

A comparison of self-perceived health status in inflammatory bowel disease and irritable bowel syndrome patients from a Canadian national population survey

Linda YL Tang MD FRCPC^{1,2}, Alice Nabalamba PhD³, Leslie A Graff MD^{4,2}, Charles N Bernstein MD FRCPC^{1,2}

LYL Tang, A Nabalamba, LA Graff, CN Bernstein. A comparison of self-perceived health status in inflammatory bowel disease and irritable bowel syndrome patients from a Canadian national population survey. *Can J Gastroenterol* 2008;22(5):475-483.

OBJECTIVE: To determine whether differences exist in perceptions of physical health, mental health and stress levels between patients with inflammatory bowel disease (IBD) and patients with irritable bowel syndrome (IBS).

METHODS: Data were obtained from the 2005 Canadian Community Health Survey, which had a sample size of 132,947 Canadians. Information on 4441 participants aged 19 years or older who reported that they had been diagnosed with Crohn's disease (n=474), ulcerative colitis (n=637) or IBS (n=3330) was analyzed regarding perceptions of their physical health, mental health, stress levels and activity levels.

RESULTS: Overall, IBD patients reported being in fair to poor health (P<0.01) more often than IBS patients. In addition, IBS patients were more likely than IBD patients to report poor mental health status (P<0.01) and greater stress levels (P<0.01). In multivariate analyses, having IBS or IBD along with another chronic disease significantly increased the odds of reporting poorer health status.

CONCLUSIONS: People with IBD were more likely to experience fair or poor general health. IBS patients reported higher levels of stress and poorer mental health than IBD patients. When IBS or IBD coexisted with another chronic condition, activity participation at home and at work was significantly more likely to be impaired.

Key Words: *Inflammatory bowel disease (IBD); Irritable bowel syndrome (IBS); Population-based study; Quality of life*

It is well understood that our perception of health in situations of chronic illness can be affected by outlook and coping mechanisms. The arthritis literature suggests that children with a positive outlook have lower levels of anxiety and depression (1). Stress appears to be individualized – what is stressful to one person may not be to another. This difference is influenced by patterns of thinking and can be modulated.

Similar to arthritis, patients with inflammatory bowel diseases (IBDs), such as Crohn's disease (CD) and ulcerative colitis (UC), and patients with irritable bowel syndrome (IBS) can be affected by stress (2,3,4). Stress modulates colonic motility, although the exact mechanism is not well understood (5).

Comparaison de la perception de l'état de santé par les personnes atteintes d'une maladie inflammatoire de l'intestin et du syndrome du côlon irritable, à partir d'une enquête canadienne nationale

OBJECTIF : Déterminer s'il existe des différences de perception de l'état de santé, de la santé mentale et du niveau de stress entre les personnes atteintes d'une maladie inflammatoire de l'intestin (MII) et celles atteintes du syndrome du côlon irritable (SCI).

MÉTHODOLOGIE : Les données sont tirées de l'Enquête de 2005 sur la santé dans les collectivités canadiennes, dont l'échantillon était de 132 947 Canadiens. Les auteurs ont analysé l'information au sujet des 4 441 participants de 19 ans ou plus qui ont déclaré être atteints d'une maladie de Crohn (n=474), d'une colite ulcéreuse (n=637) ou d'un SCI (n = 3 330) diagnostiqué afin de connaître leur perception de leur santé physique, de leur santé mentale, de leur niveau de stress et de leur taux d'activité.

RÉSULTATS : Dans l'ensemble, les personnes atteintes d'une MII déclaraient davantage être en moyenne ou mauvaise santé que les personnes atteintes du SCI (P<0,01). Par ailleurs, les personnes atteintes du SCI étaient plus susceptibles que celles atteintes d'une MII de déclarer une mauvaise santé mentale (P<0,01) et un niveau de stress plus élevé (P<0,01). D'après les analyses multivariées, le fait d'avoir une MII ou un SCI en plus d'une autre maladie chronique augmentait considérablement le risque de se déclarer en moins bonne santé.

CONCLUSIONS : Les personnes atteintes d'une MII risquent davantage d'être en moyenne ou mauvaise santé. Les personnes atteintes du SCI déclaraient un niveau de stress plus élevé et une moins bonne santé mentale que celles atteintes d'une MII. Lorsque le SCI ou la MII coexistait avec une autre maladie chronique, la participation active à la maison et au travail était considérablement plus susceptible d'être compromise.

Pace et al (4) reported that IBS and IBD cohorts have stress burdens that are significantly greater than controls. Jones et al (6) reported that IBD and IBS patients have higher levels of psychiatric distress, alexithymia and somatosensory amplification. In addition, while short-term stress has not been associated with exacerbation of UC, the perception of chronic stress appears to increase the risk of exacerbation (7). One aim of the current study was to evaluate whether there are differences in how IBS and IBD patients perceive stress levels.

In addition to stress, we are also interested in how IBD and IBS patients perceive their physical and mental health. Simren et al (8) suggested that IBD patients experience good mental

¹Department of Internal Medicine, University of Manitoba; ²University of Manitoba Inflammatory Bowel Disease Clinical and Research Centre, Winnipeg, Manitoba; ³Health Statistics Division, Statistics Canada, Ottawa, Ontario; ⁴Clinical Health Psychology, University of Manitoba, Winnipeg, Manitoba

Correspondence: Dr Charles N Bernstein, University of Manitoba, 804F-715 McDermot Avenue, Winnipeg, Manitoba R3E 3P4.

Telephone 204-789-3369, fax 204-789-3972, e-mail cbernst@cc.umanitoba.ca

Received for publication December 4, 2007. Accepted March 4, 2008.

health despite significant stresses throughout their disease cycle. In contrast, patients suffering from symptoms classically defined as IBS are less likely to report general psychological well-being (8). Furthermore, IBD patients with IBS-like symptoms had greater anxiety and reduced vitality, leading to overall poorer quality of life (8). In addition, IBD patients in remission had similar psychological well-being to the non-IBD community sample (8). In CD patients, well-being was comparable regardless of whether remission was surgically or medically induced (9). Our group recently reported (10) that active IBD is significantly related to impaired psychological functioning across a range of domains, whereas inactive disease is not. There was no difference between those diagnosed with CD versus those diagnosed with UC.

Our study is the only published Canadian population-based study assessing the IBD and IBS populations for differences in perceptions of overall health, mental health and stress levels.

METHODS

Data source

The present analysis was based on cycle 3.1 of the Canadian Community Health Survey (CCHS) (Statistics Canada), which was conducted from January to December 2005. Data were collected from a sample of 132,947 individuals. The overall response rate was 79%. The CCHS is a computer-assisted personal interview that collects cross-sectional information regarding the health of Canadians every two years. It uses a rigorous methodology that ensures standardized interviews and randomized, stratified sampling. The survey covers the non-institutionalized household population aged 12 years or older in all provinces and territories except residents of institutions, First Nations reserves, Canadian Forces bases and some remote areas. The sample was weighted to the 2005 Canadian population aged 12 years or older. More detailed descriptions of the design, and sample and interview procedures for the CCHS are available in a published report (11).

The present analysis focused on two population groups aged 19 years and older: individuals who reported that they had been diagnosed with CD or UC (1111 respondents) or with IBS (3330 respondents) by their physician. Sample weights were used in the analysis to produce accurate population estimates because each sampled person did not have the same probability of selection. Thus, the 4441 respondents represented a household population of 789,371 people aged 19 years or older. The IBD subgroup represented 200,360 people with IBD in Canada in 2005. This number is similar to the population estimate for IBD in Canada derived from a five-province population-based study using the provinces' administrative health databases (12). The IBD or IBS populations were also compared with the general Canadian population (who did not have IBD or IBS).

Analysis

Frequencies, cross-tabulations and multiple logistic regression models were produced using CCHS cycle 3.1 data weighted to the 2005 Canadian population aged 19 years and older. The analysis was performed in two stages: unadjusted frequency estimates were produced, and then multivariate models were fitted to control for selected variables. First, weighted cross-tabulations were used to estimate the frequency of IBD and IBS, as well as to determine rates of general and mental health status, level of stress and activity

limitations, and age, sex, socioeconomic status and other chronic conditions.

Multiple logistic regression modelling was then used to assess the odds of reporting fair to poor perception of general and mental health, elevated stress in daily life and activity impairment. The effects of age, sex, socioeconomic status, IBD or IBS plus a comorbidity, other chronic conditions combined, and the absence of any chronic conditions were controlled simultaneously.

The bootstrap technique, which accounts for the design effects of the survey, was used to calculate CIs and coefficients of variation and to test the statistical significance of differences between the estimates (13,14). A statistical significance level of $P < 0.05$ was applied in all cases.

Variables of interest

The CCHS contains information about long-term chronic conditions and general health status defined as not only the absence of disease but also as physical, mental and social well-being. Respondents were asked to indicate whether they had certain long-term chronic conditions and interviewers instructed them to report only chronic conditions that had been diagnosed by a health professional and were expected to last or had already lasted more than six months. Chronic diseases in the questionnaire are defined in Table 1. To reduce bias, stomach ulcers were eliminated from the analysis. Ulcers create potential bias because they are often misdiagnosed based on symptoms rather than validated by gastroscopy. Nonmelanoma skin cancers were also eliminated from the analysis because they could reduce the impact of the cancer group.

To identify gastrointestinal conditions, respondents were asked, "Do you suffer from a bowel disorder such as Crohn's disease, ulcerative colitis, irritable bowel syndrome or bowel incontinence diagnosed by a health professional?". Information about whether a respondent had IBD or IBS was ascertained through a follow-up question: "What kind of bowel disease do you have: Crohn's disease, ulcerative colitis, irritable bowel syndrome, bowel incontinence or other bowel disorder?". Questions concerning chronic conditions have, in general, been validated extensively through qualitative testing, because the CCHS commonly uses them.

Three main outcome measures – perceptions of general health, mental health and the level of stress in daily life – were examined. To determine general health status, respondents were asked, "In general, would you say your health is excellent, very good, good, fair or poor?". To measure mental health status, respondents were asked, "In general, would you say your mental health is excellent, very good, good, fair or poor?". The excellent and very good response categories, as well as the fair to poor categories were combined, creating three comparison groups: very good to excellent, good, and fair to poor. Finally, to determine the level of stress in daily life, respondents were asked, "Thinking about the amount of stress in your life, would you say that most days are not at all stressful, not very stressful, a bit stressful, quite a bit stressful or extremely stressful?". The response categories for stress were also combined as follows: not at all stressful to not very stressful, a bit stressful, and quite a bit stressful to extremely stressful. These questions have been validated extensively through qualitative testing, and have commonly been used in the CCHS since its inception in 2000 and in the longitudinal National Population Health Survey since 1994 (<http://www.statcan.ca>).

Activity impairment was determined from a series of questions that evaluated physical and psychological factors that limit functional status in the home, at work and in other areas. Respondents were asked, "Do you have any difficulty hearing, seeing, communicating, walking, climbing stairs, bending, learning or doing any similar activities (never, sometimes, often)" and "Does a long-term physical condition or mental condition or health problem, reduce the amount or kind of activity you can do at home, at school, at work, in other activities such as transportation or leisure (never, sometimes, often)?"

To further describe the overall health status of individuals with IBD or IBS, additional information concerning the number of disability days in the two-week period preceding the interview was included in the analysis. Individuals who had spent at least one day in bed during the two-week period before the interview were considered to have had a disability day. To identify the population who had had at least one disability day, respondents were asked, "During the past 2 weeks, did you stay in bed at all because of illness or injury, including any nights spent as a patient in a hospital?", "How many days did you stay in bed for all or most of the day?" and "How many of these days were due to emotional or mental health or your use of alcohol or drugs?"

Socioeconomic status variables such as household income and education were included in the analyses. The education variable was defined as the highest level of education completed in a respondent's household. The household income variable was derived by calculating the ratio between the total income of the respondent's household in the past 12 months and the 2004 low-income cutoff corresponding to the number of people in the household and the size of the community. The low-income cutoff is the threshold at which a household would typically spend a larger portion of its income on food, shelter and clothing than the average household. The ratios were sorted from smallest to largest, and adjusted ratios were calculated by dividing the original ratios by a factor of 10 to convert them into ratios less than or equal to one. The ratios were grouped in deciles across Canada (10 intervals, each with approximately the same number of respondents). The deciles were generated using weighted data. These deciles were then grouped into three household income categories: low, middle and high, plus a missing category.

RESULTS

Of the 118,350 respondents aged 19 years and older, 6,035 people, representing 1.03 million Canadians, indicated that they had been diagnosed with a bowel disorder by a health professional. Of those with a bowel disorder, 4441 reported having IBD or IBS, representing estimated populations of 200,350 with IBD (45% CD; 55% UC) and 589,000 with IBS. The remaining 1478 had bowel incontinence (4.5%) or suffered from other bowel disorders (16.9%).

A comparison of demographic characteristics of IBD and IBS are shown in Table 1. Overall, IBS was more prevalent in women than in men (78.8% versus 21.1%, respectively; $P < 0.01$), but there was no significant difference between males and females in the prevalence of IBD. The age distributions in IBD and IBS patients were similar, with the lowest prevalence in those aged 19 to 29 years. There was a trend toward a higher proportion of people diagnosed with IBD aged 60 years and older compared with IBS patients (25.0% versus 19.7%, respectively; $P > 0.05$).

TABLE 1
A comparison of the demographic characteristics of inflammatory bowel disease (IBD) versus irritable bowel syndrome (IBS) in a Canadian household population aged 19 years and older, 2005

Characteristic	IBD patients		IBS patients*	
	n (1000s)	%	n (1000s)	%
Total	200	25.4	589	74.6
Sex				
Male	89	44.4 [†]	124	21.1
Female	112	55.6 [†]	464	78.9
Age, years				
19–29	22	11.1 [†]	93	15.7
30–39	37	18.5	109	18.4
40–59	93	46.2	271	46.0
60 and older	50	25.0	116	19.7 [†]
Comorbidity				
Mental disorders (anxiety disorder, mood disorder and other)	108	53.8 [†]	394	67.7
Migraine, effects of stroke, epilepsy, Alzheimer's disease	36	18.0 [†]	172	29.3
Arthritis, back pain	92	46.0 [†]	325	55.5
Heart disease, high blood pressure, diabetes	49	24.4	131	22.4
Cancer (has cancer now, or ever had cancer; excluding nonmelanoma skin cancer)	12	6.1	43	7.4
Asthma, COPD, emphysema, chronic bronchitis, eye conditions (cataracts, glaucoma), thyroid	58	28.9 [†]	238	40.8
Other chronic conditions (not specified)	31	15.6 [†]	141	23.9

*Reference category; [†]Estimate differs significantly from that of IBS ($P < 0.01$). COPD Chronic obstructive pulmonary disease. Data from the 2005 Canadian Community Health Survey (Statistics Canada)

The prevalence of other chronic conditions among those with IBD and IBS can be seen in Table 1. When comparing patients with IBD and IBS, where there was a difference in rates of a chronic condition, it was typically those with IBS who had the significantly higher rates.

Nevertheless, individuals diagnosed with IBD were more likely than those with IBS to report that their general health status was fair or poor (32% versus 24%, respectively; $P < 0.01$) (Figure 1). Conversely, individuals with IBS were more likely than those with IBD to report poor mental health status (12% versus 8%, respectively; $P < 0.01$), stress (37% versus 28%, respectively; $P < 0.01$) and limited activity levels (31% versus 25%, respectively; $P < 0.01$) (Figures 2 to 4).

Overall, poor general and mental health status, activity limitations and disability days were reported more often by people with IBD and IBS than by people in the general population without IBD or IBS ($P < 0.05$) (Table 2). In terms of daily life stress, individuals with IBS were more likely to report that most days were stressful than those in the general population

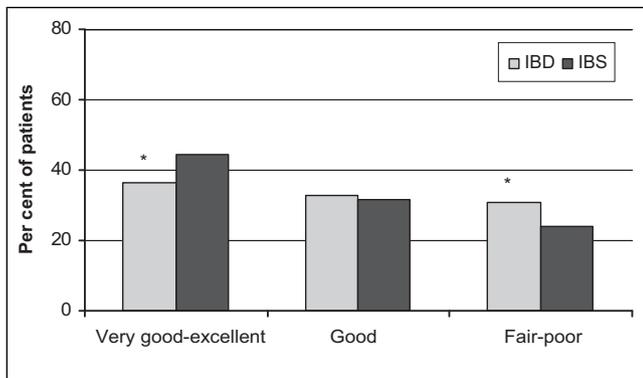


Figure 1) Self-perceived general health of inflammatory bowel disease (IBD) patients versus irritable bowel syndrome (IBS) patients in a Canadian household population aged 19 years and older, 2005. *IBD estimate differs significantly from that of IBS ($P<0.01$). Data from the 2005 Canadian Community Health Survey (Statistics Canada)

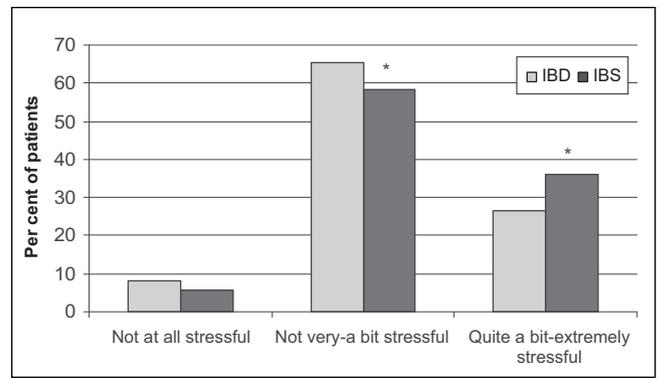


Figure 3) Self-perceived stress in the daily life of inflammatory bowel disease (IBD) patients versus irritable bowel syndrome (IBS) patients in a Canadian household population aged 19 years and older, 2005. *IBS estimate differs significantly from that of IBD ($P<0.01$). Data from the 2005 Canadian Community Health Survey (Statistics Canada)

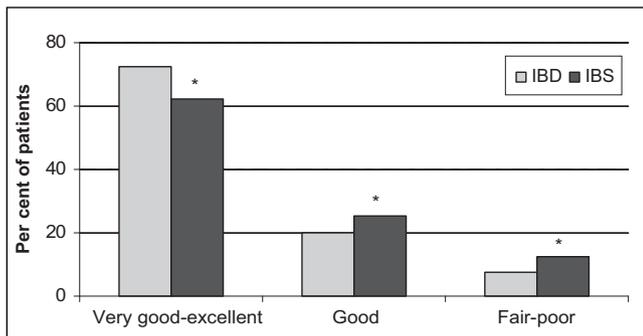


Figure 2) Self-perceived mental health of inflammatory bowel disease (IBD) patients versus irritable bowel syndrome (IBS) patients in a Canadian household population aged 19 years and older, 2005. *IBS estimate differs significantly from that of IBD ($P<0.01$). Data from the 2005 Canadian Community Health Survey (Statistics Canada)

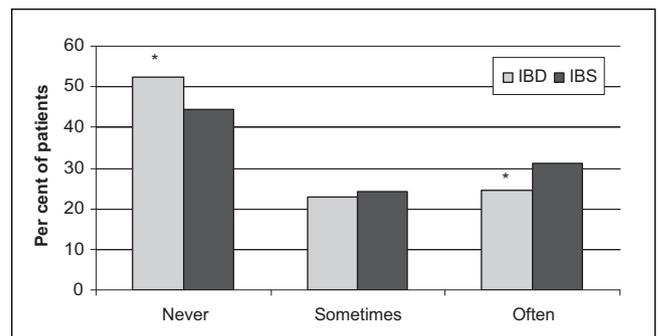


Figure 4) Frequency of activity limitations of inflammatory bowel disease (IBD) patients versus irritable bowel syndrome (IBS) patients in a Canadian household population aged 19 years and older, 2005. *IBD estimate differs significantly from that of IBS ($P<0.01$). Data from the 2005 Canadian Community Health Survey (Statistics Canada)

TABLE 2
Comparison of functional impairment in inflammatory bowel disease (IBD) and irritable bowel syndrome (IBS) patients versus the general population in a Canadian household population aged 19 years and older, 2005

Functional impairment	With IBD, %	General population, %	With IBS, %	General population, %
Self-perceived general health				
Fair or poor	30.84*	11.80	24.18*	11.65
Self-perceived mental health				
Fair or poor	7.61†	5.04	12.56*	4.87
Most days are				
Quite a bit or extremely stressful	26.57	23.39	36.00*	23.11
Experienced activity limitations				
Sometimes	22.83*	16.13	24.08*	15.99
Often	24.45*	14.72	31.23*	14.39
Disability days				
At least one day spent in bed due to illness in the past 14 days	30.84*	16.72	37.98*	16.31

*Estimate differs significantly from that of the reference category (general population without IBD or IBS) ($P<0.01$); †Estimate differs significantly from that of the reference category (general population without IBD or IBS) ($P<0.05$). Data from the 2005 Canadian Community Health Survey (Statistics Canada)

TABLE 3
Adjusted ORs relating inflammatory bowel disease (IBD), irritable bowel syndrome (IBS) and other characteristics to fair or poor self-perceived general health in the past year in a Canadian household population aged 19 years and older, 2005

Covariates	Fair or poor self-perceived physical health					
	IBD			IBS		
	Adjusted OR	95% CI	P	Adjusted OR	95% CI	P
Sex						
Male*	1	NA	NA	1	NA	NA
Female	0.87	0.83–0.92	0.001	0.84	0.8–0.89	0.001
Age group, years						
19–29	0.28	0.25–0.31	0.001	0.28	0.25–0.31	0.001
30–39	0.32	0.29–0.35	0.001	0.32	0.29–0.35	0.001
40–59	0.66	0.62–0.71	0.001	0.66	0.62–0.7	0.001
≥60*	1	NA	NA	1	NA	NA
Household income						
Lowest*	1	NA	NA	1	NA	NA
Middle	0.55	0.51–0.58	0.001	0.55	0.51–0.58	0.001
High	0.34	0.31–0.37	0.001	0.34	0.32–0.38	0.001
Education						
High school graduation or less*	1	NA	NA	1	NA	NA
Some postsecondary education	0.79	0.71–0.89	0.001	0.79	0.71–0.89	0.001
Postsecondary graduation	0.63	0.59–0.67	0.001	0.62	0.59–0.66	0.001
IBD or IBS and comorbidity						
IBD only or IBS only*	1	NA	NA	1	NA	NA
With other bowel disorder	4.61	3.3–6.45	0.001	4.72	3.37–6.6	0.001
With mental disorders	1.53	1.05–2.24	0.03	1.16	0.92–1.46	0.22
With neurological disorders	2.63	1.45–4.76	0.001	1.66	1.29–2.14	0.001
With arthritis or back pain	1.75	1.18–2.6	0.01	1.45	1.16–1.81	0.001
With heart disease, high blood pressure or diabetes	1.56	1.06–2.31	0.03	1.92	1.43–2.59	0.001
With cancer (excluding nonmelanoma skin cancer)	3.45	1.05–11.39	0.04	4.56	1.97–10.56	0.001
With respiratory conditions or eye conditions	1.18	0.77–1.82	0.44	1.48	1.17–1.87	0.001
With other chronic conditions	1.24	0.75–2.06	0.40	0.86	0.67–1.12	0.27
Other chronic condition (without IBD or IBS)	1.96	1.83–2.09	0.001	1.96	1.8–2.09	0.001
Without any chronic condition	0.15	0.13–0.17	0.001	0.15	0.13–0.18	0.001

*Reference category. NA Not applicable. Data from the 2005 Canadian Community Health Survey (Statistics Canada)

without IBS (36% versus 23%, respectively; $P < 0.01$). However, patients with IBD had similar stress levels to those in the general population without IBD. Similarly, a significantly higher number of people with IBS and IBD reported activity limitations than people in the general population without IBS (31% versus 14%, respectively; $P < 0.01$) and IBD (24% versus 15%, respectively; $P < 0.01$), respectively (Table 2).

In multivariate analyses, the relationship between IBD or IBS and general health was affected by age, income and the level of education of the patient. Older individuals, and those with lower income and lower education levels reported poorer general health ($P < 0.001$) (Table 3). Overall, women with IBD or IBS reported better general health than men (OR 0.87, 95% CI 0.83 to 0.92, and OR 0.84, 95% CI 0.8 to 0.89, respectively; $P < 0.001$). People without IBD or IBS but with other chronic diseases (stroke, cancer, etc) were more likely to report poor health than IBD and IBS patients without another chronic disease (OR 1.96, 95% CI 1.83 to 2.09; $P < 0.001$). Of other comorbidities, having another bowel disorder increased the likelihood of reporting poor health in both IBD (OR 4.61, 95% CI 3.3 to 6.45; $P < 0.05$) and IBS patients (OR 4.72, 95%

CI 3.37 to 6.6; $P < 0.05$). Developing cancer also increased the likelihood of reporting poor general health in IBD (OR 3.45, 95% CI 1.05 to 11.39; $P = 0.04$) and IBS patients (OR 4.56, 95% CI 1.97 to 10.56; $P < 0.001$).

Regarding mental health, IBD and IBS patients who were older than 60 years ($P < 0.001$), and with a higher household income ($P < 0.001$) and a higher education level ($P < 0.001$) reported better perceptions of mental health (Table 4). The sex of the patient did not matter. IBD patients reported poorer mental health when they had another bowel disorder (OR 2.07, 95% CI 1.22 to 3.51; $P = 0.01$) or cancer (excluding non-melanoma skin cancer) (OR 2.95, 95% CI 1.11 to 7.85; $P < 0.03$). Similarly, IBS patients reported poorer mental health when they had other bowel disorders (OR 2.15, 95% CI 1.27 to 3.65; $P < 0.001$). Chronic disease sufferers without IBD or IBS were more likely to report poor mental health than IBD or IBS patients (OR 1.48, 95% CI 1.34 to 1.63; $P < 0.001$).

Regarding stress, women reported greater stress than men among those with IBD (OR 1.08, 95% CI 1.03 to 1.13; $P < 0.001$) or IBS (OR 1.06, 95% CI 1.01 to 1.11; $P = 0.02$) (Table 5). Both IBD and IBS patients in higher income

TABLE 4
Adjusted ORs relating inflammatory bowel disease (IBD), irritable bowel syndrome (IBS) and other characteristics to fair or poor self-perceived mental health in the past year in a Canadian household population aged 19 years and older, 2005

Covariate	Fair or poor self-perceived mental health					
	IBD			IBS		
	Adjusted OR	95% CI	P	Adjusted OR	95% CI	P
Sex						
Male*	1	NA	NA	1	NA	NA
Female	0.99	0.91–1.08	0.83	0.95	0.87–1.04	0.24
Age group, years						
19–29	1.62	1.42–1.84	0.001	1.62	1.42–1.84	0.001
30–39	1.52	1.34–1.73	0.001	1.51	1.33–1.72	0.001
40–59	1.73	1.56–1.92	0.001	1.7	1.53–1.89	0.001
≥60*	1	NA	NA	1	NA	NA
Household income						
Lowest*	1	NA	NA	1	NA	NA
Middle	0.59	0.54–0.66	0.001	0.59	0.53–0.65	0.001
High	0.38	0.33–0.43	0.001	0.38	0.33–0.43	0.001
Education						
High school graduation or less*	1	NA	NA	1	NA	NA
Some postsecondary education	0.93	0.78–1.11	0.42	0.93	0.78–1.1	0.38
Postsecondary graduation	0.72	0.66–0.79	0.001	0.72	0.65–0.78	0.001
IBD or IBS and comorbidity						
IBD only or IBS only*	1	NA	NA	1	NA	NA
With other bowel disorder	2.07	1.22–3.51	0.01	2.15	1.27–3.65	0.001
With mental disorders	0.96	0.6–1.55	0.88	1.66	1.24–2.23	0.001
With neurological disorders	1.45	0.84–2.48	0.18	1.69	1.27–2.25	0.001
With arthritis or back pain	1.58	0.92–2.71	0.10	1.3	0.99–1.7	0.06
With heart disease, high blood pressure or diabetes	1	0.56–1.78	0.99	1.37	1–1.86	0.05
With cancer (excluding nonmelanoma skin cancer)	2.95	1.11–7.85	0.03	0.81	0.36–1.83	0.61
With respiratory conditions or eye conditions	1.36	0.74–2.5	0.33	1.34	1.01–1.78	0.04
With other chronic conditions	1.22	0.66–2.25	0.52	0.84	0.6–1.17	0.29
Other chronic condition (without IBD or IBS)	1.48	1.34–1.63	0.001	1.48	1.34–1.63	0.001
Without any chronic condition	0.23	0.19–0.27	0.001	0.24	0.2–0.28	0.001

*Reference category. NA Not applicable. Data from the 2005 Canadian Community Health Survey (Statistics Canada)

households reported higher stress levels than those in the lowest income households (OR 1.06, 95% CI 1.00 to 1.12; $P < 0.04$). People with higher education levels also reported greater stress levels (OR 1.13, 95% CI 1.07 to 1.2; $P < 0.001$). Being younger than 60 years (versus being 60 years of age or older) significantly increased the likelihood of reporting greater stress threefold for both IBD and IBS patients ($P < 0.001$). When IBD or IBS coexisted with one or more chronic conditions, the odds of reporting that most days were quite a bit or extremely stressful were up to twofold higher. Chronic disease sufferers without IBD or IBS reported greater stress than IBD or IBS patients.

Overall, activity limitations were reported less by women ($P < 0.001$), younger age groups ($P < 0.001$), those with high household incomes ($P < 0.001$) and those with postsecondary education for both IBD and IBS patients ($P = 0.01$) (Table 6). Among individuals who reported having IBD or IBS and another bowel disorder, there was a significant increase in reporting activity impairment at work, at school or in other environments (OR 4.18, 95% CI 2.99 to 5.83, and OR 4.31, 95% CI 3.09 to 6.02, respectively; $P < 0.001$) (Table 6). People

with chronic disease other than IBD and IBS were also more than twice as likely to report activity limitations than those with IBD (OR 2.53, 95% CI 2.38 to 2.68; $P < 0.001$) and IBS alone (OR 2.55, 95% CI 2.40 to 2.7; $P < 0.001$).

Overall, the health parameters of IBD and IBS were influenced by sex, age, household income, highest level of education and other comorbidities (Tables 3 to 6). Those with IBD and IBS having another bowel disorder reported the poorest general health, mental health, stress and activity limitations. Also, people with other chronic diseases without IBD or IBS reported poorer function across the health parameters than patients suffering from IBS or IBD alone.

DISCUSSION

The present study is the first large national population-based study to evaluate the perceptions of patients with IBD and IBS regarding their overall physical health, mental health and stress levels. Individuals with IBD were more likely to report poor general health, while people with IBS were more likely to report poor mental health. Those with IBD reported poorer general health, even though it was the IBS group that had

TABLE 5
Adjusted ORs relating inflammatory bowel disease (IBD), irritable bowel syndrome (IBS) and other characteristics to self-perceived stress in daily life in the past year in a Canadian household population aged 19 years and older, 2005

Covariate	Self-perceived stress in daily life					
	IBD			IBS		
	Adjusted OR	95% CI	P	Adjusted OR	95% CI	P
Sex						
Male*	1	NA	NA	1	NA	NA
Female	1.08	1.03–1.13	0.001	1.06	1.01–1.11	0.02
Age, years						
19–29	3.01	2.78–3.26	0.001	3.02	2.79–3.27	0.001
30–39	3.81	3.52–4.13	0.001	3.82	3.53–4.15	0.001
40–59	3.29	3.06–3.54	0.001	3.29	3.06–3.54	0.001
≥60*	1	NA	NA	1	NA	NA
Household income						
Lowest*	1	NA	NA	1	NA	NA
Middle	0.9	0.86–0.95	0.001	0.9	0.86–0.96	0.001
High	1.06	1.00–1.12	0.04	1.06	1.00–1.12	0.03
Education						
High school graduation or less*	1	NA	NA	1	NA	NA
Some postsecondary education	1.15	1.04–1.28	0.01	1.15	1.03–1.28	0.01
Postsecondary graduation	1.13	1.07–1.2	0.001	1.13	1.07–1.2	0.001
IBD or IBS and comorbidity						
IBD only or IBS only*	1	NA	NA	1	NA	NA
With other bowel disorder	1.67	1.16–2.4	0.01	1.7	1.18–2.45	0.001
With mental disorders	1.02	0.72–1.45	0.91	1.14	0.93–1.4	0.22
With neurological disorders	1.95	1.18–3.22	0.01	1.78	1.39–2.27	0.001
With arthritis or back pain	1.45	0.96–2.19	0.08	1.05	0.84–1.31	0.64
With heart disease, high blood pressure or diabetes	0.65	0.42–0.99	0.05	1.55	1.17–2.04	0.001
With cancer (excluding nonmelanoma skin cancer)	5.64	2.09–15.23	0.001	1.76	0.79–3.92	0.16
With respiratory conditions or eye conditions	0.91	0.6–1.39	0.67	1.27	1–1.6	0.05
With other chronic conditions	0.77	0.47–1.27	0.30	0.94	0.72–1.23	0.67
Other chronic condition (without IBD or IBS)	1.29	1.21–1.38	0.001	1.28	1.2–1.37	0.001
Without any chronic condition	0.65	0.62–0.69	0.001	0.66	0.62–0.69	0.001

*Reference category. NA Not applicable. Data from the 2005 Canadian Community Health Survey (Statistics Canada)

higher rates of other chronic conditions. We may expect IBD patients to have poorer general health than IBS patients because they have higher disease-associated comorbidities including fistulas, weight loss and bleeding.

Another important finding was that IBS patients perceived worse mental health and stress levels than IBD patients. IBS has been associated with higher rates of psychological disorders and stress (3). While it has been previously suggested that IBS patients referred to tertiary care centres for evaluation struggle with stress and poorer mental health (15), it is interesting and novel that our study shows that even a community sample with IBS symptoms report similar results.

While some population estimates have suggested that approximately 14% of the population has IBS (16), the rate found in the present epidemiological study was quite a bit lower, at 2.2%. Other studies have often used symptom descriptions to categorize participants as likely having IBS, resulting in higher rates of IBS. In the present national survey, participants were asked whether they had one of the gastrointestinal conditions “diagnosed by a health professional”, which may in part explain the lower IBS rate. That is, up to 77% of

those with IBS have been found to be medically undiagnosed (16), so the present community sample of those with doctor-confirmed diagnosis may well reflect those with more active or problematic symptoms who have sought a medical opinion. While it is possible that our data represent those with the most active IBS because they have been diagnosed by a doctor, this may be balanced by the fact that this was a population-based sample and hence avoided the bias of surveying subjects who present to tertiary referral centres. Also, while some studies in adults show increased rates of psychological distress in IBS patients who seek medical attention, these results are contradicted in studies on students (17). In our study, both IBD and IBS patients had high percentages of associated mental disorders (53.8% and 67.7%, respectively), so it is unlikely that we are exclusively selecting out IBS patients with psychological disorders.

Patients with IBD and IBS report better general health, mental health, stress and activity limitations than patients who suffer from other chronic diseases such as heart disease and cancer. Also, IBD and IBS patients cope significantly worse when they have another comorbidity, especially if it is

TABLE 6
Adjusted ORs relating inflammatory bowel disease (IBD), irritable bowel syndrome (IBS) and other characteristics to activity limitations in the past year in a Canadian household population aged 19 years and older, 2005

Covariate	Activity limitations					
	IBD			IBS		
	Adjusted OR	95% CI	P	Adjusted OR	95% CI	P
Sex						
Male*	1	NA	NA	1	NA	NA
Female	0.91	0.86–0.96	0.001	0.88	0.83–0.92	0.001
Age, years						
19–29	0.28	0.26–0.31	0.001	0.29	0.26–0.31	0.001
30–39	0.31	0.29–0.34	0.001	0.31	0.29–0.34	0.001
40–59	0.56	0.53–0.59	0.001	0.55	0.52–0.58	0.001
≥60*	1	NA	NA	1	NA	NA
Household income						
Lowest*	1	NA	NA	1	NA	NA
Middle	0.69	0.65–0.73	0.001	0.69	0.65–0.73	0.001
High	0.57	0.53–0.62	0.001	0.58	0.53–0.62	0.001
Education						
High school graduation or less*	1	NA	NA	1	NA	NA
Some postsecondary education	1.14	1.03–1.27	0.01	1.14	1.03–1.27	0.01
Postsecondary graduation	0.94	0.89–0.99	0.01	0.93	0.88–0.98	0.01
IBD or IBS and comorbidity						
IBD only or IBS only*	1	NA	NA	1	NA	NA
With other bowel disorder	4.18	2.99–5.83	0.001	4.31	3.09–6.02	0.001
With mental disorders	1.36	0.99–1.86	0.06	1.22	0.99–1.5	0.06
With neurological disorders	1.49	0.89–2.49	0.13	1.63	1.29–2.07	0.001
With arthritis or back pain	1.58	1.08–2.3	0.02	2.22	1.74–2.82	0.001
With heart disease, high blood pressure or diabetes	0.86	0.59–1.25	0.42	1.64	1.25–2.14	0.001
With cancer (excluding nonmelanoma skin cancer)	1.3	0.43–3.94	0.64	1.45	0.72–2.93	0.3
With respiratory conditions or eye conditions	1.32	0.91–1.92	0.14	1.17	0.93–1.46	0.18
With other chronic conditions	1.09	0.69–1.74	0.7	0.71	0.55–0.9	0.01
Other chronic condition (without IBD or IBS)	2.53	2.38–2.68	0.001	2.55	2.4–2.71	0.001
Without any chronic condition	0.22	0.2–0.24	0.001	0.23	0.2–0.25	0.001

*Reference category. NA Not applicable. Data from the 2005 Canadian Community Health Survey (Statistics Canada)

another bowel disorder. While IBD and IBS patients are generally coping well with their disease, compared with patients suffering from other chronic diseases, there may be a critical threshold of coping for both IBS and IBD patients. This threshold could potentially be affected by the severity of their gastrointestinal disease, the type of the associated comorbidity and the psychological resources of the individual. It is not well understood what factors are responsible for pushing patients beyond this threshold of coping; this would be an interesting area for future research.

Previous reports (10,16,18,19) have shown that IBS patients, and even IBD patients, report stress or that their conditions are affected by stress. Furthermore, it is not surprising that some patients with IBD and IBS self-report poor general and mental health. However, ours is among the few studies to directly compare the two conditions for perceptions about health including stress, and among the first to do so in a population-based sample.

The strength of the present study lies in the fact that it is based on data derived from a national population-based survey with rigorous sampling methods and a large sample size. Also,

the information captures the participants' own experiences and views of their health, which is relevant given the increasingly patient-centred focus of health care. However, there are some limitations. The data on which this study is based are self-reported, using unidimensional measures of the key concepts. Health status, stress and other health conditions were not separately verified by other measures or collateral information. Nevertheless, great care was taken in the survey methodology to validate simple measurement tools that are appropriate for large samples, and to ensure population representativeness. There is some possibility of a biased picture of health perceptions, because the survey excluded people living in isolated northern communities and on First Nations reservations, the homeless, and those who are institutionalized such as the mentally ill or elderly and hospitalized patients. The survey captured only a small population of exclusive cell phone users. Although the percentage of people residing in institutions is quite small, they likely represent a more ill population who may report worse health status. On the other hand, there is always the potential that a disproportionate number of individuals who participated in the survey may have been

healthier and more likely than nonrespondents to engage in health-promoting behaviours, although that is a challenge faced by most large survey studies.

Another potential limitation of the study is in the diagnosis of IBD and IBS, because it was based on the participant's report of their condition. Bias was minimized by asking the patient to report the gastrointestinal disorder only if they had been diagnosed by their physician or by a health professional; a question that is similar to those used in other national population surveys, such as the National Health Interview Survey, to estimate disease incidence (20,21). Previous work from our group (10) found a very high level of agreement between patient self-report of IBD subtype, and subsequent chart verification of the disease. Further support for the validity of the IBD self-report was that the rates of IBD were consistent with an estimate of the population burden of IBD from a multiprovince administrative health database study (22). The IBS subjects may represent the most symptomatic of IBS subjects because they have presented to a physician and have been diagnosed (as opposed to the presumed high rates of subjects who have IBS-like symptoms but who do not seek medical care). However, our subject sample was population-based and is

not biased by those who present to research centres, and who may have more symptomatic IBS or IBD.

Despite the limitations of a self-reported study, the power of the present national population-based database reveals glimpses of how the Canadian population with IBD and IBS experience their health in the context of their disease. Our study suggests that IBS patients may potentially benefit from more resources with respect to psychological support. IBD patients who have concomitant disease may also need greater social and psychological support than previously considered. Future studies will need to replicate and validate these results in community-based cohorts of IBD and IBS patients. These results will ultimately allow us to develop quality assurance studies with social programs to address areas of need within our IBS and IBD populations to improve their overall quality of life.

ACKNOWLEDGEMENT: Dr. Bernstein is supported in part by a Crohn's and Colitis Foundation of Canada Research Scientist Award.

Conflicts of interest: No conflicts exist for Drs Tang, Nabalamba and Graff. Dr Bernstein is a consultant to Axcan Pharma, Bristol Myers Squibb, Abbott Canada, Shire Canada and UCB Canada.

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