Validating a measure of patient self-efficacy in disease self-management using a population-based IBD cohort: the IBD Self-Efficacy Scale

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Conflicts of Interest:

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ABSTRACT

Background: Self-efficacy describes a person's confidence in their ability to manage demands, and is predictive of health outcomes in chronic disease such as hospitalization and health status. However, meaningful measurement must be domain (e.g., disease) specific. This study aims to provide validation of the IBD Self-Efficacy scale (IBD-SE), using a population-based IBD sample.

Methods: Manitoba IBD Cohort Study participants completed a survey and clinical interview at a mean of 12 years post-diagnosis (n=121 Crohn's disease; n=108 ulcerative colitis), which included validated measures of psychological functioning, disability, disease-specific quality of life, perceived health, and current and recent disease activity, in addition to the IBD-SE.

Results: The IBD-SE had high internal consistency (Cronbach's α=0.97), and a four-factor structure was confirmed. Construct validity was demonstrated as follows: the IBD-SE was strongly correlated with mastery (r=.53), highly correlated in the expected directions with measures of psychological well-being (r=.70), stress (r=-.78), distress (r=-.71), disability (r=-.48), disease-specific quality of life (r=.68) and overall perceived health (r=.52) (all $p<0.001$). Those with currently inactive disease had higher self-efficacy than the active disease group (CD: mean=232 vs. 195, $p<0$ .001; UC: mean= 233 vs. 202, $p<0$ .01), with similar findings for recent symptomatic disease activity.

Conclusions: The IBD-SE is a reliable, valid, and sensitive measure as demonstrated in this population-based sample, supporting its utility in IBD. As self-efficacy is a modifiable psychological characteristic that can contribute to positive health outcomes, the IBD-SE may prove to be a valuable instrument for research and in targeted intervention with IBD patients.

Keywords: self-efficacy, inflammatory bowel disease, scale validation, disease self-management

There has been growing recognition of the central role of the patient in chronic disease management to facilitate better health outcomes and quality of life[1]. As such, factors that influence the patient's ability to deal with the demands of their disease have taken on increasing importance. Self-efficacy is a key factor in adapting to chronic disease. Self-efficacy describes a person's confidence in their ability to manage demands. It reflects a positive view of one's competence in coping with specific stresses or challenges through adaptive action[2]. Social cognitive theory of behavior change suggests that an individual's view of their self-efficacy relates to whether coping behavior is initiated, the effort used to address challenges, and how long the individual may persist with such efforts. Self-efficacy is understood to be domain-specific, meaning that confidence in the ability to manage the unique requirements of one life domain (e.g., job) does not necessarily transfer to another life domain (e.g., relationships, health). So, while self-efficacy is both measurable and modifiable, it is most relevant in a health context when it is assessed as disease-specific, in order to best capture confidence in managing the unique tasks associated with the disease.

Patient self-efficacy for disease self-management has been found to predict multiple health outcomes in a variety of chronic illness populations. It is associated with improved mobility in stroke patients[3], better self-care and glycemic control in adults with diabetes[4,5], and greater physical wellbeing for osteoarthritis patients[6]. Lower cardiac self-efficacy in patients with stable coronary heart disease was predictive of both subsequent hospitalization for heart failure and of mortality[7]. Arthritis self-efficacy has been found to predict health status and adherence to treatment recommendations in patients with rheumatoid arthritis[8].

Persons with inflammatory bowel disease (IBD), a chronic relapsing and remitting immune-mediated inflammatory condition, face multiple challenges related to the disease

symptoms, medication adherence, lifestyle adjustments, potential for surgery, and cancer surveillance. While there are well-established self-efficacy measures in other chronic inflammatory diseases that have been valuable in understanding patient outcomes, disease-specific self-efficacy measures for IBD have lagged behind. IBD self-efficacy scales have only recently evolved in the adult and pediatric literature[9,10], in parallel with qualitative work highlighting the relevance of self-efficacy in disease management for IBD patients[11]. The robust relationship between self-efficacy and health outcomes has resulted in a growing focus on interventions to enhance self-efficacy as part of an overall chronic disease management strategy[12]. However, domain-specific self-efficacy should be assessed, in order to determine if targeted interventions have resulted in the desired changes.

The aim of this study was to build on the preliminary validation work for the Inflammatory Bowel Disease - Self Efficacy scale (IBD-SE), a disease-specific measure developed by Keefer and colleagues[9]. They used small clinical and online IBD participant samples to pilot the measure. We aimed to evaluate the reliability, validity, and utility of the IBD-SE in a population-based IBD sample.

METHODS

Participants

The Manitoba IBD Cohort Study, initiated in 2002, is an ongoing study of adults with IBD who have been tracked prospectively through annual clinical interviews and semi-annual surveys. The participants were drawn from a validated population-based research registry, which identified and recruited individuals using an administrative definition of IBD from the comprehensive health data base of Manitoba Health, the single insurer that provides health care

to all residents in the province[13]. The Cohort has been described in previous reports by our group[14,15]; briefly it consisted of 388 adult enrollees with recent IBD onset who completed the baseline survey and interview in 2002-2003. Participants were followed every six months with surveys and annually with interviews. Diagnosis and disease type were verified by chart review. It has been demonstrated that the Cohort is representative of the provincial IBD population as a whole, with comparable age distribution, sex distribution, disease duration, and rural/urban residence[16].

The Cohort Study was approved by the University of Manitoba Health Research Ethics Board. Participants provided written, informed consent.

The primary measure of interest, the IBD-SE, was obtained 96 months (i.e. 8 years) after study entry, at which time there were 250 individuals in the Cohort, of which 229 (121 with Crohn's disease [CD], 108 with ulcerative colitis [UC]) had completed psychological and disease activity information for the purposes of this study. All the measures, including psychological functioning, disability, quality of life, and disease activity were assessed concurrently at 96 months, and the IBD-SE was re-assessed at the 108 month measurement period.

Measures

Self efficacy

The IBD-SE is a 29-item scale developed by Keefer and colleagues[9] based on patient interview, validated self-efficacy measures for other diseases, and self-efficacy theory. The instrument assesses the level of confidence in managing various disease-related 'tasks', with item scores ranging from 1 (not at all) to 10 (totally), and higher scores reflecting greater disease self-management efficacy. Items were grouped conceptually into 4 subscales, reflecting domains

identified by IBD patients as important: 1) managing stress and emotions [sample items: keep from feeling sad; do something to reduce stress]; 2) managing medical care [sample items: take medication at instructed times; work out differences with doctors]; 3) managing symptoms and disease [sample items: keep diarrhea/urgency from interfering; decrease fatigue]; 4) maintaining remission [sample items: engage in self-care; maintain sense of well-being]. Preliminary validation was obtained using a small clinical IBD sample (n=42) and online IBD participants (n=80), and indicated high reliability and good construct validity[9].

Psychological Functioning

The validated 7-item Mastery scale[17] assesses the degree to which persons feel they have some control or mastery over their life to handle day to day challenges. Item responses range from strongly agree to strongly disagree on a 5-point Likert scale, with higher scores indicating a greater sense of mastery. This scale has also shown good reliability in those with chronic disease[18].

The Psychological Wellbeing Manifestations Scale consists of 25 items that query six general domains of positive experience using a 5-point Likert frequency scale, with higher scores indicating a greater sense of well-being[19]. It has been validated in an IBD sample by our group[20], and was also found to have good reliability and moderate temporal stability.

The Cohen Perceived Stress Scale (CPSS) is a 14-item questionnaire, with a 5 point Likert response format, that assesses the individual's appraisal of their stress 'load' related to chronic and acute stressors[21]. This widely-used instrument has been validated as a tool to examine the role of stress in disease[21,22,23].

The Brief Symptom Inventory (BSI) is a well-established measure of current emotional distress related to multiple psychological symptoms, consisting of 53 items[24]. It has good internal

consistency (Cronbach's alpha = 0.71 to 0.85) and validity, with evident stability (test-retest correlation =0.90), particularly for the global score (Global Severity Index-GSI), which was used for this study.

Disability

The Sheehan Disability Scale is a commonly-used and validated instrument that measures disease interference in three primary domains of life: work, social, and home, based on a visual analogue scale from 0 (no interference) to 10 (very severe interference)[25,26].

Health and Quality of Life

Perceived health was assessed using the General Health item from the Medical Outcome Survey Short-Form-36 (SF-36)[27], which asks participants to characterize their health in the past year, using 5 response categories from 'Excellent' to 'Poor'.

The 32-item Inflammatory Bowel Disease Questionnaire (IBDQ) is a validated measure that has been extensively used in IBD studies to assess disease-specific quality of life[28,29]. Items are based on patient description of problems they have experienced due to IBD across domains of physical, emotional, social and behavioral functioning, with responses ranging on a 7 point scale from "None of the time" to "All of the time" or a similar variant. The higher the global score the better the quality of life, with scores greater than 170 associated with disease remission.

Disease activity

Current disease activity was assessed using standardized clinical indices, the Harvey-Bradshaw (HB) index for CD[30], and the modified Powell-Tuck (PT) index for ulcerative colitis[31], administered during the clinical interview. Active disease is defined as scores ≥ 5[32,33].

Recent disease activity was measured with the Manitoba IBD Index (MIBDI)[34], which is based on patient report of symptom persistence in the previous six months. The single-item

measure uses a 6-level response format, and is dichotomized into active (level 1-4, symptoms daily to occasionally) or inactive (level 5-6, symptoms rarely to none/feeling well) symptomatic disease. The scale has been validated, demonstrating good concordance with a variety of clinical disease activity indices[34].

Statistical analyses

Descriptive statistics, including means, standard deviations, and item-total score correlations were calculated for the IBD-SE items and for the total scale, as appropriate. The item-total score correlations were corrected using the jackknife approach, such that the item evaluated against the total score was removed from the total score to minimize inflation of the association. Reliability of the IBD-SE was calculated using Cronbach's alpha. Temporal stability was assessed based on Pearson correlation coefficients comparing the IBD-SE scores at the 96 month and 108 month data collection points. Construct validity[35] was determined through criterion, concurrent construct, and known groups validation, using Pearson and Spearman rho correlations, as appropriate, to evaluate associations between the IBD-SE and the psychological functioning, disability, and quality of life variables, and using analysis of variance to evaluate differences between inactive and active disease sub-groups. The latter was evaluated given prior IBD research which has shown that those with active disease tend to have poorer psychological functioning and a lower sense of mastery than those with inactive disease[14,36].

A confirmatory factor analysis was conducted to assess the four-factor structure of the scale identified in the original study[9]. Selected indicator variables were those showing the highest item-total correlations in the Keefer study. An elliptical estimation method was used to adjust for high multivariate kurtosis (normalized estimate of Mardia's coefficient = 88.32), to

ensure more appropriate goodness of fit indices. All statistical analyses were performed using SPSS version 21[37] and EQS version 6.1[38]. Goodness of fit was assessed according to Hu and Bentler's[39] criteria for acceptable model fit (Comparative Fit Index (CFI) > 0.95; Standardized Root Mean-square Residual (SRMR) < 0.08; Root Mean-square Error of Approximation (RMSEA) < .06) and a Bentler-Bonnett Nonnormed Fit Index > 0.90[40]. All factor loadings and correlations used a P value of <0.05 for statistical significance.

RESULTS

Background demographic and clinical information is reported in Table 1. In this Cohort sample, 121 had CD, 61% were women, just over two-thirds (70%) were in a partner relationship, and most (83%) were employed in some capacity, either part time or full time. The mean age of the sample was 48.7 years (*SD* = 14.7; ranging from 25-85 years), and the mean disease duration was 12 years since diagnosis. The majority had inactive disease currently (62.7%) based on the HB or PT, with half reporting minimal to no symptoms over the past 6 months (49.8% inactive based on MIBDI).

Inflammatory Bowel Disease-Self Efficacy (IBD-SE) Scale Information

Table 2 provides the total scale and subscale descriptive information for the Cohort sample and compares CD and UC subgroups. There were small differences in scores between the disease types, indicating those with UC tended to have modestly higher self-efficacy (mean score UC = 231.7, CD=216.3, p=0.018).

Psychometric Qualities of the IBD-SE

Reliability

The 29-item scale was found to be highly internally consistent, with Cronbach's α=0.97. The four subscales also had high internal consistency, ranging from α=0.92-0.97 (Table 3). Item descriptive information and item-total correlations are presented in Table 3. Corrected item correlations with the total IBD-SE score ranged from .43 to .83 (p<0.05), with the majority >.70. Comparing the total scale and subscale scores across a one year period, the scores at time 1 and 2 were moderately to strongly correlated as follows: total IBD-SE r=.71 (95% CI: .63-.77); Managing stress and emotions subscale r=.60 (95% CI: .50-.68); Managing medical care subscale r=.55 (95% CI: .44-.64); Managing symptoms and disease subscale r=.69 (95% CI: .61-.76); Maintaining remission subscale r=.69 (95% CI: .61-.76).

Construct Validity

Criterion validation. Scores on the IBD-SE were strongly and positively correlated with the Mastery scale scores, providing criterion validation (Table 4).

*Construct validation***.** The IBD-SE was moderately correlated with other measures of psychological functioning in the anticipated directions, with higher self-efficacy for managing IBD significantly associated with higher psychological wellbeing, lower stress, lower distress, and lower disease interference/disability (Table 4).

Concurrent validation. Perceived health was moderately correlated with IBD self-efficacy, indicating that the better one's view of their health, the greater their sense of self-efficacy in managing their disease (Table 4). There was also a strong correlation of the IBD-SE with the total score of the disease-specific quality of life scale (IBDQ; r=.68; 95% CI: .60-.74).

*Known groups validation***.** The IBD-SE was able to differentiate between those who had active and inactive disease, both when assessing current disease status, and recent disease

activity (over the last six months). Those with inactive disease had significantly higher disease self-efficacy scores than those with active disease (Table 5).

Factor Structure

Overall, the model had a reliability coefficient rho=.981, supporting the viability of the factor structure. The theoretical four-factor model proposed in the original validation study was supported in this sample (Table 6), as indicated by goodness of fit measures (Comparative Fit Index=0.947; Bentler-Bonnett Nonnormed Fit Index= 0.94; Standardized Root Mean-square Residual = 0.072). While the Root Mean-square Error of Approximation (RMSEA= 0.10, 90% C.I. = 0.094-.107), was a little high, suggesting larger residual error than is optimal, it was still in the acceptable range. All the items loaded onto the same subscales as was proposed in the original study, and all the path loadings from the items to the subscale factors were significant, with good effect sizes (r^2 = .38 to .93).

All four subscales loaded significantly onto the higher-order factor of self-efficacy. Subscale II – Managing medical care, had the poorest loading (.47) relative to the other subscales (Table 7). The content of this subscale reflects self-efficacy for behaviors that are somewhat dependent on other people (e.g., working with providers on a treatment plan, asking doctor about illness), in contrast to the other three subscales.

DISCUSSION

Based on the use of a well-described population-based sample of persons with IBD, this study has demonstrated that the IBD-SE scale has excellent psychometric properties as both a reliable and valid measure, providing support for its use in IBD research. We found that the IBD-SE scale had high internal consistency, in parallel with the preliminary validation study[9],

supporting its reliability. This level of internal consistency and the strong item to total correlations suggest that there may be some item redundancy, so future work with the scale could consider developing a shortened version, in part to enhance scale utility. The four factors identified in the original study were well-supported overall as the best-fitting model by the confirmatory factor analysis. However, with only a couple of exceptions, suggested path additions to improve goodness of fit all involved paths either from Subscale 4 (maintaining remission) to other items or from Subscale 4 items to other subscales (data not shown), suggesting that self-efficacy for these coping behaviours may be similar in remission as for active disease periods. As such, future revisions to the measure might consider adjusting the scale to a simpler 3-factor structure that integrates content from the "Maintaining remission" items into the other three subscales.

The IBD-SE scores were fairly stable over a year period, which is not surprising given that self-efficacy may not shift significantly if there is no targeted intervention or learning opportunity to manage the disease differently. This finding is consistent with Keefer et al[9], who noted that the IBD-SE was not associated with time since diagnosis, an association which might have been expected if it was just a matter of time to adjust to the disease. Nevertheless, the moderate to strong correlations indicated there still is some change across an extended period, and that self-efficacy is not solely an entrenched personal trait.

The evaluation of construct validity using multiple validation approaches provides confidence in the scale's meaning and utility. The moderate association of the IBD-SE with the more general measure of mastery confirms overlapping but distant constructs are being assessed. The finding that self-efficacy was significantly higher for those with inactive disease suggests some sensitivity to differing disease activity states. The small differences between disease types,

with individuals with CD reporting modestly lower self-efficacy, were also observed in the preliminary validation work[9]. These disease subtype differences in self-efficacy may also be reflecting the sensitivity to differing disease states, as more with CD had been hospitalized in the past year (data not shown), and a larger proportion with CD had active versus inactive symptoms compared to those with UC.

Qualitative studies of individuals with IBD have identified that self-efficacy is relevant to patients and seen as an important determinant of health, and have argued that self-efficacy should be regularly measured in clinical practice and research[11,41]. Our group recently reported that low self-efficacy to manage IBD predicted subsequent difficulties with anxiety, depressed mood, and stress one year and two years later, even when controlling for IBD symptoms in the intervening months[42]. Self-efficacy has also been found to predict adherence to recommended schedules of surveillance colonoscopy for individuals with IBD[43].

In addition, self-efficacy has had significant attention in chronic disease management and behaviour change intervention research more generally. Improved self-efficacy was associated with improved exercise and diet for heart disease patients following a one year behaviour self-management intervention[44]. Similarly, a meta-analysis of a standardized chronic disease self-management program evaluating over 8000 participants found moderate improvements in self-efficacy and several health behaviors that were sustained for at least 12 months[45]. Preliminary work with the IBD-SE scale in skills-based IBD self-management programs has suggested the scale has some sensitivity to change with intervention[46,47]. Our findings of the IBD-SE scale as a reliable and valid tool should provide confidence to utilize the scale more widely in behavioural intervention studies for IBD patients, and to develop programs that specifically enhance self-efficacy as an adjunctive management strategy in IBD.

The population-based sample is a strength of the study. However, one limiting aspect may be the generalizability of the findings as participants were on average in the mid-adult years. While the IBD-SE scale has been validated for this sample, it may not fully reflect relevant aspects of coping and self-efficacy for younger adults or adolescents with IBD. Work is being done on the development of self-efficacy scales appropriate for adolescents and their particular needs around disease management[10,48] with some overlapping content domains, such as managing medical care and managing emotions.

In conclusion, self-efficacy is a relevant aspect of disease management and coping for individuals with IBD. The IBD-SE is a reliable and valid measure of self-efficacy for IBD patients. The IBD-SE, with its four subscales, may be able to help identify areas where patients need more support for self-management, such as emotional coping or navigating medical care, in addition to measuring changes from targeted interventions.

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Table 1. Background characteristics of the IBD Cohort (N=229)

Age: Mean (SD) in years Range	48.7 (14.5) 25-85
Sex: female % (n)	61.1% (140)
Marital status: married/common law % (n)	69.5% (183)
Education: postsecondary education % (n)	62.1% (133)
Working part/full time % (n)	82.9% (189)
Disease type: Crohn's disease % (n)	52.8% (121)
Disease duration in years Mean (SD)	12.5 (2.1)
Hospitalized for IBD in past year % (n)	16.2% (37)
Current active disease % (n)	37.3% (85)
Recent (past 6 months) active disease % (n)	50.2% (113)

Numbers are reported as mean (standard deviation) or percentage (n) as indicated.

Table 2. IBD-SE scale and subscale descriptive information for the total sample, and CD and UC groups

IBD-SE Scale	# items	Total IBD Mean (SD) N=229	CD Mean (SD) N=121	UC Mean (SD) N=108	p
Total score	29	223.5 (48.9)	216.3 (51.2)	231.7 (45.1)	.018
Managing stress & emotions	9	65.9 (18.7)	64.0 (19.5)	68.0 (17.5)	.100
Managing medical care	8	70.9 (13.3)	69.7 (13.9)	72.1 (12.4)	.180
Managing symptoms/disease	7	49.5 (15.7)	46.7 (16.4)	52.6 (14.3)	.005
Managing remission	5	37.4 (11.0)	35.9 (11.6)	39.1 (10.0)	.025

Table 3. Descriptive statistics and corrected item-total score correlations of the Inflammatory Bowel Disease Self-Efficacy scale

No.	Item	M	SD	Skew	Kurtosis	r_{corr}
Managing stress and emotions	$\alpha = .97$					
1.	Keep from getting stressed	6.83	2.43	-0.57	-0.80	.67
2.	Do something to reduce stress	7.30	2.13	-0.78	-0.02	.72
3.	Keep from getting discouraged	7.17	2.33	-0.70	-0.58	.81
4.	Do something to reduce discouragement	7.37	2.21	-0.77	-0.27	.80
5.	Keep from feeling sad	7.15	2.50	-0.88	-0.17	.80
6.	Do something to reduce sadness	7.36	2.31	-0.86	-0.06	.81
7.	Keep sadness/anxiety from interfering	7.25	2.45	-0.81	-0.35	.83
8.	Do something to reduce interference of sadness/anxiety	7.35	2.32	-0.78	-0.24	.83
9.	Get emotional support	7.60	2.50	-1.11	0.20	.70
Managing medical care	$\alpha = .92$					
10.	Follow medication prescription	8.99	2.00	-2.49	5.93	.47
11.	Take medication at instructed times	8.83	2.06	-2.39	5.57	.49
12.	Take medication as directed to prevent flare-up	8.82	2.23	-2.31	4.71	.43
13.	Work with providers on treatment plan	8.82	2.11	-2.30	5.10	.55
14.	Ask doctor about illness	8.92	1.75	-1.87	2.96	.52
15.	Discuss problems with medication	8.87	1.98	-2.26	4.95	.51
16.	Work out differences with doctors	8.64	2.23	-2.07	3.70	.55
17.	Ask doctor about medications	8.86	2.20	-2.35	-4.82	.47
Managing symptoms and disease	$\alpha = .95$					
18.	Reduce symptoms	7.51	2.44	-0.92	0.04	.73
19.	Keep sleep problems from interfering	6.96	2.67	-0.68	0.63	.72
20.	Keep discomfort/pain from interfering	7.55	2.35	-1.00	0.31	.77
21.	Keep diarrhea/urgency from interfering	7.29	2.59	-0.86	-0.23	.73
22.	Keep symptoms from interfering	7.36	2.52	-0.98	0.63	.74
23.	Decrease fatigue	6.20	2.83	-0.35	-1.02	.82
24.	Keep fatigue from interfering	6.54	2.69	-0.54	-0.74	.81
Maintaining remission	$\alpha = .93$					
25.	Manage your disease	7.85	2.29	-1.11	0.52	.75
26.	Keep disease in remission	7.48	2.70	-1.02	-0.03	.74
27.	Engage in self-care (exercise, diet, rest)	7.59	2.43	-1.00	0.09	.74
28.	Engage in stress management program	6.82	2.78	-0.58	-0.79	.82
29.	Maintain your sense of well-being	7.51	2.39	-0.93	-0.03	.83

Note. n=208; r_{corr} = corrected item-total correlations; all correlations significant at $p < 0.001$.

Table 4 Correlations and 95% Confidence Intervals between the Inflammatory Bowel Disease Self-Efficacy scale and psychological functioning, perceived health, and disease-specific quality of life measures

	Mastery	Psycho-logical Wellbeing	Perceived Stress	Distress	Disability	Perceived Health	IBD Quality of Life
IBD-SE	.53 (.43-.62)	.70 (.63-.76)	-.78 (-.83- -.72)	-.71 (-.77- -.64)	-.48 (-.58- -.36)	.51 (.42-.61)	.68 (.60-.74)

Table 5. Analysis of variance comparing Inflammatory Bowel Disease Self-Efficacy scores for those with active or inactive disease, within each disease type

	Current disease activity HB/PT			Recent disease activity MIBDI: past 6 months		
	Active Mean (SD)	Inactive Mean (SD)		Active Mean (SD)	Inactive Mean (SD)	
CD (n=121)	195.33 (55.02) n=67	232.19 (41.32) n=54	F=18.0 p<0.001	198.84 (53.92) n=68	238.35 (38.37) n=51	F=20.0 p<0.001
UC (n=108)	202.87 (42.92) n=31	233.14 (50.75) n=72	F=8.60 p<0.01	205.10 (42.60) n=45	241.52 (50.70) n=61	F=15.5 p<0.001

HB=Harvey Bradshaw clinical index for CD; PT=Powell Tuck clinical index for UC, MIBDI=Manitoba Inflammatory Bowel Disease Index.

Table 6. Confirmatory Factor Analysis factor loadings of the Inflammatory Bowel Disease Self-Efficacy scale

No.	Item	I	II	III	IV	*E*
Managing stress and emotions						
1.	Keep from getting stressed	.76				.58
2.	Do something to reduce stress	.82				.67
3.	Keep from getting discouraged	.91				.83
4.	Do something to reduce discouragement	.93				.86
5.	Keep from feeling sad	.92				.85
6.	Do something to reduce sadness	.95				.89
7.	Keep sadness/anxiety from interfering	.93				.87
8.	Do something to reduce interference of sadness/anxiety	.96				.93
9.	Get emotional support	.78				.60
Managing medical care						
10.	Follow medication prescription		.62			.38
11.	Take medication at instructed times		.62			.38
12.	Take medication as directed to prevent flare-up		.63			.40
13.	Work with providers on treatment plan		.87			.76
14.	Ask doctor about illness		.69			.47
15.	Discuss problems with medication		.94			.87
16.	Work out differences with doctors		.87			.75
17.	Ask doctor about medications		.89			.79
Managing symptoms and disease						
18.	Reduce symptoms			.76		.58
19.	Keep sleep problems from interfering			.81		.66
20.	Keep discomfort/pain from interfering			.86		.74
21.	Keep diarrhea/urgency from interfering			.83		.69
22.	Keep symptoms from interfering			.86		.73
23.	Decrease fatigue			.91		.84
24.	Keep fatigue from interfering			.92		.85
Maintaining remission						
25.	Manage your disease				.86	.74
26.	Keep disease in remission				.86	.74
27.	Engage in self-care (exercise, diet, rest)				.80	.63
28.	Engage in stress management program				.81	.65
29.	Maintain your sense of well-being				.90	.80

Note. All factor loadings significant at $p < 0.05$. n=208; Factor I = Managing stress and emotions; Factor II = Managing medical care; Factor III = Managing symptoms and disease; Factor IV =

Maintaining remission; *E* = standardized error variance.

Table 7. Inflammatory Bowel Disease Self-Efficacy subscale correlations and higher-order factor loadings

	I	II	III	IV	V
I. Managing stress and emotions	--				**.81**
II. Managing medical care	.38	--			**.47**
III. Managing symptoms and disease	.72	.42	--		**.91**
IV. Maintaining remission	.75	.48	.84	--	**.97**
M	65.38	70.76	49.39	37.24	
(SD)	(19.02)	(13.39)	(15.81)	(11.02)	

Note. All correlations significant at $p < 0.001$. n=208; Factor I = Managing stress and emotions; Factor II = Managing medical care; Factor III = Managing symptoms and disease; Factor IV = Maintaining remission; V= factor loadings on higher-order IBD Self-Efficacy factor.