



Illness perceptions in IBD influence psychological status, sexual health and satisfaction, body image and relational functioning: A preliminary exploration using Structural Equation Modeling

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Abstract

Background and aims: This study aimed to characterize the relationships between illness perceptions, body image and self-consciousness, sexual health (sexual problems and sexual satisfaction), anxiety and depression, and marital and family functioning in patients with IBD.

Methods: Seventy-four IBD patients (44 CD, 13 males, 61 females, mean age 38 years) completed an online questionnaire. Illness perceptions explored with the Brief Illness Perceptions Questionnaire, and anxiety and depression measured using the Hospital Anxiety and Depression Scale, Sexual Problems Scale, Sexual Satisfaction Scale, Marital Functioning Scale, Family Functioning Scale, and Body Image and Self-Consciousness During Intimacy Scale.

Results: Exploratory Structural Equation Modeling (SEM) provided a final model with an excellent fit ($\chi^2(25)=27.84$, $p=.32$, $\chi^2/N=1.11$, CFI>0.99, RMSEA<0.04, SRMR<0.07, GFI>0.93). Illness perceptions had a significant direct influence on depression ($\beta=0.49$, $p<0.001$), anxiety ($\beta=0.55$, $p<0.001$), and family functioning ($\beta=-0.17$, $p<0.001$). Several mediating pathways were also found involving sexual problems, sexual satisfaction, and body image and self-consciousness during intimacy. Being female was associated with increased sexual problems but increased sexual satisfaction.

Conclusions: The findings provide further evidence for the adverse impact of patient IBD-related illness perceptions on anxiety and depression. The findings also provide the preliminary evidence for the impact of illness perceptions and psychological comorbidity in relation to sexual health and relationship and family functioning. These aspects of psychological processing provide a framework and direction for further research into the nature of IBD and its influence on the patient and their family.

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1. Introduction

Research indicates that individuals with Inflammatory Bowel Disease (IBD) are at an increased risk of developing anxiety and/or depression,^{1–10} and that up to 50 percent of IBD cohorts are likely to present with having at least one psychological condition.¹¹ Further, the severity of psychological symptoms is exacerbated with disease flare-ups^{5,9,10,12} and both psychological symptoms and disease flare-ups are associated with poorer quality of life (QoL).^{4,12–14} Despite the wealth of information in relation to IBD, psychological symptoms and QoL, limited research has been conducted to explore the influence of IBD, or its illness perceptions (i.e., emotional and cognitive representations of illness), psychological morbidity (e.g., anxiety and depression) on individual sexual health (i.e., sexual problems and sexual satisfaction), body image and self-consciousness and marital and family functioning (i.e., perceived quality of interaction between the participant and their partner, perceived; satisfaction with their family life). This has led to several reviews calling for further research in this area.^{15–18} Of the research conducted to date, evidence suggests that IBD cohorts often identify concerns relating to body image,^{19–22} reduced libido,^{20,23,24} sexual difficulties,^{21–25} and problems with interpersonal and/or family relationships.^{19,22,26,27}

In a series of studies Timmer and colleagues^{23,24} have provided evidence for the adverse impact of IBD on sexual health. In a large IBD cohort study involving 280 German males (170 with Crohn's disease [CD]) Timmer et al.²³ found that sexual activity was low; 19% were not sexually active, 12% had no interest in sex, and 10% had not enjoyed their sexual experience, and 9% of the 65 sexually active reported erectile problems. Males experiencing depression were increasingly likely to report erection dysfunction, orgasmic problems, and reduced sexual desire and sexual satisfaction. Anxiety was only found to adversely impact on sexual desire. Based on these findings, the authors concluded that persistent sexual dysfunction is unlikely once disease activity is under control and psychological problems are addressed.

In a separate study involving a large female IBD cohort (336 females, 219 with CD), Timmer et al.²⁴ found 63% of the participants reported a perceived reduction in sexual activity with a further 17% not being sexually active at the time. Depression was found to be the strongest determinant of sexual problems. Specifically, females experiencing depression were more likely to report reduced sexual thoughts or desires, reduced pleasure or orgasmic problems, reduced intercourse frequency, and reduced partner satisfaction. While not as influential, anxiety was also found to adversely impact these domains, with the most impacted being intercourse frequency. Based on these findings, Timmer identified that psychological problems, specifically mood, were more influential than disease specific factors on sexual functioning. Several other studies have provided evidence that sexual problems are more likely to be reported in individuals that have psychological symptoms (especially depression),²⁵ or are female, or having experienced surgery associated with their IBD.²⁰

The outlined findings suggest that individuals with IBD are likely to report increased psychological symptoms, more body image concerns, sexual problems, problems associated with marital and family functioning, and reduced sexual satisfaction.

However research exploring how they may all interact in IBD cohorts and illness perceptions has not been explored.

In a recent meta-analysis of 45 studies, Hagger and Orbell²⁸ found that poorer illness perceptions have a significant adverse impact on both QoL and psychological well-being across a variety of chronic conditions, including Human Immunodeficiency Virus, diabetes, arthritis, and hypertension. Several IBD-focused studies have also shown that poorer IBD illness perceptions are associated with increased anxiety and depression^{29–31} and reduced QoL.^{29,30} Further, Knowles et al.³¹ have shown that illness perceptions are highly related to IBD severity and that illness perceptions, rather than IBD severity, consistent with the Common Sense Model (CSM), are better predictors of anxiety, depression, and QoL.

1.1. Study aim

Utilizing exploratory Structural Equation Modeling (SEM), the aim of the current study was to characterize the relationships between illness perceptions, body image and self-consciousness, sexual problems and satisfaction, anxiety and depression, and marital and family functioning in patients with IBD.

2. Materials and methods

2.1. Patients

Seventy-four adults in an ongoing romantic relationship (44 CD, 13 males, average age 38) with IBD completed an online survey. All were in a committed romantic relationship with the majority in a heterosexual relationship (95%). The average length of the relationship was 9.90 years (11.35). The majority of participants were American (54%), while 19% European, 11% were Australian, and 16% were from another country. Regarding employment, the majority (50%) worked full-time, 19% worked part-time or casual, 14% were homemakers, the remaining 17% included individuals who were students, retired, or unemployed. Patients' mean disease duration was 8.42 years, 3 (4%) participants reported currently having a stoma while another 3 participants currently had a fistula.

Inclusion criteria included: self-reported diagnosis of IBD, in a current committed romantic relationship and age over 18 years. Ethical approval to conduct this research was attained from Swinburne University of Technology Human Ethics Research Committees.

2.2. Measures

2.2.1. Brief Illness Perceptions Questionnaire (BIPQ)³²

The Brief Illness Perception Questionnaire is a 9-item questionnaire exploring the emotional and cognitive representations of illness based on the longer 80-item Illness Perception Questionnaire – Revised (IPQ-R) by Weinman et al. cited in Broadbent et al.³² The BIPQ explores illness perception across 8 dimensions: treatment control, identity, consequences, timeline, concern, understanding, emotional response, and personal control. Items are assessed on an 11-point Likert scale, for example "How much does your illness affect your life: 0 [not at all]–10 [severely affects my life]".

To further improve model fit and internal consistency, all four questionnaires were evaluated in a confirmatory factor analyses (CFA) using the Amos statistical package (version 16) and Cronbach alpha with item-if-deleted analyses. Only BIPQ was found to require modifications. Based on these techniques, the BIPQ was reduced to 4 items: "How much does illness affect your life?", "How much do you experience symptoms from your illness?", "How concerned are you about your illness?" and "How much does your illness affect you emotionally? Illness perceptions scores were attained by averaging the items, subscale ranges 0–10, with higher scores reflecting a poorer emotional and cognitive representation of illness (BIPQ internal consistency was 0.97).

2.2.2. Hospital Anxiety and Depression Scale (HADS)³³

The HADS is a 14-item self-report questionnaire assessing levels of anxiety (ANX; 7 items) and depression (DEP; 7 items) over the past week. Each question is assessed on a 4-point Likert Scale: "I feel tense or 'wound up'" 0 = not at all 3 = most of the time). Traditionally, using the 7-item subscales, mean subscale values are interpreted as 0–7 (normal), 8–10 (mild), 11–15 (moderate), and 16–21 (severe),³⁴ this cut-off of 8/9 to differentiate normal from mild to severe distress has been validated recently.³⁵ Anxiety and depression scores were attained by summing the subscale items (ranges 0–21), with higher scores indicating a greater severity. Depression and anxiety scale internal consistency were 0.84 and 0.80 respectively.

2.2.3. Sexual Problems Scale (SPS)³⁶

The Sexual Problem Scale is a 4-item self-report questionnaire assessing the level of perceived impairment in capacity of an adult to achieve sexual arousal and orgasm. It was developed as part of the Medical Outcomes study research. Each question (e.g., How much was a lack of sexual interest in the past four weeks" is assessed on a 5-point Likert scale: "Not a problem" 1 to "Much a problem" 4; "Not applicable" was scored as a 1). One of the four items was gender specific: difficulty associated with attaining erection (males), reaching orgasm (female). Not applicable was re-scored to 1. Scores were reversed and converted to a score out of 20 to 100, with higher scores indicating greater levels of perceived sexual problems (SPS internal consistency was 0.86).

2.2.4. Sexual Satisfaction Scale³⁷

The Sexual Satisfaction Scale is a 4-item self-report questionnaire assessing levels of satisfaction with sex over the past four weeks. It was adapted from the Sexual History Form and used as part of the Multiple Sclerosis Quality of Life Inventory (MSQLI) to assess levels of sexual satisfaction. Each question (e.g., "During the past 4 weeks, how satisfied have you been with the amount of affection expressed physically in your relationship?" is assessed on a 6-point Likert scale: "Extremely satisfied" 1 to "Extremely dissatisfied" 6). Scores were reversed and summed, with higher scores indicating greater sexual satisfaction (SSS internal consistency was 0.94).

2.2.5. Marital Functioning Scale (MFS)³⁶

The Marital Functioning Scale is a 6-item self-report questionnaire assesses the perceived quality of interaction between the participant and their partner. It was developed as part of the Medical Outcomes study research.³⁷ Each question

(e.g., "We said anything we wanted to say to each other" is assessed on a 5-point Likert scale: "Definitely true" 1 to "Definitely false" 5. Scores were reversed and converted to a score out of 20 to 100, with higher scores indicating greater levels of perceived marital functioning (MFS internal consistency was 0.87).

2.2.6. Family Functioning Scale (FFS)³⁶

The Family Functioning Scale is a 4-item self-report questionnaire assesses the perceived satisfaction with their family life. It was developed as part of the Medical Outcomes study research. Each question (e.g., "In terms of your satisfaction with your family life, please rate the amount of togetherness and cohesion you have" is assessed on a 5-point Likert scale: "poor" 1 to "Excellent" 5). Scores converted to a score out of 20 to 100, with higher scores indicating greater levels of perceived family functioning and satisfaction with family life (FFS internal consistency was 0.94).

2.2.7. Body Image and Self-Consciousness During Intimacy Scale (BISC; Wiederman)³⁸

The Body Image and Self-Consciousness During Intimacy Scale is a 15-item self-report questionnaire assesses the levels of concern associated with body image e.g., "During sex, I (would) prefer to be on the bottom so that my stomach appears flat" and self-consciousness "I would feel very nervous if a partner were to explore my body before or after having sex". Each question is assessed on a 6-point Likert scale: "Never" 0 to "Always" 5. Scores were summed (range of 15–75) with higher scores indicating increased body image and self-conscious concerns associated with intimacy (BISC internal consistency was 0.97).

2.3. Procedures

The participants were recruited via adverts on online support forums for IBD and also Australia, American and European Crohn's Associations advertisements. The recruitment period was from 7th of July, 2010 to the 23rd of July, 2011.

2.4. Statistical analyses

Exploratory analysis and visual inspection of the data indicated that all of the study variables met the necessary assumptions for statistical analysis (e.g., normality, linearity)⁴³. Cronbach alpha analyses were undertaken for all questionnaires. Correlational analyses were undertaken to compare the relationship between the study variables: illness perceptions, anxiety and depression, body image and self-consciousness during intimacy, sexual problems, sexual satisfaction, and marital and family functioning. A Structural Equation Model (SEM) was specified using the Amos statistical package (version 19) based on an iterative process of adding significant pathways and removing variables that did not add significantly to the model's fit.

3. Results

Exploration of the demographic characteristics and the illness perceptions, anxiety and depression scores suggested

that they were similar to previous hospital-based research published previously by one of the authors (SK). There were no significant differences across the study variables in terms of gender, ethnicity, work status, relationship type, disease type, with or without a stoma and/or fistula with the exception that females reported significantly more sexual problems than males ($F(1,72) = 39.15, p < 0.001$).

As shown in Table 1 (descriptive and correlational analyses), illness perceptions had a significant positive correlation with anxiety, depression, body image and self-consciousness during intimacy, and sexual problems. Illness perceptions also had a significant negative correlation with sexual satisfaction. No significant correlation was found between illness perceptions and marital function. The negative correlation between illness perceptions and family functioning was not significant ($p < 0.06$).

Anxiety was associated with increased depression, body image and self-consciousness during intimacy and reduced sexual satisfaction. Similarly, depression was associated with increased concerns relating to body image and self-consciousness during intimacy and reduced sexual satisfaction. Depression was also associated with increased sexual problems, and reduced family functioning.

Body image and self-consciousness during intimacy and sexual problems were positively correlated, but this was not significant. Both body image and self-consciousness during intimacy and sexual problems had significant negative correlations with sexual satisfaction, marital functioning, and family functioning although the correlations between sexual problems and marital and family functioning were not significant.

Finally, sexual satisfaction had a significant positive relationship with marital functioning and family functioning, while marital functioning had a significant positive relationship with family functioning.

Regarding sexual problems in this sample, 7 males (53.9%) and 51 females (83.6%) identified a lack of sexual interest. Three males (17.4%) reported difficulty getting or keeping an erection, 34 females (55.7%) identified experiencing difficulty having an orgasm. Of the 34 females, 10 (16.4%) reported identifying ability to have an orgasm was very much a problem.

To better understand the relationships and interactions between the study variables, a path analyses was developed using Amos. Study variables including demographic (gender, disease type, years diagnosed, years in the relationship) were included in the model. The final model was derived by adding

pathways, based on Amos modification indices that resulted in pathways that were both significant and improved the model's fit. As recommended by Hu and Bentler,³⁹ criteria used to specify paths or variables to be added were based on inspection of standardized residuals, modification indices and a significant improvement in fit (i.e., significant change in χ^2/N and an increase in standard goodness of fit measures [$\chi^2 p > 0.05$; $\chi^2/N = 1-3$, CFI > 0.095, RMSEA < 0.07, CFI > 0.95, SRMR < 0.08, GFI > 0.95]). Single indicator latent variables were specified with subscale internal consistency and variance in order to reduce measurement error in the model. Several demographics were removed from the model as they did not add significantly to the model, these included years in a relationship, years diagnosed, and disease type. The final model (Figure 1) is presented below.

Despite the small sample size, the final model had an excellent fit ($\chi^2(25) = 27.84, p = 0.32, \chi^2/N = 1.11, CFI > 0.99, RMSEA < 0.04, SRMR < 0.07, GFI > 0.93$). The total amount of variance accounted for in each of the variables was also good, 52% of depression symptoms, 30% of anxiety, 37% of sexual problems, 16% of body image and self-consciousness during Intimacy, 52% of sexual satisfaction, 31% of marital functioning, and 69% of family functioning.

Illness perceptions had a significant direct influence on depression ($\beta = 0.72, p < 0.001$), anxiety ($\beta = 0.55, p < 0.001$) and family functioning ($\beta = -0.17, p < 0.05$). Several significant indirect (mediating) pathways were identified: sexual problems mediated the relationship between depression and sexual satisfaction, while sexual satisfaction mediated the relationship between sexual problems and marital functioning. In turn marital functioning mediated the relationship between sexual satisfaction and family functioning. Sexual satisfaction was also found to be influenced by anxiety through the mediation of body image and self-consciousness during intimacy. Of the demographic variables, only gender was maintained in the final model due to its direct influence on both sexual problems and sexual satisfaction. Unexpectedly, the direct influence of gender suggested that being female was associated with greater sexual problems (e.g., difficulty in reaching orgasm) but greater sexual satisfaction.

4. Discussion

The current study aimed to characterise the relationships between illness perceptions, body image and self-

Table 1 Pearson's correlations (and significance values) and descriptive values of study variables.

	Illness perceptions	Anxiety	Depression	BISC1	Sexual problems	Sexual satisfaction	Marital functioning	Mean (SD)	CI (95%)
Illness perceptions	–	–	–	–	–	–	–	7.54 (1.66)	7.15–7.92
Anxiety	0.47***	–	–	–	–	–	–	8.81 (4.10)	7.86–9.76
Depression	0.65***	0.37***	–	–	–	–	–	7.32 (3.82)	6.44–8.21
BISC ¹	0.28*	0.34**	0.27*	–	–	–	–	20.05 (20.35)	15.34–24.77
Sexual problems	0.32**	0.26*	0.42***	0.17	–	–	–	60.56 (24.70)	2.76–3.23
Sexual satisfaction	–0.29*	–0.30**	–0.45***	–0.38**	–0.48***	–	–	13.93 (6.45)	12.44–15.43
Marital functioning	–0.05	0.01	–0.18	–0.34**	–0.09	0.47***	–	79.37 (16.82)	22.64–24.98
Family functioning	–0.22	–0.05	–0.24*	–0.31*	–0.21	0.54***	.71***	72.02 (22.71)	10.02–11.60

1. Body Image and Self-Consciousness during Intimacy Scale, *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

consciousness, sexual problems, sexual satisfaction, anxiety and depression, and marital and family functioning in individuals with IBD using SEM. This is the first study to the authors' knowledge that explores the relationships between these variables in an IBD cohort while using SEM. Further, this preliminary study expands upon the past research by exploring the impact of anxiety and depression on sexual problems, sexual satisfaction and marital and family functioning.

Initial (descriptive and correlational) analyses showed illness perceptions to be significantly positively correlated with anxiety and depression. Consistent with past IBD research, Knowles³¹ our results confirm that as an individual's perceptions relating to IBD become more hopeless, levels of psychological distress increase. Further, consistent with previous research increased IBD activity was associated with greater anxiety and depression symptoms.¹⁻¹⁰

Also consistent with past research by Moody et al.²⁵ was the finding that sexual problems were associated with depression. In addition, the current study provides evidence that depression was adversely related to body image and self-consciousness during intimacy, sexual satisfaction, and family functioning, while anxiety was adversely related to body image and self-consciousness during intimacy, sexual problems and sexual satisfaction. These results suggest that as levels of psychological distress increase so do problems in sexual health and enjoyment, and also family functioning, especially when associated with depression. Further, our results suggest that body image and self-consciousness during intimacy contribute to sexual satisfaction and also marital and family functioning, while as would be expected sexual problems influenced levels of sexual satisfaction.

Sexual problems had a significant adverse relationships with sexual satisfaction, family functioning. The finding that sexual satisfaction was positively related to both marital and

family functioning and that marital function was positively related to sexual satisfaction is consistent with the work by Ngai et al.⁴⁰

Males were more likely to report a reduced interest in sexual activity (53.9%) and 17.4% reported experiencing erectile dysfunction. Although higher, our results are consistent with the findings by Timmer et al.²⁴ who identified 31% of males had either no sexual interest and 9% of males with IBD experienced erectile dysfunction and or were not sexual active. Again, although higher, our finding that 83.6% of females in this study reported a lack of sexual interest is also consistent with Timmer et al.²⁴ who found 63% of their females sample identified reduced sexual activity. We suspect that the higher percentage of sexual problems in the current study may be due to online recruitment methodology. However, our results confirm the earlier work of Timmer and colleagues indicating that sexual problems are a significant problem and concern in IBD cohorts.

To extend upon the limitations of previous research which have tended to base conclusions on either single-item or non-validated scales¹⁹ or descriptive or regression analyses^{20,23,24} this study utilized validated scales and SEM. SEM has several advantages of regression-based analyses, it controls for measurement error and allows for the simultaneous evaluation of all variables and possible pathways. Further, the final exploratory model was derived by adding pathways based on Amos modification indices and includes only those pathways and variables that statistically provide the best fit. Due to this, the final exploratory model provides the most accurate representation of the interactions between the variables utilized in this study.

The final model was consistent with previous research^{28,31} indicating that poorer illness perceptions of IBD are associated with increased anxiety and depression. Also consistent with the past research²⁶ was the finding that females were more

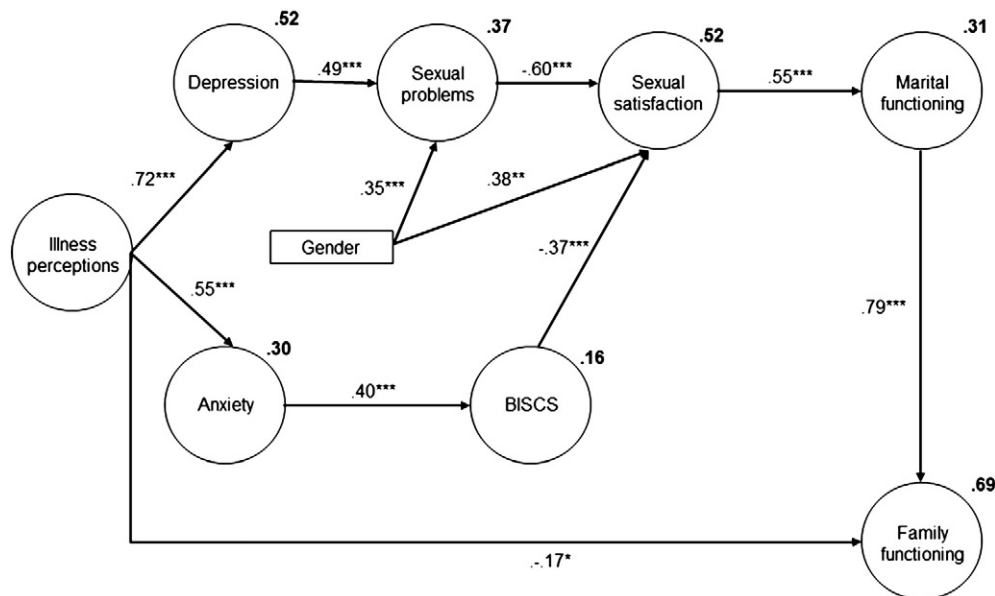


Figure 1 Final path model (Note: only latent variables and gender presented with error terms removed), * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

likely to report more sexual problems, although, unexpectedly, were also more likely to report greater sexual satisfaction. Anxiety promoted concerns relating to body image and self-consciousness during intimacy, which in turn had an adverse impact on sexual satisfaction. This finding is also consistent with past research⁴¹ showing that concerns relating to body image had an adverse impact on sexual satisfaction. Consistent with the research by Litzinger et al.⁴² and Ngai et al.⁴⁰ sexual satisfaction was positively associated with greater perceptions in marital functioning. Finally, family functioning was directly influenced by illness perceptions and marital functioning, with marital functioning being the strongest predictor.

Our findings also indicate the importance of understanding, and taking into account individual perceptions of illness, body image and concerns relating to sexual, marital and family functioning. Further, the evidence suggests that individual psychological distress has a significant impact on marital and family functioning through its influence on body image and sexual health.

4.1. Limitations and future studies

The primary limitation of this study was the failure to assess IBD specific symptoms and status. Although illness perceptions are strongly correlated with illness activity,³¹ future studies should include a measure of IBD severity and status. Given the small sample size (N=74), and the heterogeneous nature of the sample (e.g., 54% Americans, 82% female), and reliance on online recruitment, possible selection bias cannot be ruled out. Although consistent with our group's previous publication,³¹ the current study's sample size was small. However we purposely choose scales which have been published widely and have known high psychometric properties. Further, we statistically validated all variables specified in the model to improve model specificity and reduce measurement error.

Future studies should address the above limitations and seek to explore possible differences between active versus non-active disease status and common comorbid issues (e.g., pain, side-effects of medications) in a more representative sample involving multiple sources of participation (e.g., outpatient clinics, private gastroenterology clinics). Utilization of control and/or comparison groups in addition to collecting partner responses would also be valuable. Given that being female in this study was associated with increased sexual problems but increased sexual satisfaction, further research is needed to explore the differences across gender in terms of both incidence and severity of sexual problems and perceived sexual satisfaction. Future research should also aim to explore if these differences compare to the general population and other chronic disease cohorts.

Due to the lack of research in this area a confirmatory SEM approach was not possible. However future studies could utilize SEM to undertake a confirmatory modelling approach based on the current model presented in this study.

Future research could also extend upon this research by adding additional illness outcome measures such as quality of life, and explore the influence of other known IBD-related mediating processes (e.g., personality,^{44,45} coping styles,³¹ self-efficacy and self-esteem⁴⁶), and health-promoting activities such as stress-management, mindfulness or yoga.⁴⁷

5. Conclusions

This study has extended past research and provided further evidence for the complex interplay between IBD illness perceptions, body image and self-consciousness, sexual problems, anxiety and depression, and marital and family functioning in individuals with IBD. While this study was limited by possible sample bias (e.g., gender imbalance and internet self-selection), our findings are consistent with past research indicating that depression and anxiety do impact sexual health and body image. In turn sexual health and body image impacted upon marital and family functioning. The current findings are the first to explore these variables using SEM in an IBD population. The current study's findings further support the call by several researchers^{22,48} that health professionals need to assess for the impact of IBD on sexual health, body image, and marital and family functioning, especially if individuals are female and/or experience psychological distress.

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