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Participation and Attrition in a Coping Skills Intervention for Adolescent Girls with Inflammatory Bowel Disease

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Abstract The current study examined factors associated with adolescent and parent participation in a coping skills intervention for adolescent girls with inflammatory bowel disease (IBD) and examined factors associated with attrition related to intermittent missing data. Thirty-one adolescent girls with IBD and their parents enrolled in the intervention. Psychosocial and disease factors related to participation in the 6-week web component of the coping skills intervention were examined as were baseline group differences between those who provided post-treatment data and those who did not. Adolescents experiencing more difficulties related to their disease and psychosocial functioning participated less in the web component of the treatment intervention. Families who attrited had higher baseline levels of parental catastrophic thoughts, parenting stress, and adolescent depression. Families experiencing greater levels of psychological and disease-related difficulties may be at risk for low participation and eventual dropout from pediatric IBD psychological treatment interventions.

Keywords Attrition · Psychosocial intervention · Participation · Inflammatory bowel disease · Web-based · E-health

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Introduction

Inflammatory bowel disease (IBD) includes Crohn's disease, ulcerative colitis, and indeterminate colitis. These are chronic relapsing inflammatory diseases of the gastrointestinal tract affecting approximately 71 out of 100,000 youth below the age of 21 in the United States (Kappelman et al., 2007) with documented rising incidences (Malaty, Fan, Opekun, Thibodeaux, & Ferry, 2010). Often diagnosed in adolescence (Sandler & Eisen, 2000), these diseases produce debilitating symptoms including abdominal pain, diarrhea, rectal bleeding, and growth delay (Mackner, Sisson, & Crandall, 2004). Additionally, IBD in pediatric patients is associated with elevated rates of depression and internalizing disorders (Banez & Cunningham, 2009), fears about the future, poorer youth reported social functioning, and difficulty participating in daily activities (Greenley et al., 2010; Moody, Eaden, & Mayberry, 1999). Given the physical and psychosocial consequences experienced by youth with IBD, researchers have become increasingly interested in developing interventions aimed at improving coping skills (Hayutin, Blount, Lewis, Simons, & McCormick, 2009; McCormick, Reed-Knight, Lewis, Gold, & Blount, 2010) and reducing depression (Szigethy et al., 2007, 2004).

In addition to limiting clinical benefit for participants in intervention research, attrition represents a significant threat to the internal, external, and statistical validity of treatment intervention studies (Karlson & Rapoff, 2009). Attrition is a significant concern for behavioral medicine intervention research, with a literature review reporting a mean attrition rate of 33% for individuals with a chronic illness (Davis & Addis, 1999). Research specific to pediatric populations finds a similar average attrition rate of 32% (range 0–59%) by follow-up, signaling the need to identify risk factors for attrition (Karlson & Rapoff, 2009). Recent research on attrition in pediatric populations has worked to provide operational definitions of the different types of attrition including (a) preinclusion attrition, which occurs when eligible participants do not consent to participate or fail to complete pre-randomization requirements, (b) dropout attrition, which occurs when participants dropout of the study early; and (c) attrition related to intermittent missing data, which occurs when participants fail to complete follow-up assessments (Zebracki et al., 2003). Further, although not synonymous with attrition, low adolescent and parent participation also presents threats to validity and reduces researchers' ability to evaluate the feasibility and effectiveness of family-based interventions for chronically ill youth (Zeller et al., 2004). The aim of the current investigation was to examine factors associated with adolescent and parent participation and attrition in a coping skills treatment intervention for adolescent girls with IBD. Further, we sought to determine differences between participants who provided post-treatment data and those who did not so as to further understand attrition related to intermittent missing data (McCormick et al., 2010; Zebracki et al., 2003). Results will build upon the small body of research that has identified factors associated with attrition from pediatric health interventions, including Zeller et al. (2004) who found attrition from a pediatric weight management program to be associated with higher rates of internalizing symptoms.

Within the current investigation, factors associated with the level of adolescent and parent participation in a 6-week web component that followed a one-day coping skills treatment intervention were examined. Second, group differences between those who provided post-treatment data and those who did not were examined to better understand factors associated with attrition related to intermittent missing data. For these two study aims, we hypothesized that both lower participation and higher attrition would be associated with higher adolescent and parent reports of abdominal pain, functional disability, somatic symptoms, adolescent and parent reports of catastrophic cognitions about the adolescents' pain, and with higher adolescent self-reported depression. Hypotheses were guided by past research demonstrating a relationship between attrition and internalizing symptoms (Zeller et al., 2004) as well as Wallander and Varni's (1992) disability-stress-coping model suggesting that chronic illness symptoms (e.g. abdominal pain) create increased stress. Adjustment to disease related stress is determined partially by an individual's coping mechanisms, suggesting that maladaptive coping styles such as the tendency to experience catastrophic cognitions related to pain are related to poorer adjustment. For the current investigation, lower participation and higher attrition were conceptualized as indications of poorer adjustment and were therefore hypothesized to be related to physical symptoms and functional activity limitations, as well as catastrophic cognitions.

Method

Recruitment

This study is part of a larger treatment outcome investigation which sought to train adolescent patients and their parents to use coping skills to reduce pain and functional disability and promote adaptive coping (McCormick et al., 2010). Patients were recruited from two pediatric gastroenterology specialty clinics in the Southeastern United States, and recruitment was limited to adolescent females (see McCormick et al., 2010, for further explanation). Inclusion criteria were: (a) diagnosis of IBD, (b) female gender, (c) age between 11 and 18 years, (d) at least one parent willing to participate, (e) English fluency, and (f) internet access. Exclusion criteria included developmental delay.

Out of 215 potential participants initially screened through medical records for possible eligibility, 31 families were enrolled. Reasons for not enrolling included not meeting inclusion criteria ($n = 5$), lack of interest/scheduling difficulties ($n = 41$), being unreachable by phone ($n = 81$), and failing to return consents/assents after expressing initial interest ($n = 57$). The mean age for the 31 adolescents was 14.33 (SD = 1.84), with an average age of diagnosis of 10.80 (SD = 3.42). The majority of the sample was Caucasian (94%), and the remaining participants were African American. Detailed demographic information for the study sample and results of the treatment intervention are available in a previously published paper (McCormick et al., 2010).

Design and Procedure

Institutional Review Board approval was obtained for the coping skills intervention study which utilized a wait-list control group design, with all participating families eventually receiving treatment. After obtaining written informed consent and assent via mail or participants returning forms to the clinic, assessments took place: (1) before starting the day-long skills training aspect of the treatment, and (2) 6 weeks later, as soon as participants' scheduled allowed following the conclusion of web-based component of the treatment intervention. Adolescents and parents completed a packet of self-report measures either by paper-and-pencil or via phone interview. Method of data collection depended on the family's preference and availability. Completion of the measures took approximately

30 min each for the parent and adolescent. Over an 18-month period, eight treatment days occurred for cohorts in the treatment and wait-list control groups. For the current investigation, all participants who attended the initial treatment day were combined into one sample for analyses, regardless of original group assignment.

Measures

A brief questionnaire was created to assess demographic information (i.e. gender, ethnicity, members of family, family income) and diagnosis.

Abdominal Pain Index (API; parent and child report). The API (Walker, Garber, Van Slyke, & Greene, 1995) is a 4-item measure of abdominal pain frequency and severity in the past 6 weeks. Items assess the number of days the child had pain, the number of times per day the child had pain, the duration of the pain, and the severity of the pain. Total scores are found by summing items endorsed. Higher scores indicate worse pain. For this sample, the API had good internal consistency for parent and child reports ($\alpha = .86$ and $\alpha = .83$, respectively).

Functional Disability Inventory (FDI; parent and child report). The FDI (Walker & Greene, 1991) consists of 15 items assessing physical and psychosocial functioning related to physical health. Respondents endorsed items assessing the level of difficulty they experienced in activities during the last 6 weeks using a 5-point scale ranging from “no trouble” to “impossible”. Total scores are found by summing items endorsed. Higher scores indicate greater functional disability. Cronbach’s alphas for the current sample were $\alpha = .83$ for child report and $\alpha = .93$ for parent report.

Child Somatization Inventory (CSI; parent and child report). On the CSI (Garber, Walker, & Zeman, 1991; Walker & Garber, 1992) children and/or parents rate 35 symptoms on a 5 point scale to indicate how much the child was bothered by each symptom in the past 6 weeks. Higher scores indicate greater somatization. Total and subscale scores are found by summing items on the appropriate scale. In this sample, the CSI total score had good internal consistency (parent report: $\alpha = .73$, child report: $\alpha = .94$). The Gastrointestinal subscale of the CSI (Meesters, Muris, Ghys, Reumerman, & Rooijmans, 2003), assesses physical symptoms related to the gastrointestinal tract (e.g. vomiting (or throwing up), feeling bloated or gassy, food causing sickness). For this sample, the Gastrointestinal subscale of the CSI had adequate internal consistency for parent and child reports ($\alpha = .82$ and $\alpha = .85$, respectively).

Pain Catastrophizing Scale for Children (PCS–C) and Pain Catastrophizing Scale for Parents (PCS–P). The PCS (Sullivan, Bishop, & Pivik, 1995) is a 13-item measure rated on a 5-point scale from 0 to 4 of children’s catastrophizing cognitions related to their own pain or parents’ catastrophizing cognitions related to their children’s pain. The measure assesses catastrophizing as a total score, as well as three sub-domains: Rumination, Magnification, and Helplessness. According to the authors of the measure, the Rumination scale assesses ruminative thoughts related to pain, worry, and difficulty inhibiting pain related thoughts. The Magnification scale assesses thoughts related to intensifying the unpleasantness of pain situations and the likelihood of negative outcomes, and the Helplessness scale assesses one’s perception of inability to deal with pain. Higher scores indicate higher levels of pain catastrophizing. For this sample, the PCS demonstrated good internal consistency ($\alpha = .95$ for parent report, $\alpha = .97$ for child report).

Stress Index for Parents of Adolescents, Parent Domain subscale (SIPA; parent report). The Parent Domain subscale of the SIPA (Sheras, Abidin, & Konold, 1998) assesses a parent’s distress associated with interacting with his or her adolescent using a 5-point scale along four dimensions: (a) Life Restrictions, (b) Relationship with Spouse/Partner, (c) Social Alienation, (d) Incompetence/Guilt. The Parent Domain is reported as a *t*-score for the current sample with scores that fall at or above the 90th percentile corresponding to a *t*-score of 63 or above and considered as “clinically significant” levels of parent distress according to the SIPA manual. Cronbach’s alpha for the SIPA parent domain subscale equaled .90 for this sample.

Child Depression Inventory (CDI; child report). The CDI (Kovacs, 2003) is a 27-item self-report measure that assesses cognitive, behavioral, and affective signs of depression in children and adolescents. For the current study, the Total score assessing overall depressive symptomatology as well as the Ineffectiveness subscale score assessing negative evaluation of one’s ability were utilized, both of which are reported as *t*-scores. According to the CDI manual, *t*-scores from 45 to 55 are considered “average,” from 56 to 60 “slightly above average”, from 61 to 65 “above average”, from 66 to 70 “much above average”, and above 70 “very much above average”. Cronbach’s alpha for the CDI total score equaled .82 for the current sample.

Treatment Intervention

The intervention that served as the larger context for the current study took place over the course of 6 weeks. Treatment began with a one-day meeting of approximately 6 h in which adolescents and their parents were trained in skills for managing pain, coping with the disease, communicating with others, and for parents only, limit setting for a child with a chronic illness. This day was immediately followed by six sessions of weekly web-based activities that required parents and adolescents to log on separately and complete assignments. See McCormick et al. (2010) for a detailed description of the treatment curriculum.

For the web component, each week parents and adolescents completed and electronically submitted one homework assignment that corresponded to a particular skill learned during the treatment day. Further, parents and adolescents separately attended one chat session per week with the other members of their treatment cohort. Sessions were facilitated by a project co-leader (i.e. clinical psychology graduate student or clinical psychologist). They were held at the same time every week for approximately 30 min. The different cohorts of parents and adolescents who participated on the same treatment day collectively determined the time for the chat sessions in order to ensure that all members were typically free to attend. During chat sessions, homework assignments were discussed and problem solving around effective use of coping skills learned in the one day intervention was facilitated. For the purposes of determining web participation, a scoring system was developed. For each of the six chat sessions attended and the six homework assignments completed, participants earned 1 point, with a possible point range of 0–12.

Procedure for Maintaining Participant Involvement

Efforts were made throughout the 6 weeks of the web-based aspect of treatment to facilitate participant involvement. First, confidentiality was assured using several means. The web site used for homework and chat sessions was secure and required password access. Also, only project facilitators could view the participant's homework assignments. Similarly, chat sessions could only be viewed by group members and the project facilitators (e.g. parents could not see adolescents' chats and vice versa). Second, participants were provided with a reminder phone call each week prior to the chat session. This was done to prompt homework completion and chat session participation, and also to help facilitators continue to build rapport with families and troubleshoot difficulties in applying coping skills. If a family could not be reached, a message was left and a follow-up phone call was made prior to the chat session. Third, project facilitators posted transcripts of each chat session to the web site's discussion board so that individuals who missed a chat session could keep current regarding the program and re-join the discussion in the next week. Finally, group members were invited to customize their individual sites to help build interest in the program.

After completion of assessment inventories for pre-treatment and post-treatment following the web component, participants were compensated with \$20 gift cards to a local store following the return of completed packets or phone interviews for data collection. They also received a \$25 gift certificate at the end of the training program if the parent and adolescent each completed five out of six web-based homework assignments and five of six chat sessions.

Results

Medical and Demographic Factors

No significant relationships were found between web participation rates and demographic and medical factors (i.e. age, ethnicity, parental marital status, diagnosis, time since diagnosis). Similarly, no significant differences were found on medical and demographic factors regarding attrition related to intermittent missing data, which will be referred to simply as "attrition" for the remainder of the results.

Web Participation Rates

Pearson product moment correlation analyses were used to examine relationships between web participation rates with physical and psychosocial variables. Two of the physical and psychosocial variables were not normally distributed and were therefore examined using Spearman's Rho correlation coefficient, which resulted in the same outcomes as Pearson product moment correlation analyses. As a result, Pearson's correlation coefficients are reported for consistency. See Table 1 for means, standard deviations, and ranges for all study variables including participation rates. Regarding adolescent participation rates, lower participation rates were significantly associated with higher rates of adolescent reported abdominal pain ($r = -.36$, $p < .05$), parent reported abdominal pain ($r = -.40$, $p < .05$), adolescent-reported functional disability ($r = -.38$, $p < .05$), adolescent-reported somatic physical symptoms ($r = -.43$, $p < .05$), adolescent-reported GI somatic symptoms ($r = -.54$, $p < .01$), parent-reported somatic GI symptoms ($r = -.36$, $p = .05$), parent-reported catastrophizing cognitions (i.e. PCS-P Rumination subscale) ($r = -.38$, $p < .05$), and adolescent-reported depressive symptoms (i.e. CDI Ineffectiveness subscale) ($r = -.48$, $p < .01$). Adolescent participation was not related to parent-reported functional disability, somatic physical symptoms, or parenting stress. It was also unrelated to adolescent or parent reported catastrophizing symptoms except for the PCS-P Rumination subscale reported above.

Parent participation in the web component was positively associated with adolescent participation ($r = .68$, $p < .001$). No other significant bivariate relationships were found between parent participation and physical and psychosocial variables.

Table 1 Mean, standard deviation, and range for variables included in web participation analyses

Variable	M	SD	Observed range
Teen participation in web component	5.45	4.02	0–12
Parent participation in web component	5.94	4.23	0–12
Adolescent report			
Abdominal Pain (API)	11.45	5.98	0–26.00
Functional Disability (FDI)	5.48	5.88	0–22.00
Somatic Symptoms (CSI)	19.19	14.99	0–51.00
Somatic Symptoms: GI (CSI-GI)	10.00	7.60	0–27.00
Pain Catastrophizing (PCS): Total	17.43	12.47	0–44.00
Pain Catastrophizing (PCS): Rumination	8.27	4.83	0–16.00
Pain Catastrophizing (PCS): Magnification	3.07	2.84	0–9.00
Pain Catastrophizing (PCS): Helplessness	6.10	5.74	0–22.00
Depression (CDI): Total Scale	45.61	9.00	34.00–76.00
Depression (CDI): Ineffectiveness Subscale	45.77	9.45	38.00–81.00
Parent report			
Abdominal Pain (API)	11.38	6.61	0–25.00
Functional Disability (FDI)	11.70	11.19	0–47.00
Somatic Symptoms (CSI)	22.93	16.85	1.00–74.00
Somatic Symptoms: GI (CSI-GI)	9.80	6.21	0–25.00
Pain Catastrophizing (PCS): Total	21.32	11.87	5.00–45.00
Pain Catastrophizing (PCS): Rumination	9.65	4.26	3.00–16.00
Pain Catastrophizing (PCS): Magnification	4.70	2.79	0–10.00
Pain Catastrophizing (PCS): Helplessness	6.97	6.11	0–22.00
Parenting Stress (SIPA): Parenting Domain	49.66	10.27	30.00–71.00

API Abdominal Pain Index, *FDI* Functional Disability Index, *CSI* Child Somatization Inventory, *CSI-GI* Child Somatization Inventory: Gastrointestinal Index, *PCS* Pain Catastrophizing Scale, *CDI* Child Depression Inventory, *SIPA* Stress Index for Parents of Adolescents

The relationship between adolescent and parent participation in the web component and attrition was examined and revealed that there was a significant, positive relationship between adolescent participation and study completion, as defined by the provision of post-treatment data ($r = .39$, $p < .05$). Parent participation in the web component was unrelated to attrition.

Post-Treatment Assessment

Of the 31 families who enrolled in the coping skills intervention group, 19 families, or 61% of the sample, provided post-treatment data whereas 12 families, or 38% of the sample, did not provide post data and therefore attrited. Researchers attempted to obtain post-treatment data from all enrolled families. There were no families in which one member of the parent–child dyad provided post-treatment data without the other member of the dyad also providing data.

A one-way MANOVA was used to evaluate group differences between those who provided post-treatment data and those who attrited. Prior to conducting such analyses, assumptions of ANOVA were evaluated, revealing two dependent variables which were not normally distributed and therefore did not meet assumptions of ANOVA. For those variables, non-parametric tests (i.e. Mann–Whitney) were conducted.

Overall, there was a significant group effect for the physical and psychosocial variables, $F(15, 12) = 2.80$, $p < .05$, $\eta_p^2 = .78$. Examination of the follow-up ANOVAs for each of the dependent variables revealed several significant differences (See Table 2). For families who did not provide post-treatment data, parents endorsed having significantly more catastrophic cognitions about their adolescent's pain at baseline. In particular, analyses of subscales within the parent-reported PCS revealed higher scores on the Magnification and the Helplessness subscales.

Additionally, compared to parents who provided post-treatment data, those who attrited had higher parenting stress at baseline. Finally, adolescents who did not provide post-treatment data endorsed higher scores on the Ineffectiveness subscale of the CDI at baseline compared to those who did give post-treatment data; however, no differences were found on CDI total score. Given the small sample size of the study, effect sizes were interpreted in the absence of statistical significance in order to identify additional meaningful differences between families who provided post-treatment data and those who attrited. As seen in Table 2, for families who did not provide post-treatment data, medium effects as indicated by η_p^2 values

Table 2 Group comparisons between post data collected group and attrition group

		Post data						
		Collected group		Attrition group		Group comparisons		
Physical and psychosocial variables		M_1	SD_1	M_2	SD_2	$F_{1,2}$ (U)	$P_{1,2}$	η_p^2 (r) $_{1,2}$
Parent report								
API		11.50	6.75	11.95	6.22	.03	.86	<.01
FDI		10.67	11.65	13.50	10.92	.40	.53	.02
CSI	Total	19.39	13.90	29.30	21.17	2.24	.15	.08
	GI subscale	8.94	5.59	12.40	6.74	2.13	.16	.08
PCS	Total	17.39	11.01	28.25	11.38	6.11	.02*	.19
	Magnification	3.89	2.54	6.60	2.27	7.87	.009**	.23
	Helplessness[a]	5.11	5.97	10.20	5.75	48.50	.02*	.43
	Rumination	8.39	3.94	11.45	4.50	3.51	.07	.12
SIPA	Parent domain	46.17	9.00	53.80	8.98	4.63	.04*	.15
Adolescent report								
API		11.39	5.22	12.10	7.09	.09	.76	<.01
FDI		4.61	6.11	7.60	5.89	1.57	.22	.06
CSI	Total	18.11	14.98	21.10	15.75	.25	.62	<.01
	GI Subscale	8.61	6.88	12.10	8.45	1.14	.25	.05
PCS	Total	15.56	11.78	21.60	13.75	1.50	.23	.06
	Magnification	2.94	3.04	3.40	2.80	.15	.70	<.01
	Helplessness	5.11	5.00	8.40	6.85	2.13	.16	.08
	Rumination	7.50	4.76	9.80	4.89	1.47	.24	.05
CDI	Total	45.33	9.31	47.90	9.22	.49	.49	.02
	Ineffectiveness[a]	42.83	6.26	50.60	12.41	63.50	.04*	.38

API Abdominal Pain Index, *FDI* Functional Disability Index, *CSI* Child Somatization Inventory, *PCS* Pain Catastrophizing Scale, *SIPA* Stress Index for Parents, *CDI* Child Depression Inventory

[a] The Mann–Whitney test was utilized for comparison due to non-normal data. For these cases, the *U* test statistic and *r* effect size are reported. Regarding effect sizes, .01, .06, and .14 represent small, medium, and large effects, respectively for η_p^2. For *r*, .10, .30, and .50 represent small, medium, and large effects, respectively

Astericks represent significant *p*-values $*p \leq .05$, $**p \leq .01$

of .06 to .13 were found for parents reporting higher levels of somatic physical symptoms, GI somatic symptoms, and Rumination on the PCS. Examination of effect sizes also reveals that for families who did not provide post-treatment data, adolescents reported meaningfully higher levels of functional disability and catastrophic cognitions about their pain as measured via the total score and the Helplessness subscale.

Discussion

The current study examined factors associated with adolescent and parent participation in a 6-week web component of a coping skills intervention for adolescent girls with IBD and examined factors associated with attrition related to intermittent missing data. As researchers and clinicians become increasingly active in developing and implementing psychosocial interventions for youth with IBD and other chronic illnesses, studies such as the current one offer insight for identifying and targeting barriers to full treatment provision.

Regarding participation in the 6-week web component, which consisted of weekly chats and homework assignments, results revealed that adolescent participation was related to several disease and psychosocial variables. The overall picture that emerges from the findings is that adolescents experiencing more difficulties related to their disease and psychosocial functioning participated less in the web component of the treatment intervention. Lower adolescent participation was associated with higher adolescent and parent reported abdominal pain and somatic complaints, and with higher adolescent reported functional disability. There are several potential explanations for these findings that are in need of additional research. One possible explanation is that adolescents who were experiencing higher levels of disease symptoms including abdominal pain, functional disability, and somatic symptoms may have felt too ill to participate in the weekly scheduled web chats and homework assignments. Although the use of a web component was designed to provide greater accessibility than more typical face-to-face meetings, adolescents with chronic illnesses may need additional options for flexibility, as well as clear explanations for the necessity of attempting to participate in spite of current symptoms, in order that they may reap potential long-term benefits.

Lower adolescent participation in the web component of treatment was also related to higher parent reported ruminative thoughts about their daughters' abdominal pain and higher adolescent reported feelings of ineffectiveness, suggesting that psychological factors may have also created barriers to full participation. Past research on factors associated with attrition from a pediatric weight management program identified depressive symptoms as predictive of attrition, indicating that symptoms of low mood may be a risk factor for participation in psychologically based treatment intervention programs for youth (Zeller et al., 2004). Interestingly, parents' report of their own catastrophic cognitions was related to adolescent participation but not parent participation. Perhaps parents' catastrophic cognitions sent implicit messages of fear and avoidance to their adolescents. Further research is needed to better understand how parental factors are associated with adolescent participation in pediatric treatment intervention programs.

We also examined factors associated with attrition due to intermittent missing data. Within the current sample, 12 families (39% of the sample) attrited by failing to provide post-treatment data despite consistent attempts to maintain participant involvement. Group comparisons revealed several differences between completers and non-completers, which could help inform attempts to reduce attrition in future research. For parent report, those who attrited reported more catastrophic cognitions related to their daughters' pain. A plausible explanation for these findings is that parents with higher baseline levels of catastrophic cognitions felt more easily overwhelmed and were more likely to engage in avoidance by failing to complete study measures when faced with the potentially anxiety provoking task of focusing on questions about their child's physical and psychological symptoms. Although not assessed in this study, avoidance could also decrease adolescents and parents active and determined application of coping skills to address adolescents' symptoms. These possibilities are in need of further research. However, given the implications, future pediatric intervention research might attempt to normalize parents' experience of fear and anxiety related to their children's illness and work to address emotional barriers to full treatment provision, including avoidance. For example, trainers may inform participants that the discussion of topics related to chronic illness and the completion of measures may result in uncomfortable emotional reactions, along with the urge to engage in experiential avoidance (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Trainers can both validate this experience and challenge participants to work through the entire program and endure temporary discomfort that may be aroused, in order to see maximum benefit and treatment effects.

In addition to higher rates of catastrophic thoughts, parents in the attrition group also reported higher parenting stress. Although the treatment intervention was designed to ultimately improve coping skills and decrease stress, participation in the weekly chat sessions and homework assignments, along with completion of post-treatment measures, may have been viewed as yet another activity for already stressed parents. Additional research is needed to examine mechanisms by which parenting stress may lead to higher attrition in order to assist participants whose stress may interfere with treatment completion. Interpretation of effect sizes revealed that parents in the attrition group reported higher levels of somatic physical symptoms and somatic GI symptoms in their daughters. Higher levels of parent-reported somatic GI symptoms were also related to lower adolescent participation in the web component. For adolescent girls with IBD, GI specific somatic symptoms may be a particularly salient barrier to participation in psychosocial interventions.

For adolescents, those in the attrition group reported more depressive symptoms, specifically related to feeling ineffective. Feelings of ineffectiveness were also related to lower adolescent participation in the web component, suggesting that the constructs measured by the CDI Ineffectiveness scale are particularly important for understanding risk factors for low participation and eventual dropout. Perhaps adolescents who feel ineffective or negative about their abilities are at risk for discounting their abilities to participate in or benefit from a psychological intervention. Given that past research has also shown symptoms of depression to predict treatment intervention dropout, screening for depression and then addressing barriers created by depressive symptoms may increase rates of completion and associated benefit finding for participants in pediatric psychosocial interventions (Zeller et al., 2004). Adolescents in the attrition group also reported meaningfully higher levels of functional disability and catastrophic cognitions related to their pain. Effect size analyses suggest that catastrophizing for both parents and adolescents was consistently related to attrition.

Strengths of the current study are the identification of several potentially modifiable variables that were associated with participation in the web component of the treatment intervention as well as attrition. The identification of risk factors for low participation and attrition such as increased rates of disease and psychosocial difficulties, sets the stage for identifying those at risk for attrition or low participation at the time of enrollment and then targeting barriers with these individuals throughout treatment. Additional research should examine specific ways in which disease and psychosocial variables create barriers so that these issues can be targeted for intervention.

Despite the strengths of the current investigation, several limitations exist. First, the intervention was designed for adolescent girls with IBD, which limits generalizability to adolescent boys or other chronic illness groups. Lack of information on socioeconomic status of the participants and objective disease ratings may also limit conclusions regarding generalizability. In addition, the small sample size of the original study limited power for statistical analyses. However, several significant relationships were found, suggesting that this is an important line of research for future intervention studies. Additional investigations of factors such as objective disease severity and socioeconomic status that are potentially associated with participation and attrition in psychosocial intervention programs are needed for patients with IBD and other pediatric conditions.

Varying rates of participation and attrition are expected with treatment outcome research (Karlson & Rapoff, 2009). Despite this, research, including the current study, can be used to guide the identification of participants most at risk for low participation and attrition so that resources can be provided to assist them in obtaining the full benefit of interventions. Results of the current study suggest that for adolescent females with IBD, the experience of higher levels of disease and psychosocial difficulties, as well as parent experience of catastrophic cognitions and parenting stress, are associated with lower participation and higher rates of attrition. Despite researchers' best efforts, results such as these suggest that we may not be reaching those most in need of psychosocial treatments and that additional work is needed to assist the most vulnerable of patients.

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