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Original article

Perceived Stress and Bowel-Related Symptoms Among Participants with and Without Self-Reported Physician-Diagnosed Irritable Bowel Syndrome: A Cross-Sectional Study

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Abstract
Irritable bowel syndrome (IBS) is a common disorder of gut–brain interaction, and psychological stress is widely believed to aggravate its symptoms. Many people live with recurring abdominal pain, bloating, or altered bowel habits without ever receiving a diagnosis, and very little is known about how their psychological state compares with that of diagnosed patients and of people without symptoms. This study was conducted to examine the relationship between perceived stress and bowel-related discomfort, and to compare stress, anxiety, and depressive symptoms between people with a physician-diagnosed IBS, people reporting IBS-type symptoms without a diagnosis, and people without such symptoms. An analytical cross-sectional study was carried out using a bilingual (Arabic and English) online questionnaire distributed between 30 May and 7 July 2026. Perceived stress was measured with the 10-item Perceived Stress Scale (PSS-10), anxiety and depression with the Hospital Anxiety and Depression Scale (HADS), and bowel symptoms and their impact with ten items rated 1 to 5. Of 102 submissions, 78 had complete stress and symptom data and were analysed using Spearman correlation, Mann–Whitney U, Kruskal–Wallis, and chi-square tests, with a two-sided p-value below 0.05 taken as significant. The mean age was 23.9 ± 9.3 years and 85.9% of participants were female. Nine participants (11.5%) reported a physician diagnosis of IBS, 41 (52.6%) reported symptoms without a diagnosis, and 25 (32.1%) reported no symptoms. The mean PSS-10 score was 19.17 ± 6.28, with moderate stress in 76.9%. Higher stress was positively correlated with the bowel symptom score (ρ = 0.442), symptom impact (ρ = 0.432), overall bowel distress (ρ = 0.430), anxiety (ρ = 0.632), and depression (ρ = 0.396), all $p < 0.001$. PSS-10 scores differed across the three groups ($p = 0.001$): 24.0 ± 4.5 in diagnosed, 19.6 ± 6.5 in self-reported, and 16.4 ± 5.4 in symptom-free participants. Anxiety above the HADS threshold was found in 88.9%, 62.2%, and 17.4% of the three groups, respectively ($p < 0.001$), whereas depression did not differ significantly ($p = 0.252$). In a multivariable model, perceived stress remained independently associated with the symptom score ($p = 0.032$). Higher perceived stress was associated with more severe, more disruptive, and more distressing bowel symptoms. Participants with symptoms but no diagnosis carried a stress and anxiety burden that lay between that of diagnosed and symptom-free participants. Because of the small diagnosed group and the cross-sectional design, these results describe associations only and should be confirmed in larger and longitudinal studies.
Keywords. Irritable Bowel Syndrome; Perceived Stress; PSS-10; HADS; Anxiety; Gut–Brain Axis; Libya.

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Introduction

Irritable bowel syndrome is one of the most common functional gastrointestinal disorders seen in clinical practice. It is characterised by recurrent abdominal pain that is related to defecation or to a change in the frequency or form of stool, in the absence of a structural or biochemical explanation (1,2). Under the Rome IV classification it is grouped with the disorders of gut–brain interaction, a label that reflects the growing recognition that the gut and the nervous system cannot be studied separately (2). The condition does not shorten life, but it can be persistent and unpredictable, and it often leads people to restrict what they eat, where they go, and how they study or work.

Estimates of how common IBS is depend heavily on the diagnostic criteria and the population sampled. A meta-analysis of studies from many countries found a pooled prevalence of around one in ten adults, with considerable variation between regions (3,4). The Rome Foundation Global Study, which surveyed adults in dozens of countries, also showed that functional bowel disorders are widespread and are associated with reduced quality of life (5). Women are affected more often than men in most reports, and the symptoms tend to first appear in young adulthood (3,6). A substantial share of affected people never seek medical care, so studies based only on clinic attendees describe just one part of the problem (7).

The idea that emotions influence the bowel is an old one, but the biology behind it has become clearer in recent decades. Psychological stress activates the hypothalamic–pituitary–adrenal axis and the autonomic nervous system, and these systems can change gut motility, increase visceral sensitivity, alter intestinal permeability, and shift the gut microbiota (8–10). In people with IBS, stress has been reported to precede symptom flares, and symptom severity often rises during exams, family conflict, or other demanding periods (9,11). Anxiety and depression are also more common among people

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with IBS than in the general population (12), which makes it difficult to separate the effect of stress itself from that of low mood and worry.

Stress is usually described as either an event or a response, but what matters most for health is how much a person feels that life is unpredictable, uncontrollable, and overloaded. This subjective appraisal is what the Perceived Stress Scale was designed to capture (13,14). Using perceived stress rather than a checklist of life events allows two people in the same circumstances to be distinguished by how heavy those circumstances feel to each of them. It is also quick to complete, which is helpful in a survey that has to be answered on a phone.

Young adults, and university students in particular, deserve attention in this context. They face examinations, financial and family pressures, irregular sleep, and changes in diet, all of which are plausible triggers for bowel symptoms. Medical education has been described as demanding in its own right, and studies in medical students have repeatedly found that perceived stress is common and is accompanied by physical symptoms such as fatigue, headache, muscle tension, and gastrointestinal complaints. A recent cross-sectional study of stress among medical students at our own faculty reported moderate perceived stress in most students and significant links between stress and several physical and psychological symptoms, including gastrointestinal problems; that work prompted the present study to look more closely at the bowel.

A further gap concerns people who have symptoms but no diagnosis. In practice, IBS is diagnosed on symptoms and the exclusion of alarm features, and many people who would meet the criteria either do not attend a doctor or are told their complaints are “just nerves”. It is not known whether such people resemble diagnosed patients, who are likely to be more severely affected and more distressed, or resemble people with no symptoms at all. To our knowledge, data on this question are lacking for Libya, where prolonged social and economic strain may add to the psychological burden of the population.

This study was therefore designed to measure perceived stress, anxiety, and depressive symptoms in a sample of adults in Libya, to examine how these relate to the severity and impact of bowel symptoms, and to compare three groups: people with a physician-diagnosed IBS, people with self-reported IBS-type symptoms but no diagnosis, and people with no such symptoms. We hoped the findings would help clinicians recognise the psychological side of bowel complaints and support the case for asking about stress in routine assessment.

Methodology

Study design and setting

An analytical cross-sectional study was carried out using an online questionnaire. The survey was open to adults and older adolescents living in Libya and was run from 30 May 2026 to 7 July 2026. The study was coordinated by the Faculty of Medicine, International Maaref University, Tripoli, Libya.

Study population and sampling

The target population was people living in Libya who were able to read Arabic or English and who agreed to complete the questionnaire. Participants were recruited through a convenience approach, with the link shared through social media groups and personal contacts and then passed on by respondents (snowball sampling). Both people who had received a diagnosis of IBS and people who had not been invited, because the comparison between these groups was one of the main aims of the study. No formal sample size calculation was performed in advance, since the size of the reachable diagnosed population was unknown; this is acknowledged as a limitation.

The online form received 102 submissions. Four were empty, and a further 20 lacked a complete PSS-10 or a complete set of bowel symptom items. These 24 submissions were excluded, leaving 78 participants for the main analyses. For variables with a few missing answers (for example, age, HADS items, or the impact items), the analysis used the cases with available data, and the number of respondents is reported wherever it differs from 78.

Data collection

Data collection was conducted using an anonymous, self-administered, bilingual questionnaire structured into five parts. First, demographic details—including age, sex, education, occupation, and marital status—were recorded alongside clinical characteristics, where participants noted a prior physician diagnosis of IBS or reported specific lower gastrointestinal symptoms. Perceived stress over the previous month was evaluated using the 10-item Perceived Stress Scale, where reverse-scored positive items yielded a total score from 0 to 40 categorized into low, moderate, or high stress levels, demonstrating a Cronbach’s alpha of 0.78. Anxiety and depression were assessed with the Hospital Anxiety and Depression Scale, utilizing two 7-item subscales scored from 0 to 21 to identify possible cases at a threshold of 8 and probable cases at 11. Finally, bowel symptom severity was measured through five adapted IBS Severity Scoring System items covering pain, bloating, habit dissatisfaction, and daily life interference, sum-scored from 5 to 25 with a Cronbach’s alpha of 0.86 as a locally tailored composite rather than a standard clinical band.

Five items asked how much bowel symptoms affected work or study, social activities, and sleep, whether they caused embarrassment; and how distressing the symptoms were overall, each rated from 1 to 5. Their sum (range 5–25) was used as the symptom impact score. The last item, “Overall, how distressing do you find your bowel-related symptoms?” (1 = not at all, 5 = extremely), was also analysed on its own as overall bowel distress.

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Participants who reported a physician diagnosis of IBS formed the diagnosed group. Participants without a diagnosis who selected at least one symptom formed the self-reported group, and those who selected "none of the above" formed the symptom-free group. Three respondents could not be classified (one did not answer the diagnosis question and two gave answers that could not be assigned) and were excluded from group comparisons but kept in the correlation analyses.

Statistical analysis

Data were cleaned in Microsoft Excel and analysed with Python (pandas and SciPy). Continuous variables are summarised as mean ± standard deviation and categorical variables as frequencies and percentages. Because the scores were not normally distributed and several groups were small, non-parametric tests were used. Spearman's rank correlation assessed relationships between continuous measures. The Mann–Whitney U test compared two groups, and the Kruskal–Wallis test compared three or more groups, followed by pairwise Mann–Whitney tests with Bonferroni correction. The chi-square test compared proportions above the HADS threshold. A multiple linear regression model with the bowel symptom score as the outcome and PSS-10, HADS anxiety, and HADS depression scores as predictors examined whether stress was associated with symptoms independently of mood. A two-sided p-value below 0.05 was considered statistically significant.

Ethical considerations

Participation was voluntary and the questionnaire was anonymous. The opening page explained the purpose of the study, and submission of the completed form was taken as agreement to participate. No names, contact details, or other identifying information were collected, and the data were used only for research and academic purposes. The study involved no intervention and carried no more than minimal risk. Participants who wished to discuss their symptoms or feelings were encouraged to consult a doctor.

Results

Characteristics of the participants

A total of 78 participants were included in the analysis. Most were female (67, 85.9%) and 11 (14.1%) were male. Ages ranged from 16 to 63 years (median 20; mean 23.9 ± 9.3; available for 74 participants), and more than half (41, 55.4%) were aged 20 to 24 years. Most participants were single (64, 82.1%). Half held a university degree (39, 50.0%), 19 (24.4%) had completed secondary school, and 17 (21.8%) held a diploma. Nine participants (11.5%) reported a physician diagnosis of IBS, 41 (52.6%) were in the self-reported group, 25 (32.1%) were symptom-free, and 3 (3.8%) could not be classified (Table 1). All nine diagnosed participants were female, with a mean age of 21.0 ± 1.5 years.

Table 1: Characteristics of the study participants (n = 78)

Characteristic	Frequency (n)	Percentage (%)
Sex: Female	67	85.9
Sex: Male	11	14.1
Age group (n = 74): ≤19 years	19	25.7
Age group: 20–24 years	41	55.4
Age group: ≥25 years	14	18.9
Education: Secondary	19	24.4
Education: Diploma	17	21.8
Education: Degree	39	50.0
Education: Postgraduate	2	2.6
Education: Other	1	1.3
Marital status: Single	64	82.1
Marital status: Married	9	11.5
Marital status: Other	5	6.4
Physician-diagnosed IBS	9	11.5
Self-reported symptoms, no diagnosis	41	52.6
No symptoms	25	32.1
Unclassified	3	3.8

Other marital status includes divorced (2), widowed (1), and unspecified (2). Percentages for age groups are of the 74 participants who reported age.

Among the 41 participants in the self-reported group, the symptoms most often selected were bloating or gas (15 participants, 36.6%), recurring abdominal pain or cramping (13, 31.7%), diarrhoea, constipation or alternating bowel habit (7, 17.1%), and urgency to use the toilet (5, 12.2%). A few participants described several symptoms together or added their own description, so the categories are not mutually exclusive.

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Perceived stress

The mean PSS-10 total score was 19.17 ± 6.28, with scores ranging from 0 to 38. According to the accepted classification, 9 participants (11.5%) had low stress, 60 (76.9%) had moderate stress, and 9 (11.5%) had high stress (Figure 1). Responses to the individual items are shown in Table 2. Thirty-five participants (44.9%) felt nervous and stressed fairly often or very often, 45 (57.7%) were angered by things outside their control at least fairly often, and 26 (33.3%) said difficulties were piling up too high at least fairly often. Only a small minority answered "never" on these negatively worded items, which shows that some degree of strain was experienced by almost everyone in the sample.

Table 2: Responses to individual PSS-10 items (n = 78)

PSS-10 item	Never n (%)	Rarely n (%)	Sometimes n (%)	Fairly often n (%)	Very often n (%)
Upset because of unexpected events	10 (12.8)	18 (23.1)	25 (32.1)	19 (24.4)	6 (7.7)
Unable to control important things	14 (17.9)	20 (25.6)	28 (35.9)	10 (12.8)	6 (7.7)
Felt nervous or stressed	6 (7.7)	11 (14.1)	26 (33.3)	21 (26.9)	14 (17.9)
Confident handling personal problems*	5 (6.4)	5 (6.4)	27 (34.6)	23 (29.5)	18 (23.1)
Felt things were going your way*	6 (7.7)	9 (11.5)	35 (44.9)	24 (30.8)	4 (5.1)
Unable to cope with responsibilities	10 (12.8)	26 (33.3)	32 (41.0)	8 (10.3)	2 (2.6)
Able to control irritations*	7 (9.0)	12 (15.4)	35 (44.9)	17 (21.8)	7 (9.0)
Felt on top of things*	4 (5.1)	11 (14.1)	32 (41.0)	17 (21.8)	14 (17.9)
Angered by things outside your control	4 (5.1)	6 (7.7)	23 (29.5)	26 (33.3)	19 (24.4)
Difficulties piling up too high	7 (9.0)	14 (17.9)	31 (39.7)	12 (15.4)	14 (17.9)

**Reverse-scored items (raw responses shown). PSS-10 = 10-item Perceived Stress Scale.*

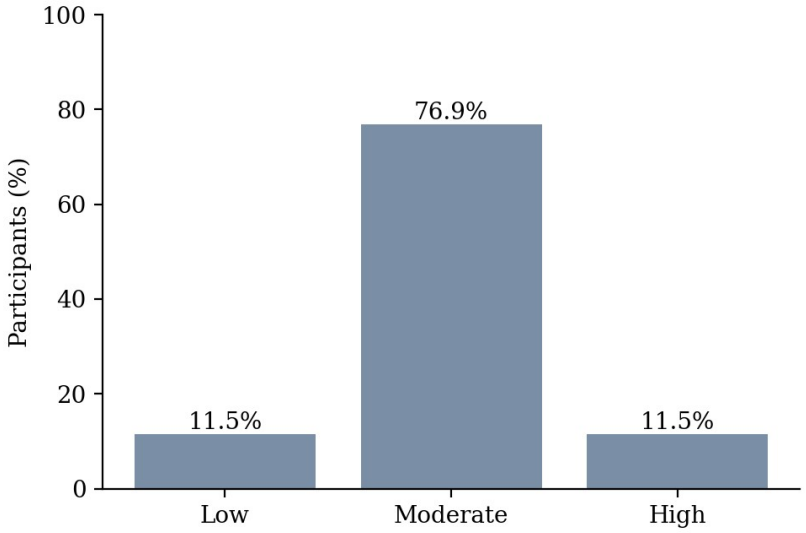

Figure 1: Distribution of participants according to perceived stress level (n = 78)

Anxiety and depression

The mean HADS anxiety score was 8.49 ± 4.50 (n = 72). Thirty-seven participants (51.4%) scored 8 or more, and 25 (34.7%) scored 11 or more. The mean HADS depression score was 6.37 ± 3.83 (n = 76), with 28 participants (36.8%) at 8 or more and 13 (17.1%) at 11 or more. The two subscales were moderately correlated with each other ($\rho = 0.419$, $p < 0.001$).

Bowel symptoms and their impact

The mean bowel symptom score was 10.38 ± 4.89 out of 25 (range 5–23), and the mean symptom impact score was 10.74 ± 5.49 (n = 73; range 5–25). The mean rating of overall bowel distress was 2.60 ± 1.42 on the five-point scale. As Table 3 shows, ratings clustered at the lower end for most items, but a clear minority reported severe problems: for example, 11 participants (14.1%) rated pain severity as 4 or 5, and 22 of 75 (29.3%) rated overall distress as 4 or 5. Embarrassment was the least affected domain (mean 1.70), while overall distress had the highest mean (2.60).

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Table 3: Ratings of bowel symptoms and their impact (1 = none/not at all, 5 = most severe)

Item	1	2	3	4	5	n	Mean	SD
Severity of abdominal pain	25	23	19	8	3	78	2.24	1.13
Frequency of abdominal pain	37	18	14	6	3	78	1.97	1.15
Severity of bloating or distension	37	19	10	7	5	78	2.03	1.25
Dissatisfaction with bowel habits	43	11	13	7	4	78	1.95	1.25
Interference with daily life	35	13	17	6	7	78	2.19	1.33
Effect on work or study	35	10	15	7	7	74	2.20	1.37
Effect on social activities	33	16	9	7	8	73	2.19	1.39
Effect on sleep	30	20	14	4	6	74	2.14	1.24
Embarrassment because of symptoms	49	9	8	5	3	74	1.70	1.16
Overall distress from symptoms	26	9	18	13	9	75	2.60	1.42

Cells show the number of participants choosing each rating.

Association between perceived stress and bowel symptoms

Higher PSS-10 scores were significantly and positively correlated with the bowel symptom score ($\rho = 0.442$, $p < 0.001$), the symptom impact score ($\rho = 0.432$, $p < 0.001$), and overall bowel distress ($\rho = 0.430$, $p < 0.001$). The strongest correlation observed was between perceived stress and HADS anxiety ($\rho = 0.632$, $p < 0.001$), followed by HADS depression ($\rho = 0.396$, $p < 0.001$) (Table 4, Figure 2). Anxiety was also correlated with the symptom score ($\rho = 0.428$, $p < 0.001$), the impact score ($\rho = 0.455$, $p < 0.001$), and overall distress ($\rho = 0.427$, $p < 0.001$). Depression showed weaker associations with the symptom score ($\rho = 0.256$, $p = 0.031$) and the impact score ($\rho = 0.259$, $p = 0.027$), and its association with overall distress was not significant ($\rho = 0.202$, $p = 0.085$).

Table 4: Spearman correlations between PSS-10 score and other measures

Measure	n	Correlation coefficient (ρ)	p-value
Bowel symptom score	78	0.442	<0.001
Symptom impact score	73	0.432	<0.001
Overall bowel distress	75	0.430	<0.001
HADS anxiety	72	0.632	<0.001
HADS depression	76	0.396	<0.001

Spearman's rank correlation was used. Sample sizes differ because of missing item-level data. A p-value <0.05 was considered statistically significant.

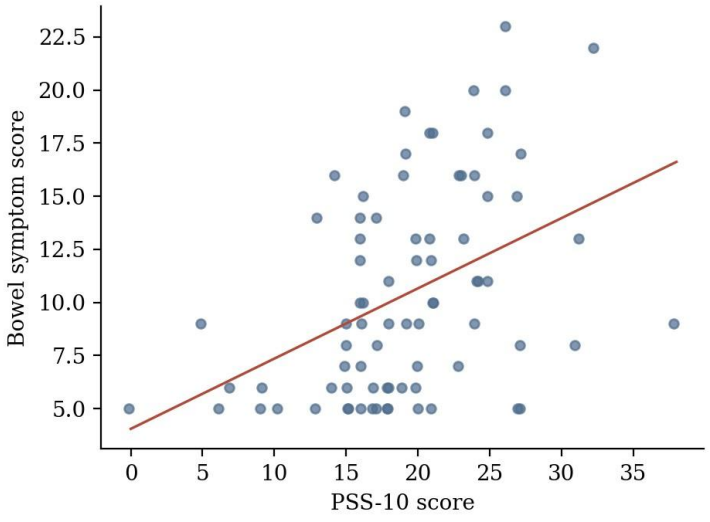

Figure 2: Relationship between PSS-10 score and bowel symptom score (Spearman ρ = 0.442)

At item level (Table 5), perceived stress was related to pain severity ($\rho = 0.520$), pain frequency ($\rho = 0.486$), and interference with daily life ($\rho = 0.423$), with a smaller association with dissatisfaction with bowel habits ($\rho = 0.256$, $p = 0.024$). It was not significantly related to the severity of bloating ($\rho = 0.147$, $p = 0.200$). Of the impact items, stress correlated with effects on work or study ($\rho = 0.467$), social activities ($\rho = 0.422$), and sleep ($\rho = 0.378$), and the association with embarrassment ($\rho = 0.183$, $p = 0.118$) did not reach significance. Average symptom scores also rose across stress categories, from 6.67 ± 3.04 in the low-stress group to 10.80 ± 4.79 in the moderate and 11.33 ± 5.81 in the high-stress group (Kruskal–Wallis $p = 0.023$), although only nine participants fell in each of the outer categories.

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Table 5: Correlation between PSS-10 score and individual bowel items

Bowel item	Correlation coefficient (ρ)	p-value
Severity of abdominal pain	0.520	<0.001
Frequency of abdominal pain	0.486	<0.001
Severity of bloating or distension	0.147	0.200
Dissatisfaction with bowel habits	0.256	0.024
Interference with daily life	0.423	<0.001
Effect on work or study	0.467	<0.001
Effect on social activities	0.422	<0.001
Effect on sleep	0.378	<0.001
Embarrassment	0.183	0.118
Overall distress	0.430	<0.001

Spearman's rank correlation was used.

Stress, mood, and bowel symptoms in a combined model

To see whether stress was related to bowel symptoms independently of mood, a multiple linear regression was fitted with the bowel symptom score as the outcome (n = 71 with complete data). The model explained about one quarter of the variance in symptom score (R^2 = 0.257). Perceived stress remained a significant predictor (B = 0.236, SE = 0.108, p = 0.032), meaning that each additional point on the PSS-10 was associated with about a quarter of a point higher symptom score after accounting for anxiety and depression. HADS anxiety showed a similar-sized effect that did not reach significance (B = 0.277, SE = 0.155, p = 0.077), and HADS depression did not contribute (B = 0.038, SE = 0.164, p = 0.816). Because stress, anxiety, and depression are themselves correlated, these coefficients should be read as exploratory.

Comparison between diagnosed, self-reported, and symptom-free participants

Stress, anxiety, bowel symptoms, symptom impact, and overall distress differed significantly across the three groups (Table 6, Figure 3). In every case, the diagnosed group had the highest scores and the symptom-free group the lowest, with the self-reported group in between. The exception was depression, where scores did not differ significantly (p = 0.304). Pairwise comparisons with Bonferroni correction (Table 7) showed that PSS-10 scores were higher in diagnosed than in symptom-free participants (adjusted p = 0.002) and higher in self-reported than in symptom-free participants (adjusted p = 0.044). The difference between diagnosed and self-reported participants did not reach significance for stress (adjusted p = 0.117), anxiety, symptom score, or impact score, but did for overall bowel distress (adjusted p < 0.001).

Table 6: Scores by participant group (mean ± SD)

Measure	Diagnosed (n = 9)	Self-reported (n = 41)	Symptom-free (n = 25)	p-value (Kruskal–Wallis)
PSS-10 total	24.0 ± 4.5	19.6 ± 6.5	16.4 ± 5.4	0.001
HADS anxiety	11.1 ± 2.7	9.5 ± 4.8	5.8 ± 3.6	<0.001
HADS depression	5.9 ± 4.7	7.1 ± 4.1	5.4 ± 2.8	0.304
Bowel symptom score	15.2 ± 5.8	11.6 ± 4.2	6.4 ± 2.3	<0.001
Symptom impact score	16.5 ± 4.9	12.2 ± 5.3	6.7 ± 2.9	<0.001
Overall distress (1–5)	4.6 ± 0.5	2.9 ± 1.2	1.4 ± 0.8	<0.001

Valid n is slightly smaller for some measures (8 diagnosed for impact and distress; 37–39 self-reported for HADS, impact, and distress; 23 symptom-free for HADS anxiety). Three unclassified participants are excluded.

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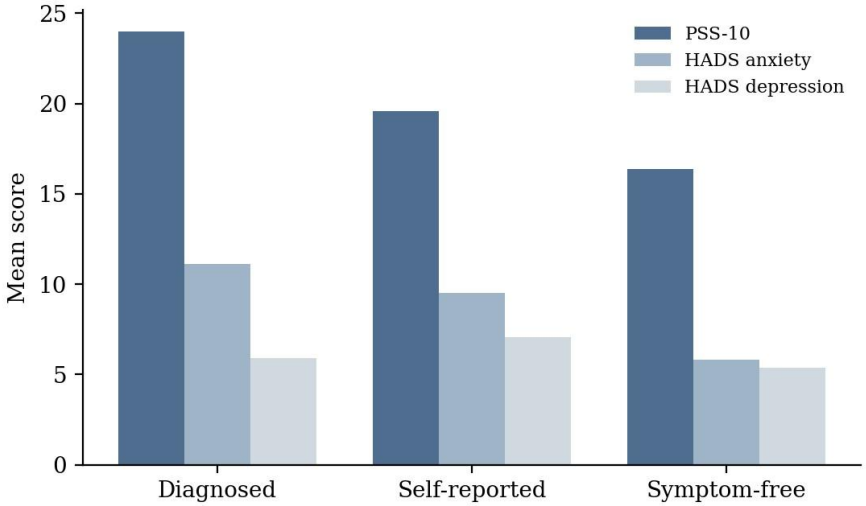

Figure 3: Mean PSS-10, HADS anxiety, and HADS depression scores by participant group

Table 7: Pairwise comparisons between groups (Bonferroni-adjusted p-values)

Measure	Diagnosed vs. symptom-free	Self-reported vs. symptom-free	Diagnosed vs. self-reported
PSS-10 total	0.002	0.044	0.117
HADS anxiety	0.001	0.007	>0.99
Bowel symptom score	0.001	<0.001	0.193
Symptom impact score	<0.001	<0.001	0.138
Overall distress	<0.001	<0.001	<0.001

Mann–Whitney U test with Bonferroni correction for three comparisons.

The distribution of stress categories and mood scores above threshold is shown in Table 8. High perceived stress was found in 2 of 9 diagnosed participants (22.2%), 5 of 41 self-reported participants (12.2%), and 1 of 25 symptom-free participants (4.0%). Anxiety at or above the HADS threshold of 8 was present in 88.9% of the diagnosed group, 62.2% of the self-reported group, and 17.4% of the symptom-free group (χ^2 $p < 0.001$). The corresponding proportions for depression were 44.4%, 43.6%, and 24.0%, which did not differ significantly ($p = 0.252$).

Table 8: Stress category and HADS threshold by participant group

Variable	Diagnosed n (%)	Self-reported n (%)	Symptom-free n (%)
Low stress (PSS-10 0–13)	0 (0.0)	5 (12.2)	4 (16.0)
Moderate stress (14–26)	7 (77.8)	31 (75.6)	20 (80.0)
High stress (27–40)	2 (22.2)	5 (12.2)	1 (4.0)
HADS anxiety ≥8	8/9 (88.9)	23/37 (62.2)	4/23 (17.4)
HADS depression ≥8	4/9 (44.4)	17/39 (43.6)	6/25 (24.0)

Denominators for HADS reflect participants with complete subscale data.

Demographic factors

Women had higher perceived stress than men (19.88 ± 6.07 vs. 14.82 ± 6.05, $p = 0.023$), although bowel symptom scores were similar (10.49 ± 4.94 vs. 9.73 ± 4.71, $p = 0.644$), and anxiety and depression scores did not differ by sex ($p = 0.203$ and $p = 0.738$). Married participants had lower stress than single participants (14.44 ± 6.44 vs. 19.73 ± 6.06, $p = 0.028$), but only nine participants were married, and symptom scores did not differ ($p = 0.295$). Neither stress nor symptom scores varied significantly by education ($p = 0.241$ and $p = 0.407$) or by age group ($p = 0.257$ and $p = 0.975$), and age was not correlated with stress ($\rho = -0.185$, $p = 0.114$) (Table 9).

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Table 9: Association between demographic factors and PSS-10 and bowel symptom scores

Variable	Category (n)	PSS-10 mean ± SD	Symptom score mean ± SD	p-value (PSS / symptom)
Sex	Female (67)	19.88 ± 6.07	10.49 ± 4.94	0.023 / 0.644
	Male (11)	14.82 ± 6.05	9.73 ± 4.71	
Marital status	Single (64)	19.73 ± 6.06	10.56 ± 5.05	0.028 / 0.295*
	Married (9)	14.44 ± 6.44	8.67 ± 3.91	
Education	Secondary (19)	20.32 ± 5.73	11.05 ± 5.78	0.241 / 0.407
	Diploma (17)	20.53 ± 7.43	11.00 ± 4.43	
	Degree (39)	18.00 ± 6.14	9.51 ± 4.60	
Age group	≤19 (19)	20.42 ± 5.28	10.79 ± 5.81	0.257 / 0.975
	20–24 (41)	19.37 ± 6.58	10.39 ± 4.88	
	≥25 (14)	16.79 ± 6.84	9.86 ± 3.96	

*Mann–Whitney U or Kruskal–Wallis test as appropriate. *Single vs. married only; five participants with other marital status and two with postgraduate or other education are not shown.*

Discussion

This study examined the relationship between perceived stress and bowel-related discomfort in a convenience sample of adults in Libya. The main finding was that people who felt more stressed also had more severe bowel symptoms, more interference of those symptoms with daily life, and greater distress about them. The correlations were moderate, at about 0.43 to 0.44, and persisted after accounting for anxiety and depression in a multivariable model. This is in keeping with the view that stress is one contributor to IBS symptoms rather than their only cause (9,11,18).

Our observation that stress was linked to symptom severity agrees with clinical and experimental work showing that psychological stress can increase gut sensitivity and motility and can worsen symptoms in people with IBS (8,9,18). Reviews of the topic describe stress as acting through the brain–gut axis, the autonomic nervous system, and immune signalling, and as capable of influencing the microbiota (10,19). Our cross-sectional data cannot demonstrate such mechanisms, but they are consistent with them. It is equally possible that the relationship runs in the other direction: pain, urgency, and unpredictable bowel habits are themselves stressful, and people who are worried about their symptoms may report higher stress on the PSS-10. In practice the two probably reinforce each other.

Stress was tied more closely to pain than to bloating. Pain severity and frequency tracked stress, while bloating severity did not. One explanation is that the experience of pain depends on how the brain processes visceral signals and on attention and mood, whereas bloating may depend more on diet, gas production, and abdominal wall behaviour. This is speculative, and the single-item measurement of bloating may simply have been too coarse. Stress was also associated with how much symptoms affected work or study, social life, and sleep. This fits with the view that IBS burden is shaped by how symptoms are appraised and coped with, and not only by symptom intensity (1,5). Among university-aged participants, whose days are structured around classes and examinations, this interference may be particularly noticeable.

Anxiety showed the strongest relationship with perceived stress and was also associated with bowel symptoms, while depression showed weaker links. A meta-analysis found that both anxiety and depressive symptoms are more frequent in IBS than in controls (12), and our results add that, in a sample dominated by young people, anxiety may be the more prominent companion. The regression suggested that stress carried most of the independent signal, with anxiety close behind, but the overlap between these measures and the modest sample mean that the data cannot reliably divide their effects. Anxiety and stress both involve worry about demands and the future, and they are difficult to separate in practice.

Perhaps the most interesting finding concerns the three groups. Participants with a diagnosis had the highest stress, anxiety, symptom, and distress scores, and symptom-free participants the lowest, as expected. The self-reported group fell between them on almost every measure, and their stress and anxiety were significantly higher than in people without symptoms. This suggests that people with undiagnosed bowel symptoms are not simply healthy people with occasional discomfort. A considerable share of them carry a level of psychological distress that is closer to that of diagnosed patients than to that of symptom-free peers, and studies that recruit only from clinics would miss them (7). We did not find a significant difference between the diagnosed and self-reported groups for stress, anxiety, symptom score, or impact, but with only nine diagnosed participants the study had little power to detect one, and the absence of a difference should not be taken as evidence that none exists. The one clear distinction was in overall distress, which was markedly higher in the diagnosed group, possibly because people who seek a diagnosis are those whose symptoms trouble them most.

Depression did not differ significantly between groups, and about 44% of both diagnosed and self-reported participants scored 8 or above compared with 24% of symptom-free participants. This pattern points in the same direction as the anxiety findings but was not statistically significant, and again the small groups limit what can be concluded. The high overall proportions above the HADS threshold, with 51.4% for anxiety and 36.8% for depression, should not be read as prevalence estimates. The sample was young and mostly female, was recruited by an open online link, and people who are stressed or symptomatic may have been more willing to respond.

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Women reported higher perceived stress than men, which has been reported repeatedly in PSS studies and in student samples (14,20), although the small number of men (n = 11) calls for caution. Bowel symptom scores were similar in both sexes in our data, which differs from reports of higher IBS prevalence in women (3,6); again, the sample composition and the use of a symptom score rather than diagnostic criteria may explain this. The lower stress among married participants rests on nine people and may reflect age, social support, or chance. Education and age group were not related to stress or symptoms.

The practical message is that a clinician who meets a patient with recurrent abdominal pain or altered bowel habits should ask not only about diet, weight loss, and alarm features, but also about stress, worry, sleep, and the effect of symptoms on study and social life. Brief tools such as the PSS-10 and HADS are quick and could help to identify patients who may benefit from psychological approaches, such as relaxation training, cognitive behavioural therapy, or gut-directed hypnotherapy, in addition to dietary and pharmacological advice (11,21). For students, university health services could offer stress-management support, since stress and bowel symptoms appear to go together.

Strengths and limitations

The study has several strengths. It used validated and widely applied instruments for stress and mood, offered in both Arabic and English, and it included people who have not sought a diagnosis, who are usually absent from clinic-based research. It also compared three clearly defined groups and reported both correlations and group differences.

There are also important limitations. First, the cross-sectional design prevents conclusions about causation or direction. Second, the sample was a non-random convenience sample, young, and 85.9% female, so the results cannot be generalised to the Libyan population. Third, only nine participants reported a physician diagnosis, which makes estimates for that group imprecise and limits the power of comparisons with it. Fourth, the diagnosis was self-reported and unverified, and the self-reported group was defined by choosing a symptom rather than by Rome IV criteria, so some participants in it may not have IBS. Fifth, the bowel symptom score is a locally adapted composite of five items rather than the standard IBS-SSS, and the impact score was based on a small number of single items, so neither has been formally validated. Sixth, 24 of the 102 submissions (23.5%) were excluded for being empty or incomplete, which could introduce selection bias. Finally, several comparisons were made without adjustment for multiple testing apart from the pairwise group tests, so borderline findings, such as the association with marital status, should be interpreted cautiously. All data were self-reported and subject to recall and response bias.

Conclusion

This study found that perceived stress was positively and significantly associated with the severity, impact, and distress of bowel symptoms, and with anxiety and depressive symptoms, in a sample of adults in Libya. Most participants had moderate perceived stress, with a mean PSS-10 score of 19.17 ± 6.28. Stress remained associated with bowel symptom severity after accounting for mood in a multivariable model.

Participants with a physician diagnosis of IBS had the highest stress and anxiety, those without symptoms had the lowest, and those who reported symptoms without a diagnosis lay in between, with significantly higher stress and anxiety than symptom-free participants. Depressive symptoms did not differ significantly between groups. Among demographic factors, stress was higher in women and in unmarried participants, whereas education and age group showed no significant relationship. These findings describe associations in a small, non-random sample and need to be confirmed in larger, longitudinal studies.

Recommendations

Clinicians evaluating patients with chronic or recurrent bowel complaints should routinely ask about stress, anxiety, sleep, and the effect of symptoms on daily activities, and should consider brief screening with validated tools. Patients with prominent psychological distress may benefit from referral for stress-management strategies or psychological therapy alongside conventional treatment.

Medical faculties and universities should provide accessible counselling and stress-management services and should raise awareness among students that persistent bowel symptoms are worth discussing with a doctor and are not merely a normal response to exams. Public health messages could encourage people with long-standing bowel symptoms to seek assessment instead of accepting them silently.

Future research should include larger and more representative samples with more men and non-student participants, recruit adequate numbers of clinically diagnosed patients, apply Rome IV criteria and the standard IBS-SSS, and use longitudinal designs to clarify whether stress precedes symptom flares or follows them. Including dietary, sleep, and medication data would also help to clarify other contributors to bowel symptoms.

Conflict of interest. Nil

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