclusion criteria were age below 18 or self-reported major psychiatric disorders.

Measures

Attachment Patients and controls completed the Experience in Close Relationship (ECR), a highly validated instrument for attachment style.[27] It is a continuous measure that yields a score for attachment anxiety and attachment avoidance. It consists of 35 randomly arranged questions such as: 'I worry about being alone; I try to avoid getting too close to others'. A higher score indicates greater anxiety and avoidance. While the ECR is a continuous measure, anxiety and avoidance scores can be converted into the four basic attachment categories, described previously: secure, anxious-preoccupied, dismissing-avoidant, and fearful-avoidant.[28]

The IBS Symptom Severity Scale This is a five part validated scale that asks patients to quantify their IBS experience over the previous 10 days.[29] It has a maximum score of 500. Scores lower than 75 are considered remission, 75 to <175 mild, 175 to <300 moderate, and scores >300 indicate greater symptom severity.

The Catastrophizing Scale of the Coping Strategies Questionnaire This is a validated 6 item self-report measure of catastrophizing.[30] Participants rate items on a seven-point scale from 0 for 'Never' to 6 for 'Always'. It describes a sense of being overwhelmed or hopeless, particularly during a pain experience. A sample item is: 'It is terrible and I feel it is never going to get any better'. A higher score indicates greater catastrophizing.

Inventory of Negative Thoughts in Regard to Pain This questionnaire has been validated and consists of 21 questions with three subscales, negative self-statements, negative social cognitions, and self-blame.[31] Respondents to the Inventory of Negative Thoughts in Regard to Pain (INTRP) indicate how frequently they experience each negative thought during a flare-up of pain using a 5-point Likert-type rating scale, where a rating of 1 indicates 'Never' and a rating of 5 indicates 'Always'. Examples are: 'I am useless'; 'I cannot control this pain'; 'I must have done something to bring on this pain'. It examines how cognitions and beliefs relate to psycho-social functioning in populations who experience chronic pain. A higher score indicates higher frequency of negative statements.

Health care visits Patients were asked to answer two questions in regard to prior health care. One question addressed the following: 'How many health care visits have you had in the past year?' and the other asked: 'How many consultants have you seen for your gastrointestinal symptoms?' Answers for both questions were either 0 to 1, or 2 or more.

Questionnaires had either already been translated into other languages or were translated following a standard protocol[32] the back-translation method wherein questionnaires were first translated into the local language, then retranslated back to English by a bi-lingual individual and differences then adjudicated. The ECR has already been translated into Italian, Spanish, and Chinese. All research centers had received approval by local review boards.

Statistical methods

Descriptive statistics (mean ± SD for continuous variables, frequency distributions for nominal variables)

were computed for all variables. Patients and controls within each site were compared using *t*-test for continuous variables and Pearson chi-squared test for nominal factors. Results across sites were compared using ANOVA with Scheffé *post hoc* test for continuous variables and chi-squared test for nominal factors. Power analysis showed that our sample size of 50 cases per site, assuming the observed standard deviation of 1.21 for both anxiety and avoidance scores, provided power of 91.8% to detect a difference in the mean scores of 0.1 per site.

Both continuous and categorical attachment scores were compared between IBS and controls and geographical sites. The four attachment categories were created by dichotomizing the anxiety score and the avoidance score at the median value among controls across all sites (3.556 for anxiety and 2.833 for avoidance). The four groups were then labeled as: secure (low on both), dismissing-avoidant (low anxiety, high avoidance), preoccupied (high anxiety, low avoidance), and fearful-avoidant (high on both).[24]

Irritable Bowel Syndrome-Symptom Severity Scale (IBS-SSS) scores were compared within IBS patients across attachment categories using ANOVA with Scheffé *post hoc* tests. A *p*-value of <0.05 was considered to be significant.

Path analysis was performed, using PROC CALIS in SAS version 9.3, to test the model. Path analysis allows us to estimate and test both the direct effects of anxiety and avoidance on symptom severity and their indirect effects through their relationship to catastrophizing and negative pain beliefs.

RESULTS

Clinical characteristics

Clinical characteristics of IBS patients and controls are shown in Table 1. For the entire study cohort, there was no significant difference in age or gender between patients and controls. However, patients were older than controls in Iran and Romania. In addition, there was a lower predominance of women in the IBS patient *vs* control group in India and Rome. When correlation of gender with attachment anxiety and attachment avoidance was assessed, there was no significant gender effect, both for patients and for controls. Years of education were comparable at all sites with the exception of Mexico and New York where the mean was slightly higher. Symptom severity scores were fairly comparable, all in the moderate severity range with the exception of Bari and Romania, in the severe category (Table 1).

Attachment in IBS patients *vs* controls

Anxious and avoidant attachment scores were significantly higher in patients than in controls (Fig. 1). Because differences varied considerably depending on site, the scores were controlled for geographic site and anxiety ($p < 0.0002$) and avoidance ($p < 0.01$) scores

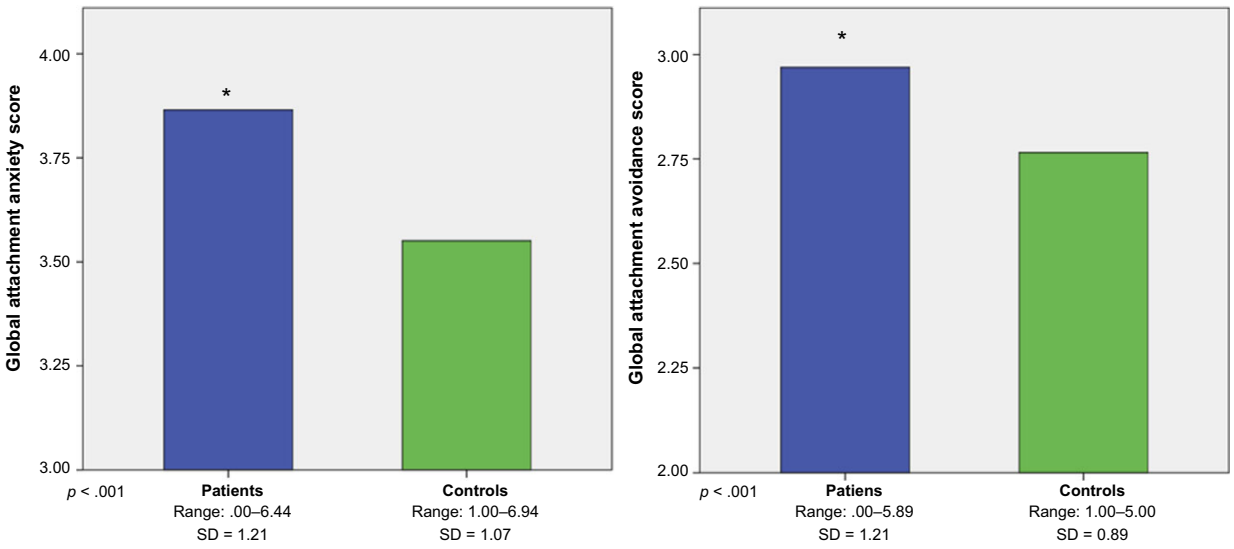

Figure 1 Attachment anxiety and avoidance in patients *vs* controls. Mean attachment anxiety scores were higher in patients ($p < 0.001$, range = 0–6.44, SD = 1.21) than controls (range = 1.00–6.94, SD = 1.07). Mean attachment avoidance scores were higher in patients ($p < 0.001$, range = 0.00–5.89, SD = 1.21) than controls (range = 1.00–5.00, SD = 0.89).

Table 1 Clinical characteristics

	Aggregate		New York		Los Angeles		Mexico		Rome		Bari		Romania		Iran		India		China	
Location	*P*	*C*	*P*	*C*	*P*	*C*	*P*	*C*	*P*	*C*	*P*	*C*	*P*	*C*	*P*	*C*	*P*	*C*	*P*	*C*
n	463	193	50	20	51	20	50	20	50	21	50	20	50	20	50	22	50	20	62	30
% Females	66	65	68	65	75	55	79	72	76****	52	74	75	66	65	72	77	34*	75	52	57
Mean age	39	38	38	36	34	35	38	45	39	44	35	36	42***	35	41**	32	37	40	41	43
IBS-SSS																				
Mean	277		298		248		257		239		309		361		220		285		278	
±SD	85		83		70		85		70		88		59		83		87		56	
Years of IBS																				
Mean	10		16		9		14		5		5		9		9		7		12	
±SD	11		18		8		15		5		5		7		11		6		8	
Years of education																				
Mean	14		18		14		17		15		13		13		13		13		14	
±SD	5		5		4		3		5		4		3		4		5		4	

*$p = 0.002$; **$p = 0.001$; ***$p < 0.001$; ****$p = 0.05$.

remained higher in patients. When the distribution of the four attachment categories was compared between patients and controls, the difference was highly significant ($p = 0.0002$; Table 2). 41.7% of patients across all sites combined had fearful-avoidant attachment *vs* 28.1% of controls ($p < 0.001$). These results indicate that attachment patterns differ from controls in the moderately severe IBS patients who were studied.

Geographic distribution of measures

There were significant group differences for attachment, catastophizing, and negative pain beliefs across the entire spectrum of geographic sites ($p < 0.001$; Fig. 2). Attachment avoidance was higher in patients than in controls in China ($p < 0.0001$), Romania ($p < 0.0001$), and Mexico ($p < 0.01$) while attachment anxiety was higher in China ($p < 0.0001$). When attachment categories were compared across all sites, the difference in category distribution was also highly significant ($p < 0.0001$; Table 2). Individual sites where attachment scores of patients were statistically different from controls included Mexico, Rome, Romania, India, and China. Almost all of the patients in China and Romania were in the fearful-avoidant category (Table 2). Coping Strategies Questionnaire (CSQ; $p < 0.05$) and INTRP ($p < 0.05$) scores were higher in Romania than the other seven sites (Fig. 3B and C, respectively). Rome, Mexico, New York, and Los Angeles tended to have the lowest values for both CSQ and INTRP.

Correlation between anxiety and IBS-SSS was significant in China ($p < 0.001$) and Bari ($p < 0.001$) (Table 3 A) and between avoidance and IBS-SSS only in China ($p < 0.001$; Table 3 B). Attachment anxiety strongly correlated with CSQ (catastrophizing) scores in all of the sites except Mexico and with self-statements and social cognitions for every geographic site and for self-blame, every site but Rome and India. Attachment avoidance correlated with CSQ scores in China and Los Angeles, with self-statements and social cognitions in China, Los Angeles, Mexico, New York, and Romania and for self-blame in China, Los Angeles, New York, and Romania. These results show that there is marked variation in psycho-social variables, both in absolute values and in inter-relationships, depending on geographic location.

Relationships between attachment, catastrophizing, negative pain beliefs and IBS symptom severity. Using path analysis, anxiety and avoidance attachment scores were not positively associated with IBS-SSS but they were significantly associated with catastrophizing and negative pain beliefs which were both, in turn, significantly associated with IBS-SSS (Fig. 3). The positive coefficients indicate that an increase in catastrophizing and negative pain beliefs is associated with an increase in symptom severity. Thus, attachment anxiety and avoidance appear to have an indirect effect on symptom severity through the mediating effects of catastrophizing and negative pain beliefs.

Unilinear correlations were significant between attachment scores and symptom severity, catastrophizing (Table 3) and negative pain beliefs (Table 3). Attachment anxiety ($p = 0.000$, $r = 0.360$) and attachment avoidance ($p = 0.000$, $r = 0.265$) were significantly correlated with negative self-statements and also strongly correlated with catastrophizing (Fig. 4). The relationship between attachment and IBS-SSS varied by attachment category since IBS-SSS was significantly higher in fearful

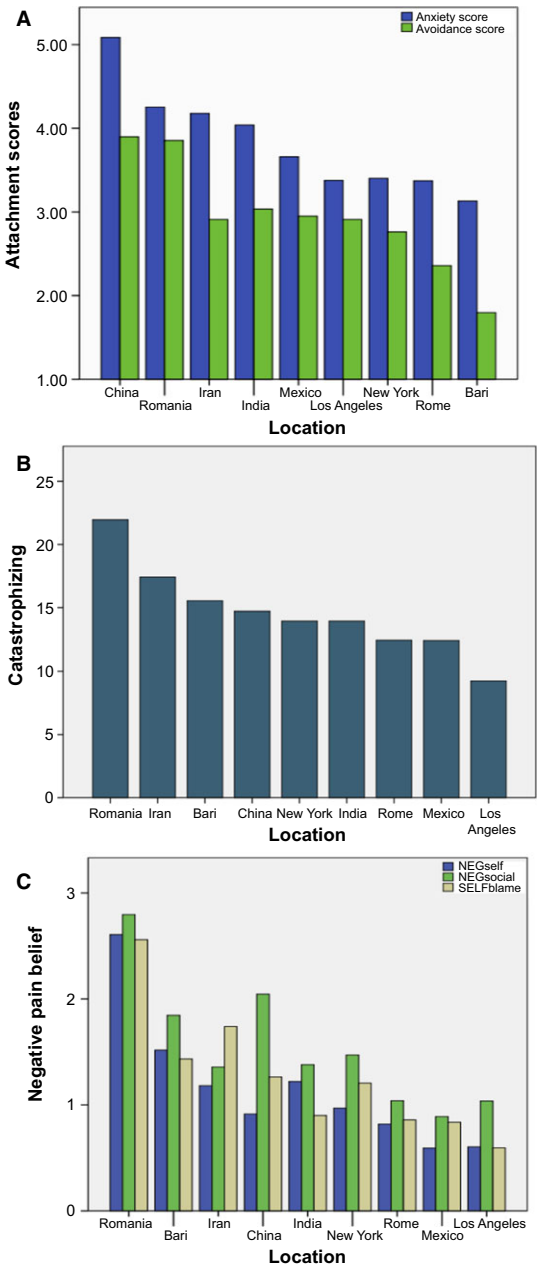

Figure 2 Attachment, catastrophizing, and negative pain beliefs across geographic sites. (A) Attachment scores, (B) catastrophizing, and (C) negative pain beliefs. Attachment anxiety was higher in China ($p < 0.0001$) than the other seven sites. CSQ (<0.05) and INTRP ($p < 0.05$) scores were higher in Romania than the other seven sites.

avoidant attachment than in secure attachment (295 *vs* 259, $p < 0.001$).

Attachment scores and health care visits. There was a significant relationship between attachment style and number of health care visits. Anxious attachment scores were significantly higher in patients with two or more health visits ($p = 0.047$)

Table 2 Attachment categories for patients and controls

Attachment category	Aggregate	New York	Los Angeles	Mexico	Rome	Bari	Romania	Iran	India	China
Secure										
P	118 (25%)	22 (44%)	18 (35%)	14 (28%)	23 (46%)	20 (40%)	0	9 (18%)	12 (24%)	0
C	57 (30%)	7 (35%)	8 (40%)	12 (60%)	3 (14%)	11 (55%)	1 (5%)	8 (36%)	1 (5%)	6 (20%)
Dismissing-avoidant										
P	52 (11%)	6 (12%)	11 (22%)	9 (18%)	1 (2%)	8 (16%)	1 (2%)	10 (20%)	6 (12%)	0
C	43 (20%)	5 (25%)	6 (30%)	3 (15%)	8 (38%)	0	3 (15%)	5 (23%)	11 (55%)	2 (7%)
Preoccupied										
P	100 (22%)	6 (12%)	8 (16%)	12 (24%)	11 (22%)	21 (42%)	1 (2%)	16 (32%)	11 (22%)	14 (23%)
C	39 (20%)	2 (10%)	3 (15%)	4 (20%)	5 (24%)	7 (35%)	6 (30%)	4 (18%)	4 (20%)	4 (13%)
Fearful-avoidant										
P	193 (42%)	16 (32%)	14 (27%)	15 (30%)	15 (30%)	1 (2%)	48 (96%)	15 (30%)	21 (42%)	48 (77%)
C	54 (28%)	6 (30%)	3 (15%)	1 (5%)	5 (24%)	2 (10%)	10 (50%)	5 (23%)	4 (20%)	18 (60%)
p-value	0.0002*	0.65	0.72	0.042†	0.0003†	0.085	<0.0001†	0.31	0.0018†	0.0002†

*Represents significant difference between patients and controls across all four categories. †Represents significant difference in category distribution, compared to the other eight sites.

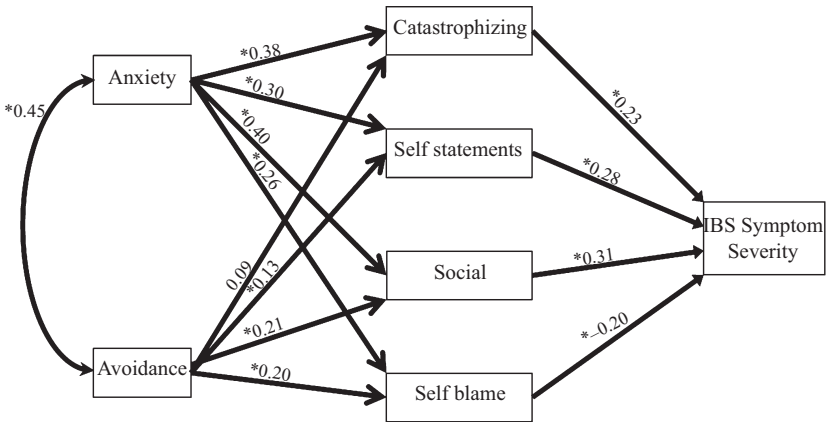

Figure 3 Path analysis. Numbers indicate standardized coefficients. All relationships were positively correlated except anxiety and IBS-SSS, avoidance and IBS-SSS and avoidance and catastrophizing.

than patients with 0–1 visits. Avoidance attachment scores were significantly higher in patients with 0–1 consultations than in patients with two or more consultations ($p = 0.0002$). After controlling for multiple comparisons across sites, there were few significant differences. Bari and India had higher number of visits in the past year than three other sites, as did Bari for GI consultations.

DISCUSSION

There were two major findings in this study. Firstly, attachment style, an important psychological concept not previously studied in IBS, was significantly different in patients compared to controls. Secondly, the psychological profiles of IBS patients, including attachment, catastrophizing, and pain beliefs were significantly different in different geographic locations.

A main focus of this study was an examination of attachment in IBS. While there was a significant difference between patients and controls in the aggregate, this was true for five of the nine geographic sites. Thus, assessment restricted to one of the other four sites such as New York or Los Angeles would have led to a null conclusion. This underlines the importance of cross-cultural research, at least in regard to psychological variables in IBS.

The rationale for investigating attachment as a possible psychological variable in IBS patients was twofold, its conceptual origins in childhood relationships which have been significant in prior IBS research, and the association between insecure attachment and chronic illness. The predominant fearful-avoidant attachment style found in some patients with IBS represents both anxiety and avoidance and has been associated with health status in numerous reports.[1,3,5] It correlates with depression[6,7] and with reports of severe punishment and trauma during childhood[33,34] reflecting the relationship between childhood experience and adult illness, similar to reports of early adverse life events in IBS.[35] In a longitudinal study,[9] adults who had been defined as insecurely or securely attached at age two, were evaluated thirty years later. The insecure group was found to have six times as many physical illnesses over their life-time as the secure group. In terms of current coping, individuals with fearful-avoidant attachment are not likely to seek the support of significant others, because of fear of rejection and denial of their need for help. Research indicates that patients with IBS who have greater family support have lower IBS symptom severity.[8] Furthermore, from a biological perspective, attachment anxiety is related to increased cortisol production.[36] Increased cortisol levels have also been documented in IBS in both basal and stimulated conditions.[37]

We also looked at the relationship between attachment style and IBS symptom severity. Using path analysis which incorporates the effects of catastrophizing and negative pain beliefs, attachment anxiety and avoidance did not correlate directly with symptom severity but they each had an indirect effect on IBS-SSS via their relationship with catastrophizing and with negative pain beliefs. A contribution of our study was the finding that attachment anxiety is highly correlated with catastrophizing and with negative beliefs.

Both catastrophizing and pain beliefs have been investigated in prior studies of IBS. Lackner *et al.* found that IBS patients who engage in catastrophic thinking reported higher levels of symptom severity.[38] In an

Table 3 Correlations between attachment anxiety (A) and attachment avoidance (B) and symptom severity, catastrophizing and negative pain beliefs for all sites

		Symptom severity		Neg self statements		Neg social		Self blame		CSQ	
Location	*n*	*r*	*p*	*r*	*p*	*r*	*p*	*r*	*p*	*r*	*p*
(A)											
All combined	463	0.14	0.003	0.36	<0.001	0.50	<0.001	0.35	<0.001	0.42	<0.001
New York	50	−0.015	0.92	0.53	<0.001	0.63	<0.001	0.57	<0.001	0.47	<0.001
Los Angeles	51	−0.011	0.94	0.33	0.019	0.35	0.012	0.28	0.049	0.4	0.004
Mexico	50	0.01	0.94	0.32	0.026	0.37	0.009	0.26	0.07	0.13	0.35
Rome	50	0.18	0.20	0.27	0.06	0.44	0.002	0.21	0.15	0.30	0.032
Bari	50	0.49	<0.001	0.61	<0.001	0.68	<0.001	0.47	0.01	0.59	<0.001
Romania	50	−0.009	0.95	−0.32	0.026	−0.34	0.017	−0.34	0.017	0.56	<0.001
Iran	50	0.028	0.85	0.66	<0.001	0.62	<0.001	0.46	<0.001	0.47	<0.001
India	50	0.12	0.42	0.36	0.01	0.43	0.002	0.19	0.19	0.46	<0.001
China	62	0.75	<0.001	0.76	<0.001	0.84	<0.001	0.79	<0.001	0.8	<0.001
(B)											
All combined	463	0.14	0.003	0.26	<0.001	0.39	<0.001	0.32	<0.001	0.26	<0.001
New York	50	−0.01	0.92	0.38	0.007	0.46	<0.001	0.44	0.001	0.26	0.07
Los Angeles	51	0.08	0.56	0.45	<0.001	0.49	<0.001	0.51	<0.001	0.49	<0.001
Mexico	50	0.21	0.15	0.29	0.045	0.36	0.012	0.12	0.41	0.11	0.44
Rome	50	0.09	0.54	0.1	0.5	0.26	0.07	0.2	0.16	0.16	0.26
Bari	50	−0.09	0.54	−0.08	0.58	−0.15	0.29	−0.09	0.53	−0.03	0.83
Romania	50	0.27	0.06	0.63	<0.001	0.52	<0.001	0.55	<0.001	−0.13	0.36
Iran	50	0.01	0.94	0.02	0.91	0.25	0.08	0.075	0.6	0.15	0.3
India	50	−0.04	0.78	0.21	0.14	0.2	0.17	0.21	0.15	0.2	0.17
China	62	0.63	<0.001	0.73	<0.001	0.82	<0.001	0.76	<0.001	0.73	<0.001

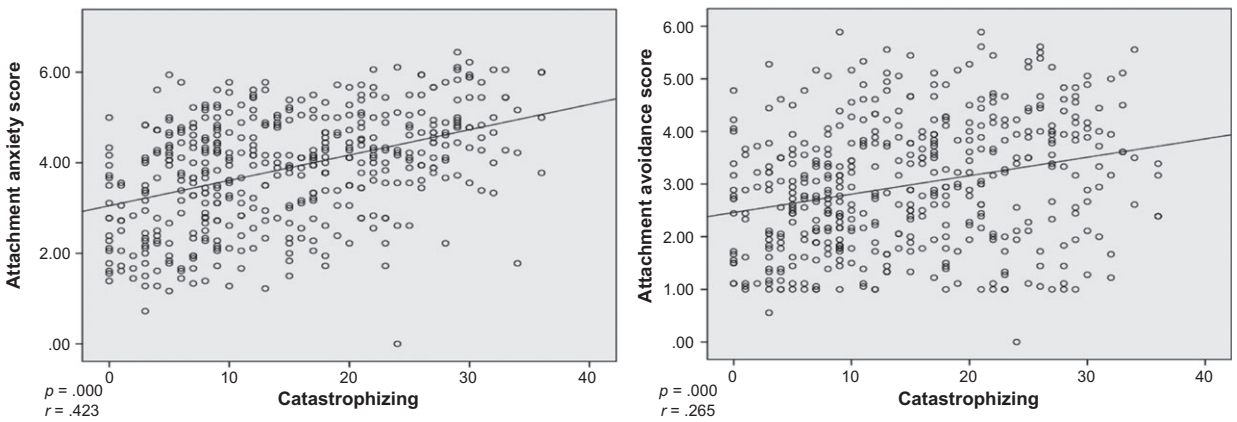

Figure 4 Correlations between attachment and catastrophizing. Attachment anxiety ($p = 0.000$ $r = 0.423$) and attachment avoidance ($p = 0.000$, $r = 0.265$) were significantly correlated with catastrophizing.

investigation of belief systems of IBS patients, a greater belief that IBS was mysterious or long enduring correlated with higher symptom severity.[14] In a controlled study of mindful meditation and IBS, a reduction in negative appraisal and catastrophic reaction to pain was correlated with improvement of symptoms.[39] A gut-directed hypnotherapy study[40] reported that a reduction in symptom severity score following treatment correlated with a reduction in negative IBS-related pain beliefs.

Path analysis has been utilized in a previous study of the relationship between generalized anxiety, catastrophizing, somatization, and IBS symptom severity.[41] Similar to our results, anxiety had an indirect effect on symptoms via catastrophizing and somatization.

The other major focus of this investigation was the impact of geographic location on the results. IBS has been described as a biopsychosocial condition[42] and we hypothesized that psychological variables regarding childhood experience as reflected by attachment, and

by pain beliefs may be affected by local culture. There is an extensive literature addressing the effect of local cultural beliefs on health.[43,44] In the current investigation there were major geographic differences in levels of attachment, catastrophizing and negative pain beliefs between widely dispersed locations. Variation in attachment results were particularly striking in China and Romania where all IBS patients were categorized as fearful-avoidant and none were securely attached, as well as in India. China and Romania have both experienced historical change with a concomitant unstable social structure and this may have affected parent-child relationships and attachment patterns. Notably the majority of Chinese controls were also categorized as fearful-avoidant but results were significantly different from Chinese patients. Catastrophizing scores were twice as high in Romania than in Los Angeles and negative pain belief scores relatively higher in Romania, Bari, Iran, and China compared to India, New York, Rome Mexico, and Los Angeles.

In a prior multinational investigation of illness beliefs and the relationship between family relationships and IBS symptom severity in eight countries across the globe, some geographic differences were noted.[8] Chinese patients had the lowest family support and depth and it is possible that low levels of family support in China may have contributed to the predominance of fearful-avoidant attachment among Chinese subjects in our study. India had the highest family conflict and one hypothesis was that change in family structure in both countries, from the extended family to the nuclear family, access to health care and migration from rural to urban communities with its associated stress may have contributed to the results. There is very little data in the literature regarding cross-cultural differences in catastrophizing or negative pain beliefs. One study compared negative pain beliefs in white Australians, Chinese Taiwanese, and Chinese Singaporean undergraduate nursing and physical therapy students.[45] Both Chinese groups had significantly more negative pain beliefs regarding future consequences of low back pain. It was proposed that their belief in traditional medicine may have affected their beliefs about pain.

Our findings can be helpful in guiding physicians who treat IBS patients. Physicians may find fearful-avoidant patients particularly frustrating because they deny their need for help, and yet are anxious about being neglected. Studies have documented associations between attachment difficulties and the quality of the doctor-patient relationship[46] including compliance with treatment recommendations.[47] One article reported that emergency room patients with insecure attachment, particularly the fearfully-avoidant category, were judged difficult by their treating physician.[48] This compromised patient–physician relationship may affect health care visiting patterns.

We found that patients with anxious attachment had significantly increased number of health care visits, while patients with avoidant attachment had decreased consultations. This finding is consistent with a study that demonstrated decreased primary care visits in avoidantly attached patients, controlling for severity of symptoms.[11] It was replicated in a study of fearfully avoidant women in a primary care setting, again in spite of higher symptom levels.[47]

However, if anxious or avoidant attachment is recognized, the physician may respond more empathically to the ambivalent need for help. It is crucial that the physician maintain a position of steady and active concern regarding the patient's well-being, in spite of the seeming dismissal of medical expertise, so that the physician can be experienced as much as possible as a reliable attachment figure.

There are some limitations in this study. While the global reach of this study is broad, 50 patients at each site was a limited sampling of the local IBS population. Geographic locations were mainly urban and most patients were seen at referral centers. Therefore, these results may not apply to IBS patients seen by primary care physicians or those living in the community. While patients were seen at tertiary medical centers, patients in Bari attended a psychosomatic hospital clinic and psychological variables among the study subjects, not measured, may have affected the results. Clearly, there is a limit to knowing exactly how the patient populations resembled each other but the investigators were experienced IBS researchers who felt that their subjects were typical of their IBS patients. In addition, symptom severity scores were moderate at all sites with the exception of Romania and Bari. We assessed socio-economic status through education, because it seemed most universal as a demographic, and results were fairly comparable, but we did not investigate income or occupation.

In conclusion, we have demonstrated that patients with moderate or severe IBS seen at tertiary centers, have significantly greater insecure attachment style when compared to healthy controls and that the results are significantly impacted by geographic location. In addition, attachment has an indirect effect on symptom severity via catastrophizing and negative pain beliefs with some geographic differences in these variables as well. Explanation for these differences requires further research but underlines the need for cross-cultural research in functional gastrointestinal

disorders, certainly with regard to psychometric studies. Finally, increasing a physician's awareness of an IBS patient's attachment patterns may help physicians connect with seemingly difficult and resistant patients and improve quality of care.

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CONFLICTS OF INTEREST

None in relation to this article.

AUTHOR CONTRIBUTION

CG codesigned the study, collected data, analyzed the data, wrote the manuscript, and approved the final draft of the article; M-JG codesigned the study, analyzed the data, wrote the manuscript and approved the final draft of the article; LC collected data, helped edit the manuscript and approved the final draft of the article; EC collected data and approved the final draft of the article; DD collected data and approved the final draft of the article; UG collected data and approved the final draft of the article; PP collected data, helped edit the manuscript and approved the final draft of the article; MS collected data, helped edit the manuscript and approved the final draft of the article; W-AW collected data and approved the final draft of the article; MZ collected data and approved the final draft of the article.

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