Parental Distress in Pediatric Inflammatory Bowel Diseases: Associations With Time From Diagnosis, Disease Activity, and Demographic Factors

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Background: There are limited studies examining caregiver distress when raising a child with inflammatory bowel disease (IBD). The aim of this study was to investigate the occurrence of symptoms of distress (anxiety, depression, and post-traumatic stress disorder [PTSD]) among parents with children with IBD and associations with disease severity, time from diagnosis, and demographic factors.

Methods: We conducted a cross-sectional study with parents of children (2–17 years) diagnosed with IBD. There were 2 cohorts: (1) recently diagnosed cohort (<6 months from diagnosis); (2) established diagnosis cohort (>1 year from diagnosis). Parents completed measures of anxiety, depression, and PTSD, while children completed surveys on the symptoms of their IBD.

Results: Fifty-two parents in the recently diagnosed cohort and 103 parents in the established diagnosis cohort completed surveys. For the entire cohort of parents, we found the mean scores on all measures of distress were within the normal ranges with 20%, 13%, and 8% of parents reporting moderate-to-severe symptoms of anxiety, depression, and PTSD, respectively. Symptoms of anxiety and depression were not significantly associated with time from diagnosis; symptoms of anxiety and PTSD were significantly associated with patients' IBD clinical activity.

Conclusions: Parents with children with IBD are remarkably resilient to distress even soon after their child's diagnosis. Despite considerable resilience, routine brief caregiver screening for symptoms of anxiety during annual visits seems reasonable and feasible.

Lay Summary

Parents with children with inflammatory bowel disease (IBD) were resilient with low rates of self-reported anxiety, depression, and post-traumatic stress disorder (PTSD), even soon after IBD diagnoses. Parents with children with more clinically active IBD had more symptoms of anxiety and PTSD.

Key Words: pediatrics, inflammatory bowel diseases, parents, distress, post-traumatic stress disorder

Introduction

Inflammatory bowel diseases (IBDs), which include Crohn's disease (CD), ulcerative colitis (UC), and inflammatory bowel disease—unclassified (IBD-U), are chronic relapsing inflammatory diseases affecting the gastrointestinal (GI) tract and associated with extraintestinal manifestations. Pediatric patients with IBD often have a more aggressive, medically refractory disease and face unique complications including growth, development, and pubertal delay compared to adults with IBD.[1,2]

A recent systemic review showed that patients with IBD had a pool prevalence of 20.5% and 15.2% for anxiety and depression, which was higher than general population norms.[3] The unpredictable and potentially embarrassing symptoms of IBD are a possible challenge to children's psychosocial adjustment. Several studies have suggested children with IBD have lower health-related quality of life (HRQOL), lower social functioning, and high rates of depressive disorders compared to their peers.[4–6]

Recent adult and pediatric guidelines have recommended psychosocial screening for patients with IBD to alleviate distress and improve care.[7,8] Common themes identified from prior qualitative studies of parents with children with IBD include fear about the effect of IBD on the child's future; concern their children will be different from other children; anxiety over illness uncertainty; and worry about their child's education.[9–11] In addition, parents were also concerned about how their child's illness will affect the entire family including financial stability and work-related challenges.[12,13] Prior studies have suggested parents of children with IBD have more symptoms of depression and anxiety compared to parents of children with no chronic illness.[14–16] Disease severity has also been found to be associated with greater parental distress; parents with children with more active IBD report more symptoms of psychological distress.[17–19] Several studies have suggested that parental distress impacts adolescents with IBD, where higher levels of parental distress

are associated with lower levels of HRQOL in an adolescent with IBD.[15,19,20] Authors in these articles have advocated for interventions to improve the psychosocial well-being of parents who provide comprehensive care for pediatric patients with IBD.[5,15]

Considerable research has focused on distress in parents of children with cancer. This work has suggested that parents are most vulnerable soon after their children are diagnosed with cancer, with a longitudinal decrease in distress to normal levels within 1 year of diagnosis.[21,22] In addition, while parents of children with cancer self-report numerous symptoms of post-traumatic stress disorder (PTSD) around diagnosis, these symptoms typically subside over time.[23] A recent systematic review concluded that parents of children with chronic medical conditions experience higher rates of anxiety and depression and mothers may have a high risk of cardiovascular disease and mortality compared to parents without chronic medical conditions.[24] Other pediatric GI disorders associated with high levels of caregiver distress (ie, depression and anxiety) include colic,[25–27] pediatric feeding disorders,[28] celiac disease,[29] intestinal failure,[30,31] functional constipation,[32] eosinophilic GI disorders.[33] To date, there have been no prior studies that have examined the impact of time from diagnosis on parental distress and the prevalence of symptoms of PTSD in caregivers of children with IBD or other chronic GI diseases.[34]

The aim of this study was to measure symptoms of parental distress (anxiety, depression, PTSD) using psychometrically robust measures and identify possible associations with time from diagnosis, clinical severity of IBD, and demographic factors. We hypothesized that parents of children with IBD who were recently diagnosed would report more symptoms of anxiety, depression, and PTSD compared to parents whose children have an established diagnosis. We also hypothesized parents of children with the quiescent disease will report fewer symptoms of distress than parents of children with clinically active disease. Lastly, we performed exploratory analyses examining the role of the parent and child sociodemographic variables on parental distress.

Methods

Participants and Recruitment

Pediatric patients with IBD (CD, UC, IBD-U, or VEO-IBD [very early onset inflammatory bowel disease]) and their parent or legal guardian were enrolled at UPMC Children's Hospital of Pittsburgh (UPMC CHP), from February 2021 to July 2021.

Inclusion criteria included: parent of a child aged 2–17 years with a confirmed diagnosis of IBD; ability to comprehend and complete the written survey in English; and willingness/ability to provide consent/assent. Participants were assigned to the *recent* diagnosis cohort if the patient had been diagnosed within the previous 6 months or the *established* diagnosis cohort if the patient had been diagnosed over 12 months prior.

Measures
Demographics
Parent demographic information obtained included age, gender, number of children, education level, occupation, zip code, and marital status. Occupational prestige scores were generated for the parent and spouse as described by Entwisle and Astone.[35] Scores range from 15 to 97, where higher scores represent higher socioeconomic status. In households with 2 working parents, the mean value was utilized.

Patient demographic information obtained included age, gender, and race. The patient survey assessed for the child's current IBD symptoms. Surveys were completed either by the patient alone, with the aid of the parent, or the patient alone depending on the age and development of the child, which was discussed with the family during the recruitment and consent process.

Parental distress (anxiety, depression, PTSD)
Parental self-reported anxiety was measured using the Patient Reported Outcomes Measurement Information System Short Form v1.0-Anxiety 8A (PROMIS-Anx), an 8-item self-report measure of anxiety symptoms experienced over the previous 7 days. Raw scores are converted into t-scores on the basis of published PROMIS scoring guidelines,[36] where t-scores 0–55 indicated little concern for anxiety, 55–60 indicated mild symptoms of anxiety, 61–70 moderate clinical concern for anxiety, and scores 70 or above suggested clinical concern for anxiety disorder.[37] Previous research has shown that the PROMIS-Anx has strong psychometric properties including internal validity (Cronbach's α = 0.93–0.95),[38,39] reliability (Intraclass Correlation Coefficient [ICC] = 0.79),[39] and relatively invariance across ethnically diverse subgroups.[40] Cronbach's α in the current trial was 0.93.

The Patient Health Questionnaire-8 (PHQ-8) was completed by parents to assess symptoms and severity of depression. This is a modified version of the PHQ-9 that omits 1 question about suicide; prior research has shown that omission of this question had little impact on measure psychometrics.[41] The questionnaire scores 8 Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria of major depressive disorder. A total score 4 and below represents no concern for depressive symptoms, 5–9 represents mild depressive symptoms, 10–14 represents moderate concern for depression, and scores 15 and above represent severe concern for depressive disorder. Previous studies have shown that the PHQ-8 has strong psychometric properties including internal validity (Cronbach's α = 0.85), reliability (ICC = 0.83),[42] sensitivity (0.86), and specificity (0.86) using a semistructured psychiatric interview as the reference standard.[41] Cronbach's α in the current trial was 0.87.

The Impact of Event Scale-Revised (IES-R) was used to measure symptoms and severity of PTSD. The 22-item scale is composed of 3 subscales: 8 intrusion, 8 avoidance, and 6 hyperarousal items. Results are reported for the average subscale scores and the total score.[43] Scores less than 23 are considered minimal concern for PTSD; scores 24–32 considered minimal symptoms of PTSD, 33–36 moderate concern for PTSD, and 37 or more suggestive severe concern for PTSD.[43] Previous research has shown that the IES-R also has strong psychometric properties including reliability (Cronbach's α = 0.93, test–retest reliability coefficient r = 0.91), sensitivity (0.95), and specificity (0.80) to predict PTSD diagnosis.[44,45] In addition, there is empiric research that supports the use of IES-R as a screening tool for PTSD in

large-scale research studies.[46,47] Cronbach's α in the current trial was 0.95.

IBD activity

The severity of the patients' IBD was calculated using either the Pediatric Crohn's Disease Activity Index (PCDAI) or the Pediatric Ulcerative Colitis Activity Index (PUCAI) from the patient's survey and chart review results.

The PUCAI is composed of 6 items and uses patient-reported symptoms to measure disease activity in pediatric UC, IBD-U, or VEO-IBD limited to colonic involvement. PUCAI scores range from 0 to 85, with scores below 10 indicating inactive disease, 10–34 mild disease, 35–64 moderate disease, and above 64 severe diseases.[48]

The PCDAI is an 11-item physician-based index that uses patient-reported symptoms, physical exam findings, growth, and serum inflammatory markers to assess disease severity in pediatric CD and VEO-IBD with inflammation beyond the colon. PCDAI scores range from 0 to 100, with scores below 10 indicating inactive disease, 10–30 mild disease, 30–39 moderate disease, and scores above 40 severe disease.[49] Scores were generated from patient survey responses and from chart review.

We completed chart review to measure the severity of the patient's disease, including most recent lab values, physician global assessment (PGA), physician-dictated remission status, current medications, and records of prior IBD-related surgery/hospitalizations.

Statistical analysis

Differences in baseline characteristics between the recently diagnosed and established diagnosed cohorts were analyzed using chi-square test for categorical variables and independent t-tests or Wilcoxon rank sum test for normally and non-normally distributed variables, respectively. Distributions of continuous variables were examined with histograms and box plots. Non-normally distributed data were transformed via the cubed root and again checked for normality. One-way analysis of variance was used to compare the transformed means between more than 2 categorical populations with Bonferroni procedures performed post hoc to determine if there was a statistically significant difference between means. Analysis between 2 continuous variables was completed via Pearson's correlation coefficient or Spearman rank correlation for normally and non-normally distributed variables, respectively. The level of significance was set at $P < .05$.

Analysis was completed via Stata SE version 6 for Macintosh.

Ethical Considerations

Written and/or verbal consent/assent from parents and patients was obtained prior to enrollment and survey distribution. We obtained University of Pittsburgh IRB approval and a waiver of written informed consent prior to study initiation: STUDY20090010.

Results

Recruitment

Two hundred and thirty parents with children with IBD were approached with 92% (212/230) who met inclusion criteria agreeing to participate. Fifty-two parents with children in the recently diagnosed cohort completed the survey (response rate: 82% [52/61]). One hundred and three parents with children in the established diagnosis cohort completed the survey (response rate: 67% [103/150]). 86% of patients whose parents completed surveys also completed surveys (132/155).

Baseline Patient and Parental Characteristics

Parents and patient demographic characteristics are reported in Table 1.

The majority of patients in both cohorts were diagnosed with CD (Table 1). Patients in the recently diagnosed cohort were significantly more likely to be on steroids, to have clinically active disease, and less likely to be assigned a PGA of quiescent disease/remission compared to patients in the established diagnosis cohort. Patients in the established cohort were significantly more likely to be on biologic therapy, to have previously required surgery for their IBD, and to have more total previous hospitalizations compared to the recent diagnosis cohort.

Most parental respondents were female. There were no significant differences in parental education level, marital status, household size, percent Caucasian, or household occupational prestige score between the cohorts.

Parental Distress and Time From Diagnosis

The mean PROMIS-Anx score was 53.3 for the entire cohort (Table 2), with 45% of parents having elevated symptoms of anxiety (t-score ≥55) and 20% reporting moderate-to-severe symptoms of anxiety (t-score >60) (Figure 1).

The mean PHQ-8 score was 4.6 for the entire cohort (Table 2), with close to 40% of parents having elevated symptoms of depression (PHQ-8 score ≥5) and 13% reporting moderate-to-severe symptoms of depression (PHQ-8 score ≥10) (Figure 1).

There was no significant difference in the transformed mean PROMIS-Anx or PHQ-8 scores or the percentage of parents with clinically elevated scores between the recently diagnosed versus established diagnosis cohort (Table 3).

The mean IES-R score was 11.8 for the entire cohort, with 13% of patients having clinically elevated symptoms of PTSD (IES-R ≥24) and 8% of parents reporting moderate-to-severe symptoms of PTSD (IES-R ≥33) (Figure 1). There was 1 significant difference in the mean transformed IES-R scores; parents of recently diagnosed children had more symptoms of PTSD compared to the established diagnosis cohort ($P = .018$) (Table 3).

The cohort was divided into those who had been diagnosed within the previous 3 months ($n = 37$) and those who had been diagnosed over 5 years prior ($n = 41$) (Supplementary Table S1). The previously described trend continued; there was no significant difference in mean symptoms of anxiety or depression between groups, while parents whose children were more recently diagnosed had significantly more symptoms of PTSD ($P < .05$).

Distress and IBD Clinical Severity and Phenotype

The entire cohort was divided into parents with children with clinically inactive disease (PUCAI/PCDAI <10) ($n = 70$) or active disease (PUCAI or PCDAI ≥10) ($n = 61$) (Table 4). Parents with children with clinically active disease were found to have a significantly increased mean transformed PROMIS-Anx

Table 1. Demographic and disease characteristics of participants.

	Recent diagnosis (n = 52)	Established diagnosis (n = 103)	P
Patient characteristics			
Mean age (SD), year	13.2 (2.9)	14.2 (2.9)	.04
Male, n (%)	30 (58.8)	61 (59.2)	.99
Mean time from IBD diagnosis (SD), year	4.23 (2.76)	0.157 (0.161)	<.001
IBD phenotype, n (%)			
UC	15 (28.8)	26 (25.2)	
CD	30 (57.7)	68 (66.0)	
IBD-U	7 (13.5)	4 (3.9)	
VEO-IBD	0 (0)	5 (4.9)	.06
Therapy, n (%)			
Corticosteroids	7 (13.5)	0 (0)	<.001
5-Aminosalicylates	10 (19.2)	2 (2.0)	<.001
Immunomodulators	2 (3.9)	2 (2.0)	.6
Biologics	21 (40.4)	88 (89.8)	<.001
Antibiotics	3 (5.8)	3 (3.1)	.4
Dietary	9 (17.3)	3 (3.1)	.003
Prior surgery	5 (9.6)	24 (23.8)	.049
Total IBD hospitalizations, n (%)			
0	22 (42.3)	18 (17.5)	
1	26 (50.0)	44 (42.7)	
2	4 (7.7)	19 (18.5)	
3	0 (0)	5 (4.9)	
>4	0 (0)	17 (16.5)	.001
PUCAI/PCDAI (SD)	23.4 (19.5)	7.2 (8.9)	<.001
PGA, n (%)			
Quiescent	11 (24.4)	73 (75.3)	
Mild	9 (20.0)	12 (12.4)	
Moderate	2 (4.4)	5 (5.2)	
Severe	0 (0)	0 (0)	.007
PGA in clinical remission, n (%)	9 (42.9)	70 (80.5)	.002
Hospitalized at diagnosis, n (%)	30 (58.8)	54 (56.8)	.86
Active perirectal disease: n (%)			
None	46 (90.2)	101 (100)	
Inflamed tag	3 (5.9)	0	
Active fistula/abscess	2 (3.9)	0	.006
Parental respondent characteristics			
Female, n (%)	39 (76.5)	83 (80.6)	.67
Married or significant other, n (%)	47 (90.4)	86 (85.2)	.45
Mean children under care (SD)	2.61 (1.10)	2.24 (0.98)	.18
Highest education level, n (%)			
High school	8 (15.69)	10 (9.8)	
College or vocational school	33 (64.7)	59 (57.8)	
Graduate/professional school	10 (19.6)	33 (32.3)	.12
Mean occupation prestige score (SD)	54.6 (18.3)	60.7 (17.8)	.53
Race: Caucasian, n (%)	48 (92.3)	97 (94.1)	.49

Abbreviations: CD, Crohn's disease; IBD-U, inflammatory bowel disease—unclassified; PCDAI, Pediatric Crohn's Disease Activity Index; PGA, physician global assessment; PUCAI, Pediatric Ulcerative Colitis Activity Index; UC, ulcerative colitis; VEO-IBD, very early onset IBD.

scores (P = .043), mean transformed IES-R score (P = .021), intrusive thoughts subscale (P = .032), and hyperarousal subscales (P = .011). 20%, 13%, and 10% of parents with children with clinically active disease had a moderate or severe concern for anxiety, depression, and PTSD score, respectively, but there was no significant difference in the percentage

Table 2. Percentage of parents with clinical elevated distress scores.

Instrument (score)	Entire cohort (n = 155) n (%)	Recent diagnosis (n = 52) n (%)	Established diagnosis (n = 103) n (%)	PUCAI/PCDAI <10 (n = 70) n (%)	PUCAI/ PCDAI ≥10 (n = 61) n (%)
PROMIS-Anx					
Minimal symptoms of anxiety (t-score <55)	84 (54.2)	25 (48.1)	59 (57.3)	42 (60.0)	29 (47.5)
Mild symptoms of anxiety (55–60)	40 (25.8)	16 (30.8)	24 (23.3)	13 (18.6)	20 (32.8)
Moderate symptoms of anxiety (61–70)	26 (16.8)	9 (17.3)	17 (16.5)	13 (18.6)	9 (14.8)
Severe symptoms of anxiety (>70)	5 (3.2)	2 (3.8)	3 (2.9)	2 (2.9)	3 (4.9)
PHQ-8					
No concern depression (0–4)	95 (61.3)	34 (65.4)	61 (59.2)	43 (61.4)	39 (63.9)
Mild symptoms of depression (5–9)	39 (25.2)	12 (23.1)	27 (26.2)	16 (22.9)	14 (23.0)
Moderate symptoms of depression (10–14)	15 (9.7)	4 (7.7)	11 (10.7)	9 (12.9)	5 (8.2)
Severe symptoms of depression (>14)	6 (3.9)	2 (3.8)	4 (3.9)	2 (2.9)	3 (4.9)
IES-R					
No concern PTSD (<23)	135 (87.1)	45 (86.5)	90 (87.4)	60 (85.7)	53 (86.9)
Mild PTSD symptoms (24–32)	8 (5.2)	1 (1.9)	7 (6.8)	4 (5.7)	2 (3.3)
Moderate PTSD concern (33–36)	2 (1.3)	2 (3.9)	0 (0)	1 (1.4)	1 (1.6)
Severe PTSD concern (≥37)	10 (6.4)	4 (7.7)	6 (5.8)	5 (7.1)	5 (8.2)

Abbreviations: IES-R, Impact of Event Scale-Revised; PCDAI, Pediatric Crohn's Disease Activity Index; PHQ-8, Patient Health Questionnaire-8; PROMIS-Anx, Patient Reported Outcomes Measurement Information System Short Form v1.0-Anxiety 8A; PTSD, post-traumatic stress disorder; PUCAI, Pediatric Ulcerative Colitis Activity Index.

of parents with clinically elevated scores compared to parents whose children did not have the clinically active disease (Table 2).

We performed a linear regression analysis for disease severity and measures of distress (Table 5). A positive association was noted for all measures of distress that reached significance for total IES-R score (P = .001), all 3 subscales (P < .05), and almost reached significance for the PROMIS-Anx measure (P = .07). There was also a positive association between all measures of distress and the total number of patient hospitalizations that reached significance for the IES-R measure (P = .041).

There was no significant difference noted in mean transformed distress scores between IBD phenotypes or patient IBD therapies, including medical and dietary therapies (P > .05) (Supplementary Table S2).

Parental Distress and Demographics

Mothers (n = 122) had significantly higher mean transformed scores than fathers (n = 32) for PROMIS-Anx (P = .006), total IES-R score (P = .049), intrusive thoughts subscale (P = .038), and hyperarousal subscales (P = .008) (Supplementary Table S3). There was no significant difference in mean transformed distress scores between parents with male (n = 97) or female (n = 58) children in all measure of distress (P > .05) (Supplementary Table S4). There was no significant association between patient age and all measures of distress (P > .05) (Supplementary Table S7).

Parents who did not have a spouse or significant other did have significantly more intrusive thoughts (P = .047) and symptoms of hyperarousal (P = .015), but there was not a significant difference on the other measures of distress (P > .05) (Supplementary Table S5). A negative correlation was found on all measures of distress and household prestige score, but

it did not reach significance (P > .05). There was a similar negative correlation between all measures of distress and parental education level that reached significance for the total IES-R score (P = .009) (Table 5).

Discussion

In our study of parents of children with IBD, we did not find significantly elevated levels of distress, as measured by symptoms of depression, anxiety, and PTSD. We also did not find, as we had predicted, that distress would decrease over time in these parents. We noted, as expected, that parents with children with more clinically active diseases had more symptoms of distress. We also measured symptoms of PTSD, which has not previously been reported for parents with children with IBD. In terms of demographic and other factors that might affect distress, we found that women reported more symptoms of distress and that higher education protected against distress. These findings allow us to compare the effects of having a child with IBD to the existing literature on distress in parents with children with chronic diseases. Our results can inform care planning related to screening and management of distress in parents who have a child with a chronic disease like IBD.

In our study, our cohort of parents with children living with IBDs, we found that these parents had a relatively low rate of psychological distress. The mean scores on all measures were within the normal ranges; 20%, 13%, and 8% of parents had moderate-to-severe concern for anxiety, depression, and PTSD, respectively. We did not find, as we had predicted, that anxiety or depression would decrease over time in these parents. This observation differs from prior work in pediatric oncology, where considerable literature suggests that parents are most vulnerable for distress soon after diagnosis, or at
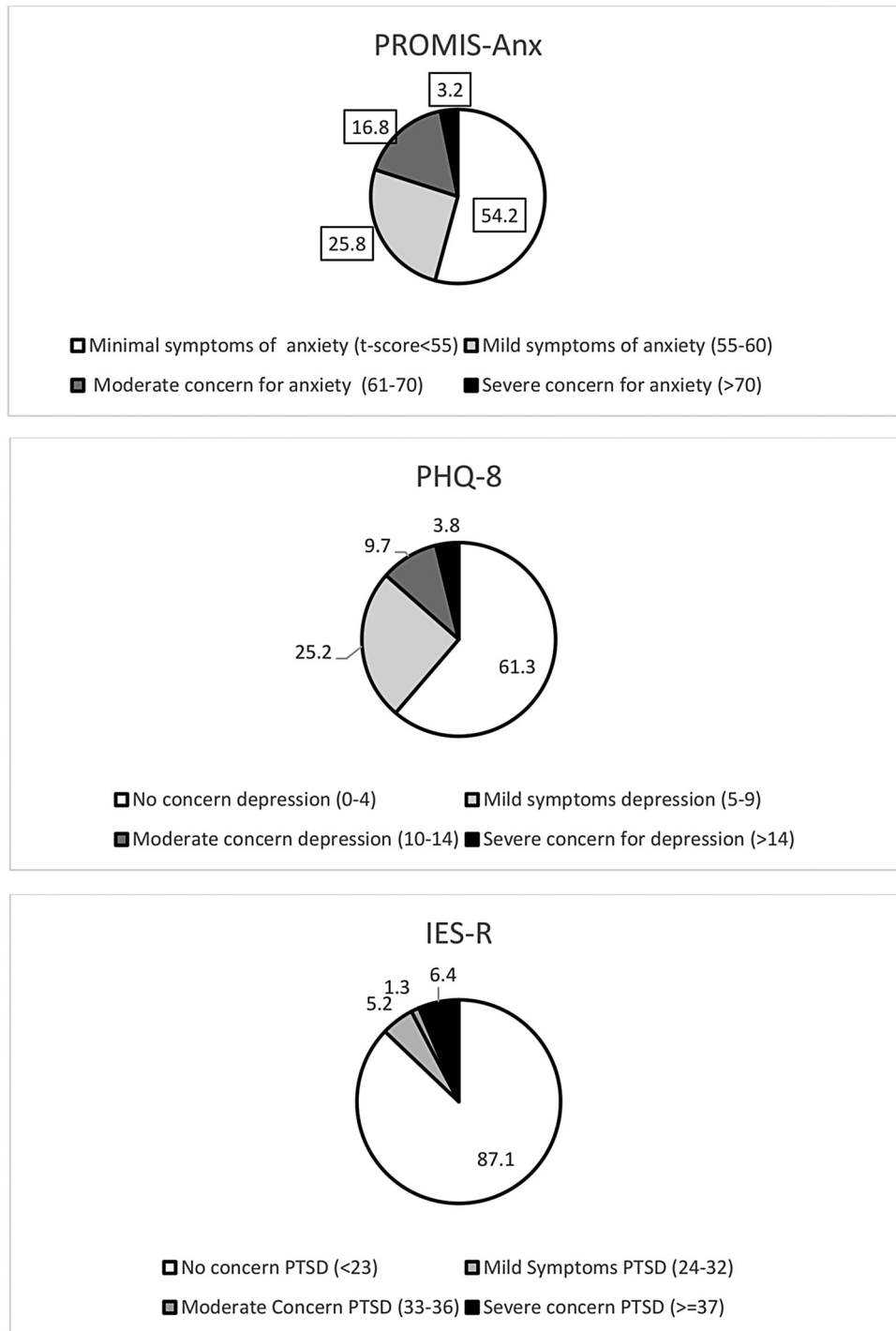
Figure 1. Percentage entire cohort with clinically elevated distress scores. Abbreviations: IES-R, Impact of Event Scale-Revised; PHQ-8, Patient Health Questionnaire-8; PROMIS-Anx, Patient Reported Outcomes Measurement Information System Short Form v1.0-Anxiety 8A; PTSD, post-traumatic stress disorder.

relapse, with symptoms typically subsiding over the course of a child's treatment.[50] This may reflect some fundamental differences in pediatric oncology and IBD, where despite advancements in treatments, cancer is the second leading cause of death among children with a 17% mortality rate.[51] In addition, children with cancer are typically treated via a previously established protocol, providing the family with a clear roadmap. Conversely, pediatric IBD has a low mortality (<1%) but there remains unpredictable clinical course with a

significant risk for morbidity, including hospitalization and surgery, throughout a patient's entire life.[52]

Disease severity was an important driver of anxiety in the parents in our cohort, which mirrors prior studies.[17–19] Interestingly, there was no significant association between parental anxiety and depression with other disease factors including IBD phenotype, current medical therapy, or total hospitalizations. In addition, there was no significant difference in the percentage of parents with moderate or severe

Table 3. Parental distress mean scores recent versus established diagnosis cohorts.

Instrument	Recent diagnosis (n = 52) (95% CI)	Established diagnosis (n = 103) (95% CI)	P
PROMIS-Anx	54.15 (51.60–56.71)	52.92 (51.18–54.66)	.22
PHQ-8	4.67 (3.41–5.93)	4.57 (3.72–5.42)	.27
IES-R	13.57 (9.76–17.38)	10.92 (8.36–13.48)	.018
Intrusive subscale	0.74 (0.52–0.97)	0.583 (0.448–0.719)	.033
Avoidance subscale	0.53 (0.38–0.68)	0.463 (0.342–0.584)	.021
Hyperarousal subscale	0.56 (0.36–0.75)	0.425 (0.310–0.540)	.017

Abbreviations: IES-R, Impact of Event Scale-Revised; PHQ-8, Patient Health Questionnaire-8; PROMIS-Anx, Patient Reported Outcomes Measurement Information System Short Form v1.0-Anxiety 8A.

Table 4. Parental distress mean scores role of disease activity.

Instrument	PUCAI/PCDAI <10 (n = 70) (95% CI)	PUCAI/PCDAI ≥10 (n = 61) (95% CI)	P
PROMIS-Anx	51.99 (49.66–54.32)	54.63 (52.51–56.75)	.043
PHQ-8	4.47 (3.32–5.62)	4.61 (3.53–5.67)	.22
IES-R	10.80 (7.27–14.33)	13.11 (9.80–16.42)	.021
Intrusive subscale	0.60 (0.41–0.79)	0.72 (0.53–0.91)	.032
Avoidance subscale	0.44 (0.28–0.59)	0.52 (0.37–0.66)	.062
Hyperarousal subscale	0.42 (0.26–0.59)	0.54 (0.37–0.70)	.010

Abbreviations: IES-R, Impact of Event Scale-Revised; PCDAI, Pediatric Crohn's Disease Activity Index; PHQ-8, Patient Health Questionnaire-8; PROMIS-Anx, Patient Reported Outcomes Measurement Information System Short Form v1.0-Anxiety 8A; PUCAI, Pediatric Ulcerative Colitis Activity Index.

Table 5. Linear regression coefficient demographic or disease factors with measures of distress.

Factor	Anxiety (β)	Depression (β)	PTSD (β)
Disease activity (PUCAI/PCDAI)	0.028	0.081	0.26*
Household OPS	−0.037	−0.028	−0.098
Parental age	0.89	0.0820	0.44
Family size	−0.48	−0.51	−0.88
Child age	−0.24	−0.041	−0.22
Parental education level	−0.033	−0.22	−1.06*
Total hospitalization	0.30	0.27	1.82*

Abbreviations: PCDAI, Pediatric Crohn's Disease Activity Index; PTSD, post-traumatic stress disorder; PUCAI, Pediatric Ulcerative Colitis Activity Index.
*$P < .05$.

concern for anxiety, depression, or PTSD between parents with children with active versus quiescent disease. This suggests that parents with children with IBD are resilient in managing and adapting to their child's disease. These results are similar to prior work in parents with children with intestinal failure, who are tasked with learning advanced skills to provide adequate nutrition and care for their child. A 2015 study of parents with children with intestinal failure found that continued use of parental nutrition was not correlated with parental stress, but rather parents had more stress when

their child had symptoms including abdominal pain, increase stool frequency, or recent hospitalization.[53] Our work also mirror prior work in parents with children with juvenile rheumatoid arthritis, another chronic pediatric inflammatory disease, and functional abdominal pain where parents reported low levels of distress that were similar to parents with children without chronic diseases.[54,55]

Among other factors, sex and level of education were related to parental distress. Similar, to other studies in pediatric IBD and other chronic illness, mothers reported significantly more symptoms of anxiety and PTSD compared to fathers.[15,56] In addition, we sought to identify some protective social factors and found negative associations between measures of distress and occupational prestige score, presence of spouse, household size, and parenting education level, but only reached significance for parental educational level and symptoms of PTSD. These findings are similar to prior work in pediatric oncology and other chronic diseases, where social support, socioeconomic status, occupation status, marital status, and education level are all associated with measures of parental distress.[57–59]

While prior studies of distress have focused on depression and anxiety, we are unique in our evaluation of PTSD symptoms in parents with children with IBD. We found relatively low rates of concern for PTSD (<10%), especially compared to pediatric oncology where up to 75% of parents have clinical concern for PTSD.[23] Importantly, this measure was responsive to the child's clinical status, with a significant increase in total PTSD or subscale score for parents of children who were recently diagnosed, had clinically active

disease, and had more total IBD hospitalizations. This finding suggests that having a child with IBD does affect a parent psychologically with increased worry and fear, even if it does not reach clinically significant thresholds.

There are several limitations in our study. All our families were recruited from our GI division at UPMC CHP, resulting in a relatively homogeneous patient population with over 90% of respondents being Caucasian. The population was further limited to those who could complete surveys in English, potentially excluding families with different cultural backgrounds and perspectives. We also recruited a small number of parents with children with VEOIBD. While our results did not suggest these parents were more vulnerable for distress, a larger cohort would better elucidate this relationship. Our GI division/IBD program also provides resources for families at the time a patient is first diagnosed with IBD including a detailed new patient teaching visit by a specialized pediatric IBD nurse practitioner (both inpatient and outpatient) and social worker, which could potentially alleviate distress in caregivers, and therefore possibly make our results less generalizable. We, therefore, advocate for future multicenter studies that focus on recruiting non-White caregivers to better characterize distress in parents who are African American, Latino, and other racial/ethnic minorities. In addition, future studies of parental distress might also include patient-reported outcomes focused on pain, fatigue, sleep, depression, and anxiety. We would encourage future work to obtain independent data from caregivers and patients when children are not acutely ill or waiting for a medical procedure.

Of note, we conducted our study during the unprecedented COVID-19 pandemic. We originally planned to include a comparison group of families who were not living with IBD; it was not feasible due to recruitment restrictions. We recognize that several studies have noted elevated, but heterogenous, rates of anxiety (6.3%–50.9%), depression (14.6%–48.3%), and PTSD (7%–53.8%), in adults during the beginning of the pandemic.[60] Importantly, longitudinal studies have shown that mental health was lowest in the beginning of the pandemic during Spring 2020 with a fairly rapid decrease in anxiety and depression symptoms to near prepandemic levels within 3–4 months.[61] We therefore performed a linear regression where no significant associations were noted between any measures of parental distress and the date the surveys were completed (Supplementary Table S6).

Taken together, our findings demonstrate that parents with children with IBD are resilient and remarkably able to adapt to the demands of having a child with a chronic medical condition. In addition, 15%–20% of parents with children with IBD in this study had clinically concern for anxiety and depression throughout the child's disease, which highlights the importance of periodic continued screening parents for these disorders. The Psychosocial Assessment Tool is a is a well-validated, brief screening instrument to identify distress in families with children with chronic medical conditions, which has been shown to have strong psychometric properties in parents with children with IBD.[62] Finally, this subset of parents would also benefit from interventions to address the financial, emotional, and social burden associated with raising a child with IBD, such as problem-solving skills training, which has been shown to sustainably mitigate distress and improve coping functioning for parents with children with chronic medical illnesses.[63] Another emerging technology that could be adapted for our population is electronic psychosocial interventions, such as Electronic Surviving Cancer Competently Intervention Program, ENGAGE, and My Grief. These internet and mobile-app-based platforms are increasingly common and recent community-based trials suggest they may be effective in decreasing distress, symptoms of anxiety, and symptoms of PTSD in parents with children with chronic medical conditions.[64–66]

Conclusion

Parents with children with IBD demonstrated relatively low rates of clinically significant anxiety, depression, and symptoms of PTSD, even soon after their child was diagnosed. It would be beneficial to screen parent for psychological distress throughout their child's disease course in order to provide comprehensive care for families with children with IBD. We also advocate for future studies and interventions, such as problem-solving therapies, mindfulness, or electronic psychosocial interventions.

Supplementary Data

Supplementary data is available at *Crohn's and Colitis 360* online.

Acknowledgments

Authors' Contributions

K.T.C., R.B.N., and S.C.K. contributed to the study concept and design. K.T.C. and C.A.C. contributed to recruitment, data acquisition, and writing manuscript. K.T.C. contributed to statistical analysis. K.T.C. and R.B.N. contributed to the interpretation of data. R.B.N. and S.C.K. contributed to the revision of the manuscript.

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Conflicts of Interest

None declared.

Data Availability

Data not publicly available.

References

1. Pigneur B, Seksik P, Viola S, et al. Natural history of Crohn's disease: comparison between childhood- and adult-onset disease. *Inflamm Bowel Dis*. 2010;16(6):953–961.

2. Conrad MA, Rosh JR. Pediatric inflammatory bowel disease. *Pediatr Clin North Am*. 2017;64(3):577–591.

3. Neuendorf R, Harding A, Stello N, Hanes D, Wahbeh H. Depression and anxiety in patients with inflammatory bowel disease: a systematic review. *J Psychosom Res*. 2016;87:70–80.

4. Greenley RN, Hommel KA, Nebel J, et al. A meta-analytic review of the psychosocial adjustment of youth with inflammatory bowel disease. *J Pediatr Psychol*. 2010;35(8):857–869.

5. Carroll MW, Kuenzig ME, Mack DR, et al. The impact of inflammatory bowel disease in Canada 2018: children and adolescents with IBD. *J Can Assoc Gastroenterol*. 2019;2(Suppl 1):S49–S67.

6. Reed B, Rea KE, Claar RL, van Tilburg MAL, Levy RL. Passive coping associations with self-esteem and health-related quality of life in youth with inflammatory bowel disease. *Front Psychol*. 2021;12:670902.

7. Farraye FA, Melmed GY, Lichtenstein GR, Kane SV. ACG clinical guideline: preventive care in inflammatory bowel disease. *Am J Gastroenterol*. 2017;112(2):241–258.

8. Mackner LM, Whitaker BN, Maddux MH, et al. Depression screening in pediatric inflammatory bowel disease clinics: recommendations and a toolkit for implementation. *J Pediatr Gastroenterol Nutr*. 2020;70(1):42–47.

9. Reed-Knight B, van Tilburg MAL, Levy RL, et al. Maladaptive coping and depressive symptoms partially explain the association between family stress and pain-related distress in youth with IBD. *J Pediatr Psychol*. 2018;43(1):94–103.

10. Kluthe C, Isaac DM, Hiller K, et al. Qualitative analysis of pediatric patient and caregiver perspectives after recent diagnosis with inflammatory bowel disease. *J Pediatr Nurs*. 2018;38:106–113.

11. Goldstein-Leever A, Bass JA, Goyal A, Maddux MH. Health-related quality of life predicts psychology referral in youth with inflammatory bowel disease. *J Pediatr Nurs*. 2019;47:73–77.

12. Akobeng AK, Miller V, Firth D, Suresh-Babu MV, Mir P, Thomas AG. Quality of life of parents and siblings of children with inflammatory bowel disease. *J Pediatr Gastroenterol Nutr*. 1999;28(4):S40–S42.

13. Rabbett H, Elbadri A, Thwaites R, et al. Quality of life in children with Crohn's disease. *J Pediatr Gastroenterol Nutr*. 1996;23(5):528–533.

14. Jelenova D, Prasko J, Ociskova M, et al. Quality of life and parental styles assessed by adolescents suffering from inflammatory bowel diseases and their parents. *Neuropsychiatr Dis Treat*. 2016;12:665–672.

15. Bramuzzo M, De Carlo C, Arrigo S, et al. Parental psychological factors and quality of life of children with inflammatory bowel disease. *J Pediatr Gastroenterol Nutr*. 2020;70(2):211–217.

16. Knez R, Francisković T, Samarin RM, Nikšić M. Parental quality of life in the framework of paediatric chronic gastrointestinal disease. *Coll Antropol*. 2011;35(Suppl 2):275–280.

17. Diederen K, Haverman L, Grootenhuis MA, Benninga MA, Kindermann A. Parental distress and quality of life in pediatric inflammatory bowel disease: implications for the outpatient clinic. *J Pediatr Gastroenterol Nutr*. 2018;66(4):630–636.

18. Giannakopoulos G, Chouliaras G, Margoni D, et al. Stressful life events and psychosocial correlates of pediatric inflammatory bowel disease activity. *World J Psychiatry*. 2016;6(3):322–328.

19. Gray WN, Boyle SL, Graef DM, et al. Health-related quality of life in youth with Crohn disease: role of disease activity and parenting stress. *J Pediatr Gastroenterol Nutr*. 2015;60(6):749–753.

20. Herzer M, Denson LA, Baldassano RN, Hommel KA. Family functioning and health-related quality of life in adolescents with pediatric inflammatory bowel disease. *Eur J Gastroenterol Hepatol*. 2011;23(1):95–100.

21. Pöder U, Ljungman G, von Essen L. Posttraumatic stress disorder among parents of children on cancer treatment: a longitudinal study. *Psychooncology*. 2008;17(5):430–437.

22. Wijnberg-Williams BJ, Kamps WA, Klip EC, Hoekstra-Weebers JEHM. Psychological distress and the impact of social support on fathers and mothers of pediatric cancer patients: long-term prospective results. *J Pediatr Psychol*. 2006;31(8):785–792.

23. van Warmerdam J, Zabih V, Kurdyak P, Sutradhar R, Nathan PC, Gupta S. Prevalence of anxiety, depression, and posttraumatic stress disorder in parents of children with cancer: a meta-analysis. *Pediatr Blood Cancer*. 2019;66(6):e27677.

24. Cohn LN, Pechlivanoglou P, Lee Y, et al. Health outcomes of parents of children with chronic illness: a systematic review and meta-analysis. *J Pediatr*. 2020;218:166–177.e2.

25. de Kruijff I, Veldhuis MS, Tromp E, Vlieger AM, Benninga MA, Lambregtse-van den Berg MP. Distress in fathers of babies with infant colic. *Acta Paediatr*. 2021;110(8):2455–2461.

26. Petzoldt J. Systematic review on maternal depression versus anxiety in relation to excessive infant crying: it is all about the timing. *Arch Womens Ment Health*. 2018;21(1):15–30.

27. Kurth E, Spichiger E, Cignacco E, et al. Predictors of crying problems in the early postpartum period. *J Obstet Gynecol Neonatal Nurs*. 2010;39(3):250–262.

28. Silverman AH, Erato G, Goday P. The relationship between chronic paediatric feeding disorders and caregiver stress. *J Child Health Care*. 2021;25(1):69–80.

29. Coburn S, Rose M, Sady M, et al. Mental health disorders and psychosocial distress in pediatric celiac disease. *J Pediatr Gastroenterol Nutr*. 2020;70(5):608–614.

30. van Oers HA, Haverman L, Olieman JF, et al. Health-related quality of life, anxiety, depression and distress of mothers and fathers of children on Home parenteral nutrition. *Clin Nutr*. 2019;38(4):1905–1912.

31. Pedrón-Giner C, Calderón C, Martínez-Costa C, Borraz Gracia S, Gómez-López L. Factors predicting distress among parents/caregivers of children with neurological disease and home enteral nutrition. *Child Care Health Dev*. 2014;40(3):389–397.

32. Peeters B, Vriesman MH, Koppen IJN, et al. Parental characteristics and functional constipation in children: a cross-sectional cohort study. *bmjpo*. 2017;1(1):e000100.

33. Taft TH, Ballou S, Keefer L. Preliminary evaluation of maternal caregiver stress in pediatric eosinophilic gastrointestinal disorders. *J Pediatr Psychol*. 2012;37(5):523–532.

34. Pinquart M. Posttraumatic stress symptoms and disorders in parents of children and adolescents with chronic physical illnesses: a meta-analysis. *J Trauma Stress*. 2019;32(1):88–96.

35. Entwisle DR, Astone NM. Some practical guidelines for measuring youth's race/ethnicity and socioeconomic status. *Child Dev*. 1994;65(6):1521–1540.

36. Recklitis CJ, Blackmon JE, Chevalier LL, Chang G. Validating the Patient-Reported Outcomes Measurement Information System Short Form v1.0-Anxiety 8a in a sample of young adult cancer survivors: comparison with a structured clinical diagnostic interview. *Cancer*. 2021;127(19):3691–3697.

37. Health Measures. PROMIS score cut points. Accessed September 30, 2021. https://www.healthmeasures.net/score-and-interpret/interpret-scores/promis/promis-score-cut-points

38. Hadlandsmyth K, Dindo LN, St Marie BJ, et al. Patient-reported outcomes measurement information system (PROMIS) instruments: reliability and validity in veterans following orthopedic surgery. *Eval Health Prof*. 2020;43(4):207–212.

39. Marrie RA, Zhang L, Lix LM, et al. The validity and reliability of screening measures for depression and anxiety disorders in multiple sclerosis. *Mult Scler Relat Disord*. 2018;20:9–15.

40. Teresi JA, Ocepek-Welikson K, Kleinman M, Ramirez M, Kim G. Measurement equivalence of the patient reported outcomes measurement information system(®) (PROMIS(®)) anxiety short forms in ethnically diverse groups. *Psychol Test Assess Model*. 2016;58(1):183–219.

41. Wu Y, Levis B, Riehm KE, et al. Equivalency of the diagnostic accuracy of the PHQ-8 and PHQ-9: a systematic review and individual participant data meta-analysis. *Psychol Med*. 2020;50(8):1368–1380.

42. Mattsson M, Sandqvist G, Hesselstrand R, Nordin A, Boström C. Validity and reliability of the Patient Health Questionnaire-8 in Swedish for individuals with systemic sclerosis. *Rheumatol Int.* 2020;40(10):1675–1687.

43. Creamer M, Bell R, Failla S. Psychometric properties of the impact of event scale—revised. *Behav Res Ther.* 2003;41(12):1489–1496.

44. Jeong B, Lee SW, Lee J-S, et al. The psychometric properties of the Korean version of the verbal abuse questionnaire in university students. *Psychiatry Investig.* 2015;12(2):190–196.

45. Lim H-K, Woo J-M, Kim T-S, et al. Reliability and validity of the Korean version of the Impact of Event Scale-Revised. *Compr Psychiatry.* 2009;50(4):385–390.

46. Uzer T. Validity and reliability testing of the transitional impact scale. *Stress Health.* 2020;36(4):478–486.

47. Morina N, Ehring T, Priebe S. Diagnostic utility of the impact of event scale-revised in two samples of survivors of war. *PLoS One.* 2013;8(12):e83916.

48. Turner D, Otley AR, Mack D, et al. Development, validation, and evaluation of a pediatric ulcerative colitis activity index: a prospective multicenter study. *Gastroenterology.* 2007;133(2):423–432.

49. Hyams JS, Ferry GD, Mandel FS, et al. Development and validation of a pediatric Crohn's disease activity index. *J Pediatr Gastroenterol Nutr.* 1991;12(4):439–447.

50. Okado Y, Tillery R, Sharp KH, Long AM, Phipps S. Effects of time since diagnosis on the association between parent and child distress in families with pediatric cancer. *Child Health Care.* 2016;45(3):303–322.

51. Siegel DA, Richardson LC, Henley SJ, et al. Pediatric cancer mortality and survival in the United States, 2001–2016. *Cancer.* 2020;126(19):4379–4389.

52. Burisch J, Kiudelis G, Kupcinskas L, et al. Natural disease course of Crohn's disease during the first 5 years after diagnosis in a European population-based inception cohort: an Epi-IBD study. *Gut.* 2019;68(3):423–433.

53. Mutanen A, Kosola S, Merras-Salmio L, Kolho K-L, Pakarinen MP. Long-term health-related quality of life of patients with pediatric onset intestinal failure. *J Pediatr Surg.* 2015;50(11):1854–1858.

54. Gerhardt CA, Vannatta K, McKellop JM, et al. Comparing parental distress, family functioning, and the role of social support for caregivers with and without a child with juvenile rheumatoid arthritis. *J Pediatr Psychol.* 2003;28(1):5–15.

55. Zeevenhooven J, Rutten JMTM, van Dijk M, Peeters B, Benninga MA. Parental factors in pediatric functional abdominal pain disorders: a cross-sectional cohort study. *J Pediatr Gastroenterol Nutr.* 2019;68(2):e20–e26.

56. Dunn MJ, Rodriguez EM, Barnwell AS, et al. Posttraumatic stress symptoms in parents of children with cancer within six months of diagnosis. *Health Psychol.* 2012;31(2):176–185.

57. Iqbal A, Siddiqui KS. Depression among parents of children with acute lymphoblastic leukemia. *J Ayub Med Coll Abbottabad.* 2002;14(2):6–9.

58. Kholasehzadeh G, Shiryazdi S, Neamatzadeh H, Ahmadi N. Depression levels among mothers of children with leukemia. *Iran J Ped Hematol Oncol.* 2014;4(3):109–113.

59. van Oers HA, Haverman L, Limperg PF, van Dijk-Lokkart EM, Maurice-Stam H, Grootenhuis MA. Anxiety and depression in mothers and fathers of a chronically ill child. *Matern Child Health J.* 2014;18(8):1993–2002.

60. Xiong J, Lipsitz O, Nasri F, et al. Impact of COVID-19 pandemic on mental health in the general population: a systematic review. *J Affect Disord.* 2020;277:55–64.

61. Fancourt D, Steptoe A, Bu F. Trajectories of anxiety and depressive symptoms during enforced isolation due to COVID-19 in England: a longitudinal observational study. *Lancet Psychiatry.* 2021;8(2):141–149.

62. Pai ALH, Tackett A, Hente EA, Ernst MM, Denson LA, Hommel KA. Assessing psychosocial risk in pediatric inflammatory bowel disease: validation of the Psychosocial Assessment Tool 2.0_General. *J Pediatr Gastroenterol Nutr.* 2014;58(1):51–56.

63. Eccleston C, Fisher E, Law E, Bartlett J, Palermo TM. Psychological interventions for parents of children and adolescents with chronic illness. *Cochrane Database Syst Rev.* 2015;(4s):CD009660.

64. Canter KS, McIntyre R, Babb R, et al. A community-based trial of a psychosocial eHealth intervention for parents of children with cancer. *Pediatr Blood Cancer.* 2022;69(1):e29352.

65. Eklund R, Eisma MC, Boelen PA, Arnberg FK, Sveen J. Mobile app for prolonged grief among bereaved parents: study protocol for a randomised controlled trial. *BMJ Open.* 2021;11(12):e052763.

66. Woodford J, Wikman A, Cernvall M, et al. Study protocol for a feasibility study of an internet-administered, guided, CBT-based, self-help intervention (ENGAGE) for parents of children previously treated for cancer. *BMJ Open.* 2018;8(6):e023708.