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An Exploration of Family Problem-Solving and Affective Involvement as Moderators Between Disease Severity and Depressive Symptoms in Adolescents with Inflammatory Bowel Disease

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Abstract

Little is known about how family functioning relates to psychosocial functioning of youth with inflammatory bowel disease (IBD). The study aim was to examine family problem solving and affective involvement as moderators between adolescent disease severity and depressive symptoms. Participants were 122 adolescents with IBD and their parents. Measures included self-reported and parent-reported adolescent depressive symptoms, parent-reported family functioning, and physician-completed measures of disease severity. Disease severity was a significant predictor of adolescent-reported depressive symptoms, but not parent-reported adolescent depressive symptoms. Family affective involvement significantly predicted parent-reported adolescent depressive symptoms, while family problem-solving significantly predicted adolescent self-report of depressive symptoms. Neither affective involvement nor problem-solving served as moderators.

Family affective involvement may play an important role in adolescent emotional functioning but may not moderate the effect of disease severity on depressive symptoms. Research should continue to examine effects of family functioning on youth emotional functioning and include a sample with a wider range of disease severity to determine if interventions aimed to enhance family functioning are warranted.

Keywords

Adolescent; Inflammatory bowel disease; Disease severity; Family functioning; Depression

Introduction

Inflammatory bowel disease (IBD) is a broad term used to classify a group of chronic IBD, two of the most common being ulcerative colitis and Crohn's disease (Bousvaros et al., 2006; Deshmukh, Kulkarni, & Lackamp, 2010). Ulcerative colitis inflammation occurs in the large bowel, whereas Crohn's disease can impact any portion of the gastrointestinal tract (Burke, Neigut, Kocoshis, Chandra, & Sauer, 1994). Overall, IBD affects 71 in 100,000 youth under 20 years of age in the United States (43 per 100,000 for Crohn's disease and 28 per 100,000 for ulcerative colitis), with approximately 20–30 % of IBD patients diagnosed before the age of 20 (Hanauer, 2006; Kappelman et al., 2007). Prevalence of IBD is greater in adolescents between the ages of 15 and 19 years, with 143 per 100,000 (85 per 100,000 for Crohn's disease and 58 per 100,000 for ulcerative colitis) affected (Hanauer, 2006; Kappelman et al., 2007). Inflammatory bowel disease is diagnosed in all races and ethnic groups throughout the world, with the highest prevalence in North America and Europe (Loftus, 2004). Caucasians are affected by IBD more frequently than African Americans, Asian Americans, Americans of Hispanic background, and aboriginal North Americans (Mahid, Mulhall, Gholson, Eichenberger, & Galandiuk, 2008). Symptoms of IBD (e.g., frequent diarrhea, abdominal pain, fatigue, weight loss, short stature, delayed puberty) are chronic, intermittent, and unpredictable. Treatment regimens can be complex and time-consuming, consisting of multiple medication doses per day, dietary modification, infusions, and in some cases, surgery (Hommel, Denson, Crandall, & Mackner, 2008). Medication side effects (e.g., weight gain, acne, hair growth, irritability, depression) may further contribute to the burden of this potentially embarrassing and disruptive disease (Greenley et al., 2010). Given the complex, chronic, unpredictable, and embarrassing nature of the disease, youth with IBD are at increased risk for significant psychosocial maladjustment (Mackner & Crandall, 2007). This can be especially true for those patients that endure the burden of more aggressive treatment options (Gray, Denson, Baldassano, & Hommel, 2011).

Several studies reveal that youth with IBD endorse more behavioral and emotional symptoms, particularly internalizing problems (e.g., depressive and anxiety symptoms, social withdrawal), than healthy controls and children with other chronic illnesses (Burke et al., 1989; Engstrom, 1999; Mackner, Crandall, & Szigethy, 2006; Szigethy et al., 2004). Higher disease severity has been suggested as a risk factor for internalizing problems by some researchers; however, the relationship between these variables is inconsistent. Szigethy et al. (2004) found that moderate to severe disease severity in male adolescents

with IBD was correlated with reports of anhedonia, decreased appetite, and fatigue, but not with total depressive symptom scores on the Children's Depression Inventory (Szigethy et al., 2004). Another study found that disease severity predicted internalizing symptoms in a sample of adolescents with IBD; however disease severity only accounted for a small portion of the variance in internalizing symptoms (Gray, Denson, Baldassano, & Hommel, 2011).

Inconsistencies in the literature regarding the relationship between disease severity and internalizing problems are not surprising, as there are a number of additional environmental factors that play a salient role in the psychosocial well-being of youth with chronic illness (Kazak, Rourke, & Navsaria, 2009; Mackner, Crandall, & Szigethy, 2006; Thompson & Gustafson, 1996). Studies including children with chronic illness have examined family functioning as one aspect of the environment that can affect a number of outcomes, including behavioral and emotional functioning, health-related quality of life, adherence to treatment recommendations, and disease state (Herzer, Denson, Baldassano, & Hommel, 2011; Herzer et al., 2010; Rodenburg, Meijer, Dekovic, & Aldenkamp, 2005). Few studies, however, have examined specific aspects of family functioning that may play a role in the emotional adjustment in youth with IBD (Herzer et al., 2010).

Family problem-solving (i.e., family's ability to solve conflicts and disagreements) and affective involvement (i.e., degree of family interest and involvement with one another) are two examples of specific family constructs that have been recently examined in relation to disease-related and psychosocial outcomes of youth with IBD (Herzer et al., 2010). These two constructs are worthy of investigation, as approximately 25 % of adolescents with IBD report clinically significant problems with family affective involvement, while approximately 12 % endorse clinically significant problem-solving difficulties among family members (Herzer, Denson, Baldassano, & Hommel, 2011). Recent research has shown that poor family functioning in these areas can have negative consequences. Adolescents with IBD have reported impairments in quality of life when their families endorse limited engagement in effective problem-solving strategies at the clinical level (Herzer, Denson, Baldassano, & Hommel, 2011). It has also been proposed that high affective involvement is suggestive of dependency among family members and that parental overprotection could negatively impact adolescents in their transition to autonomous disease management (Herzer, Denson, Baldassano, & Hommel, 2011). Finally, very limited affective involvement among family members can hinder other areas of family functioning that are often useful for managing chronic illness, such as communication (Herzer, Denson, Baldassano, & Hommel, 2011).

Other research has shown that family support and open communication serve to protect against the impact that disease activity can have on psychosocial functioning of youth with IBD (Engstrom, 1999). This finding can be conceptualized within the "Risk and Resistance Model," which outlines children's psychological adjustment in the context of maternal and family adaptation to pediatric chronic illness (Wallander, Varni, Babani, Banis, & Wilcox, 1989). This model proposes that the adverse effects of risk factors (e.g., disease/disability parameters, functional status) on children's psychosocial adaptation (e.g., mental, social, and school functioning) may be moderated by a variety of resistance factors (e.g., intrapersonal,

social–ecological, and stress-processing variables). To our knowledge, this model has only been examined in the IBD literature by Engstrom (1999); however, this study was limited by a small sample size and use of an unpublished interview to assess family functioning.

The current study seeks to build upon previous literature by examining the relationship between disease severity and depressive symptoms in adolescents with IBD and to determine whether specific domains of family functioning (i.e., problem-solving and affective involvement) moderate emotional adaptation (i.e., depressive symptoms) to greater disease severity. Based on the Risk and Resistance theoretical framework, we hypothesize that family affective involvement and problem-solving will serve as resistance factors in the relationship between disease severity and depressive symptoms in youth with IBD. Specifically, we expect that youth with healthier family affective involvement and problem-solving in the presence of greater disease severity will endorse fewer depressive symptoms than youth with poorer family functioning in these domains.

Method

Participants and Procedure

This study was part of a larger longitudinal multisite assessment project examining psychosocial functioning, quality of life, and treatment adherence in adolescents (13–17 years) with IBD. Participants were recruited at one of three hospital-based pediatric gastrointestinal clinics in the Midwest, Northeast, and Southeast regions of the United States. Eligibility criteria for the study included: (1) patient age 13–17, (2) diagnosed with Crohn's disease or ulcerative colitis, and (3) accompanied to their outpatient appointment by a parent or legal guardian. Limited English fluency, a diagnosis of mental retardation, or a psychotic disorder precluded study participation. None of the families that were approached met any of these exclusionary criteria.

Eligible families attending regularly scheduled clinic appointments were approached in private patient rooms by a clinician to assess interest in study participation. Interested dyads met with a trained research assistant, who explained the study protocol and obtained informed consent and assent. Each adolescent and parent were encouraged to complete their questionnaires independently. In order to maintain privacy, the research assistant did not remain in the exam room. However, the research assistant would frequently check on families to ensure independent completion of measures and answer questions. Each family was compensated with one \$10 gift card upon study completion. Physicians completed a disease severity questionnaire immediately after the patient was examined. The study was approved by the governing IRB of each institution. In total, 170 parent–child dyads were approached for study participation. Of these, 31 families declined participation due to either feeling too ill or lack of time/ interest. The remaining 17 were excluded from analyses due to incomplete data. The final sample included 122 adolescents and their caregivers.

Adolescent Report Measures

Depressive Symptoms—The Children's Depression Inventory (CDI) (Kovacs, 1992) is a 27-item adolescent self-report questionnaire that assesses for the presence of depressive

symptoms over the previous 2 weeks, with higher scores indicating increased symptom severity. Each item is comprised of three statements that assess the frequency of a single depressive symptom (e.g., crying, loneliness, fatigue, poor appetite) on a '0'–'2' point scale. Items are written at the 2nd grade level. The CDI has adequate to good internal consistency ($\alpha = .71-.88$) and good test-retest reliability of .85 (Sitarenios & Stein, 2004). This sample demonstrated good internal consistency ($\alpha = .88$).

Parent Report Measures

Demographics—Parents/legal guardians of participating adolescents completed a basic demographic form that included questions about child and parent age, gender, race/ethnicity, as well as parent marital status, education, and family income.

Family Functioning—The Family Assessment Device (FAD) (Miller, Epstein, Bishop, & Keitner, 1985) is a 60-item measure that provides an assessment of family functioning along seven different dimensions. Parents were asked to answer each item based on “how well it describes your own family” on a 4-point Likert scale ranging from '0' (*strongly agree*) to '3' (*strongly disagree*). Items for this measure are written at the 6th grade reading level. For the purpose of this study, only the problem-solving and affective involvement subscales were analyzed. Example items on the problem-solving subscale are: “After our family tries to solve a problem we usually discuss whether it worked or not” and “We try to think of different ways to solve problems.” The affective involvement subscale includes items such as, “We are too self-centered” and “Even though we mean well, we intrude too much into each other's lives.” Higher scores on the problem-solving subscale suggest that families are less able to resolve problems at a level that maintains effective family functioning, whereas higher scores on the affective involvement subscale indicate less than optimal functioning in that family members are either overly involved or not involved or interested enough in the activities and interests of other family members (Epstein, Bishop, & Levin, 1978). Clinical cutoff scores differentiating “healthy” versus “unhealthy” problem-solving and affective involvement are 2.20 and 2.10, respectively (Miller, Epstein, Bishop, & Keitner, 1985). The FAD is a well-established measure that has been used in a variety of pediatric chronic illness populations. It demonstrates good reliability and validity (Alderfer et al., 2008), with internal consistency in the current sample at .70 for problem-solving and .73 for affective involvement.

Adolescent Depressive Symptoms—Parents completed the Child Behavior Checklist (CBCL) (Achenbach & Rescorla, 2001) as a measure of adolescent behavioral and emotional functioning. Parents reported the frequency of each behavior during the previous 6 months on a three-point Likert scale, with ratings of '0' (*not true*), '1' (*somewhat or sometimes true*), or '2' (*very or often true*). The 113-item CBCL is written at the 5th grade reading level and yields eight factors (i.e., anxious/depressed, withdrawn/ depressed, somatic complaints, social problems, thought problems, attention problems, rule-breaking behaviors, and aggressive behaviors) as well as two broadband scales (i.e., internalizing and externalizing problems). T-scores were used for the withdrawn/depressed subscale, which includes items such as, “There is very little he/she enjoys” and “Unhappy, sad, or depressed.”

Disease Severity Measures

Ulcerative Colitis—The Lichtiger Colitis Activity Index (LCAI) (Lichtiger et al. 1994) is an eight-item measure designed to assess disease activity in patients with ulcerative colitis (UC) across eight symptoms: daily stool frequency, nocturnal diarrhea, visible blood in stool, fecal incontinence, abdominal pain or cramping, general well-being, abdominal tenderness, and need for antidiarrheal medication. Scores on the LCAI range from 0 to 21, with higher scores indicating greater disease activity (i.e., ≥ 2 = quiescent disease; <10 = a response to therapy; ≥ 10 = active disease and no response to therapy) (Fanjiang, Russell, & Katz, 2007). This measure was completed by treating physicians immediately following completion of the patient medical exam. Reliability for the current sample was good ($\alpha = .78$).

Crohn's Disease—The Pediatric Crohn's Disease Activity Index (PCDAI) (Hyams et al., 1991) is designed to assess disease activity in patients with Crohn's disease (CD), taking into account patient history (e.g., abdominal pain, abdominal examination), growth parameters, and the following laboratory data: complete blood count (CBC), erythrocyte sedimentation rate (ESR), and albumin. In the current study, treating physicians completed this measure immediately following completion of the patient medical exam. For the purpose of this study, a short-form PCDAI index was calculated according to guidelines outlined by Kappelman et al. (2011). The Short PCDAI included the following items: abdominal pain, well-being, weight, stool, abdominal exam, and extraintestinal manifestations, with higher scores suggesting greater disease activity. The possible score range is 0–90, with scores 0–15 indicating inactive disease state, 15–30 indicating mild disease state, and ≥ 30 indicating moderate-to-severe disease activity. The Short PCDAI has been demonstrated as a practical and valid measurement of pediatric Crohn's disease activity (Kappelman et al., 2011). Cronbach's alpha for the current sample ($\alpha = .65$) is consistent with reliability statistics presented in other studies (Turner et al., 2012). The Short PCDAI is strongly correlated with the full version PCDAI ($r = 0.86$) and has been identified as more feasible for use in outpatient medical settings that inconsistently measure all items on the full PCDAI (Turner et al., 2012).

Statistical Analyses

Data were analyzed using IBM SPSS Statistics, Version 20. Descriptive statistics (means, SDs) were calculated for demographic variables, disease severity, family functioning (i.e., problem-solving and affective involvement), and both adolescent and parent reports of adolescent depressive symptoms. Correlation analyses, *t* tests, and ANOVAS were used to examine potential sociodemographic, disease-related, or site-related differences in dependent variables. Given that higher scores on the Short PCDAI and LCAI represent greater disease severity, scores were combined on the same scale to form a continuous index of disease severity (Hommel, Denson, & Baldassano, 2011). An SPSS macro “PROCESS” was used to examine main and interaction effects using both parent and adolescent reports of adolescent depressive symptoms. PROCESS is a computational procedure for SPSS that implements moderation analyses using an ordinary least squares regression framework (Hayes, 2012). The PROCESS macro for simple moderation is advantageous compared to other techniques (e.g., Johnson-Neyman and pick-a-point), as it mean centers all predictor

variables used to form products when estimating a moderated path and includes the estimation of bias-corrected bootstrap confidence intervals to test for significance (Hayes, 2012). Two separate moderation models were examined for each criterion variable (i.e., CBCL withdrawn/depressed subscale score and CDI total score). Moderators were examined independently to correct for multicollinearity problems that could present with the simultaneous examination of two similar moderating variables.

Results

Participant Sociodemographic and Disease-Related Characteristics

This sample included 122 adolescents ($M = 15.7$ years, $SD = 1.3$) diagnosed with Crohn's disease (78.7 %) or ulcerative colitis (21.3 %) and their parents/legal guardians. Youth were evenly distributed across both genders (51.6 % male) and the majority was Caucasian (86.7 %). The composition of our sample across disease diagnosis and sociodemographic characteristics is similar to that reported by other studies (Greenley et al., 2012; Mackner, Bickmeier, & Crandall, 2012). Participating adults were predominantly mothers (86 %), as well as some fathers (12.2 %) and other legal guardians (1.8 %). Approximately 70 % of adults indicated that they are married. Slightly over 60 % of mothers and 54 % of fathers completed at least some college. The median family income ranged from \$75,001 to \$100,000 per year. There were significant differences in income across study sites [$F(2,103) = 9.73, p < .001, \eta^2_p = .16$], with median incomes of \$100,001–\$125,000 at the Northeast site, \$75,001–\$100,000 at the Midwest site, and \$25,001–\$75,000 at the Southeast site.

Of the 96 participants diagnosed with CD, 58.5 % had inactive disease, 20.2 % had mild disease, and 21.3 % had moderate-severe disease. The majority of adolescents with UC were rated with quiescent disease (54.2 %) or being responsive to therapy (41.8 %). Adolescents recruited from the Southeast site were rated as having significantly higher total disease severity scores [$t(71) = 2.596, p = .013, d = .64$] than participants recruited from the Midwest site.

Depressive Symptoms

Approximately 20 % of youth scored above the clinical cut-off of 12 ($M = 8.5, SD = 5.9$) on the CDI (Kovacs, 1992), and there was no statistically significant difference between those with CD (21.2 %) and UC (16.7 %). Based on parent report, only 8.0 % of adolescents were rated as having clinically significant depressive symptoms ($M = 56.6, SD = 8.7$), with T-scores on the CBCL withdrawn/depressed subscale ranging from 50 to 89. Depressive scores on the CDI were significantly higher among the Southeast sample compared to the Midwest sample of adolescents [$t(73) = 2.839, p = .006, d = .66$], while parent report of adolescent depressive symptoms on the CBCL did not differ by site. Further examination of income (i.e., median split) revealed significant differences in adolescent-reported depressive symptoms [$t(100) = 2.31, p = .023, d = .42$]. Adolescents with a family income less than \$75,000 reported higher CDI total scores compared to those with a family income greater than \$75,000. No age or gender differences in CDI or CBCL scores were observed. Due to the significant site and income-related differences in disease severity and depressive

symptoms, both variables were entered as covariates in subsequent analyses with CDI total scores as the outcome.

Family Functioning

The mean scores for family problem-solving ($M = 1.87$, $SD = 0.37$) and affective involvement ($M = 1.89$, $SD = 0.44$) were in the “healthy” range. However, 11.7 and 32.1 % of parents indicated family problem-solving and affective involvement to be above the clinical cut-off for dysfunctional family functioning, respectively. No differences in FAD subscale scores were observed across sociodemographic variables, including family household income, child gender, and child age.

Main Effects of Disease Severity and Family Functioning Predicting Adolescent Depressive Symptoms

Bi-variate and partial correlations between the independent and dependent variables are presented in Table 1. Controlling for family income and site of participation (see Tables 2, 3), disease severity was a significant predictor of adolescent-reported depressive symptoms ($B = .122$, $p < .01$), such that adolescents with greater disease severity reported more depressive symptoms. Disease severity was not a significant predictor of parent-reported adolescent depressive symptoms ($B = .021$, $p > .05$). Family affective involvement was a significant predictor of parent-reported ($B = 4.13$, $p = .05$) depressive symptoms, but not adolescent-reported depressive symptoms ($B = 2.65$, $p = .07$). Family problem-solving significantly predicted parent-reported adolescent depressive symptoms ($B = 5.49$, $p < .05$), but did not predict adolescent-reported depressive symptoms ($B = 1.75$, $p > .05$).

Interactions Between Disease Severity and Family Functioning Variables Predicting Adolescent Depressive Symptoms

All four moderator models are presented in Figs. 1, 2, 3, 4. Regression analyses did not find significant interaction effects. Specifically, family problem-solving did not moderate the relationship between disease severity and adolescent-reported ($B = .074$, $R^2 = .003$, $p > .05$) or parent-reported ($B = .074$, $R^2 = .001$, $p > .05$) depressive symptoms. Family affective involvement similarly did not moderate the relationship between adolescent-reported ($B = -.061$, $R^2 = .002$, $p > .05$) or parent-reported ($B = .103$, $R^2 = .001$, $p > .05$) depressive symptoms.

Discussion

There has been a consensus among pediatric IBD researchers that the literature has not yet adequately identified factors that help predict which youth are at risk for poor psychosocial adjustment. The need to consider psychosocial factors as moderators and mediators of the course and outcome of IBD was explicitly identified as a goal of future pediatric IBD research by Bousvaros et al. (2006) at a recent “Challenges in Pediatric IBD” conference. The current study is one of the first to contribute to our understanding of emotional functioning in pediatric IBD by examining potentially modifiable aspects of family functioning (i.e., problem-solving and affective involvement) that may influence the course and outcome of depressive symptoms in adolescents with IBD. Consistent with previous

pediatric IBD research, greater disease severity predicted greater adolescent depressive symptoms. However, this relationship was only significant when examining adolescent-reported depressive symptoms. This finding may be due to parents' less-than-optimal insight into the frequency of their child's emotional experiences, or perhaps adolescents over-reporting symptoms of depression. However, this is only speculative as our measures of depressive symptoms are not directly comparable. Also, the majority of adolescents in this study were described by physicians as having mild disease symptoms, which may have limited our ability to detect a more meaningful and consistent relationship between disease severity and adolescent depressive symptoms.

Family affective involvement was a predictor of parent-reported depressive symptoms in adolescents with IBD. It may be that too much affective involvement can be perceived by adolescents with IBD as intrusive or unnecessary, particularly when in a mild or quiescent disease state. On the other hand, adolescents may be more likely to experience depressive symptoms if their family members show very little interest or involvement in them during times of distress. This can be especially difficult for adolescents with IBD who may still require some assistance with disease management and associated challenges. The fact that 32 % of parents reported clinically significant unhealthy affective involvement (i.e., scores above 2.10) suggests that family members may have difficulty displaying a level of affective involvement that is empathic yet not overly protective and may benefit from brief family-based interventions.

Family affective involvement did not moderate the relationship between disease severity and adolescent depressive symptoms. Although data regarding time since diagnosis was not collected, it is possible that many of these adolescents have already been under the regular care of a gastrointestinal physician and have established a routine with regard to management of disease symptoms. This may be less true for adolescents who have been recently diagnosed. Additionally, empathic family involvement may not be salient enough to limit the influence of disease severity on adolescent depressive symptoms. It contributed to less than one percent of the variance in both parent- and adolescent-reported depressive symptoms, suggesting that there are other intervening variables that influence this relationship. It is possible that affective involvement shares a quadratic, rather than linear, relationship with depressive symptoms, such that very high and very low scores are more strongly predictive of depressive symptoms. However, a quadratic relationship between these variables was not observed in exploratory analyses ($R^2 = .02$).

Although problem-solving was a significant predictor of parent-reported adolescent depressive symptoms, there was no interaction between disease severity and problem-solving predicting depressive symptoms. It is possible that parents do not engage their adolescents when confronted with issues requiring decision-making and problem-solving. Adolescents may be more likely to include peers in problem-solving as they become more independent, suggesting that examination of protective factors in the peer domain is also important. Also, because adolescents in this study generally presented with mild disease symptoms, families may have been in a period of "reduced stress" perhaps due to the lower impact of the adolescent's disease on the family compared to times in their disease course

when symptoms are more intense. This may have contributed to parents' report of generally healthy problem-solving on the FAD.

Despite the important contributions of this study, there are limitations that should be noted. First, our findings were limited by the restricted variability in variables examined. The majority of those with CD (i.e., 78 %) and UC (i.e., 96 %) were rated as being in mild or inactive disease states. Mean scores for adolescent depressive symptoms and family functioning were also in the "healthy" range, likely limiting our ability to detect relationships and generalize findings to youth with greater disease symptoms. It is possible that recruitment bias may have accounted for the restricted range of biopsychosocial functioning in our sample (Gold, Issenman, Roberts, & Watt, 2000). That is, adolescents and their families who are more likely to keep scheduled medical appointments, have fewer barriers to appointment attendance (e.g., financial hardship, limited or no access to transportation), and are more likely to agree to participate may also be more likely to be those who are well-adjusted compared to patients who often fail to attend appointments. Future research is needed to clarify relationships among these variables in a more diverse sample of adolescents.

Results of our study were also limited by the measures utilized. For instance, the interpretation of adolescent-reported depressive symptoms is more difficult due to the CDI including more somatic-related items. Additionally, the McMaster Family Assessment Device does not directly measure family functioning in the context of managing chronic illness. Although children above age 12 are able to complete the FAD, we made the decision to exclude an adolescent self-report version from the set of adolescent-completed questionnaires due to the length of the measure. The use of two separate measures to assess disease severity is not ideal despite its common use in the IBD literature. However, given that this study examined data using regression analyses and higher scores on both measures were indicative of greater disease severity, methodological issues were minimized. Another limitation of our study is its cross-sectional design, which hinders conclusions about the direction of the relationships among variables. Finally, our sample is composed of primarily Caucasian adolescents, and results may not be generalizable to other ethnic and racial groups as well as younger children.

There are several strengths of the current study that are worth noting. First, our research focuses on specific aspects of family functioning, which can provide more information regarding modifiable characteristics of the family environment that play a role in youth adaptation to chronic illness. The findings of the current study suggest that family affective involvement and problem-solving can be important resource factors for adolescents with IBD, irrespective of disease state. Also, our study helps to clarify the relationship between disease severity and depressive symptoms in a relatively high-functioning sample of adolescents with IBD. Another study strength is the use of both child and parent report of adolescent depressive symptoms, allowing assessment of potential response biases and inflation of relationships associated with single respondent data (Holmbeck, Li, Schurman, Friedman, & Coakley, 2002). Finally, our large sample of adolescents from three different regions of the U.S. increases the generalizability of our findings. The research findings suggest that poorer family functioning in the domains of affective involvement and problem-

solving may predispose some of these adolescents to greater depressive symptoms. As the incidence of IBD is greater in adolescents, it is important to understand the impact that disease can have on the everyday life, mental health, and social functioning of these patients. Physicians need to be aware of the potential psychological and social issues when treating adolescents with IBD and their families, as these variables may influence adolescent adherence to medication (Hommel, Denson, Crandall, & Mackner, 2008). Physicians working with youth with IBD should screen for depressive symptoms, particularly in patients with greater disease severity or dysfunctional levels of family functioning. It is also important that physicians privately speak to youth regarding depressive symptoms and general psychological functioning in order to limit parental influence. If problems are noted, a referral for a psychological evaluation and treatment may be necessary, as depressive symptoms and dysfunction among family members have both been linked to poor adherence to medication in this population (Hommel, Denson, Crandall, & Mackner, 2008). Given the main effect of family affective involvement and problem-solving on parent-reported depressive symptoms in youth with IBD, it is reasonable to speculate that improvements in family functioning may lead to a subsequent reduction in depressive symptoms. However, examining other aspects of family functioning, including family functioning in the context of managing chronic illness, will be important given the unique circumstances families of youth with chronic medical conditions face that may play a significant role in pediatric adaptation to illness.

Overall, future research should continue to examine the role of the family in the physical and psychosocial functioning of youth with IBD. Researchers should seek to collect data from racially diverse samples of youth with IBD, as well as those who are experiencing heightened disease symptoms at the time of study participation. Clearly prospective, longitudinal research with repeated measurement using validated objective and subjective measures of disease severity and psychosocial functioning are needed before conclusions can be made regarding the role of family functioning in youth with IBD and to establish whether interventions to address family problems have positive results on adolescent emotional functioning.

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Fig. 1.

Examination of family affective involvement as a moderator in the relationship between adolescent disease severity and adolescent self-reported depressive symptoms

Fig. 2.

Examination of family problem-solving as a moderator in the relationship between adolescent disease severity and adolescent self-reported depressive symptoms

Fig. 3.
Examination of family affective involvement as a moderator in the relationship between adolescent disease severity and parent-reported adolescent depressive symptoms

Fig. 4.

Examination of family problem-solving as a moderator in the relationship between adolescent disease severity and parent-reported adolescent depressive symptoms

Table 1

Pearson and partial intercorrelations

	1	2	3	4	5
1. Disease severity	–	.124	.002	.094	.303 [†]
2. Problem-solving	.095	–	.599 [†]	.180	.145
3. Affective involvement	.057	.595 [†]	–	.212 [*]	.191
4. CBCL withdrawn/depressed	.048	.243 [*]	.156	–	.455 [†]
5. CDI total score	.256 [†]	.129	.100	.458 [†]	–

On all five measures, higher scores indicate greater pathology and/or poorer functioning

Partial correlations after controlling for site and income are provided in the upper diagonal

*
p .05

[†]
p .01

Table 2

Moderator analyses for adolescent-reported depressive symptoms on the child depression inventory (CDI)

	B	SE B	R²
Disease severity × problem solving			.120
Step 1: Family income	−.302	.296	
Site	.481	.869	
Step 2: Disease severity	.122 [†]	.045	
Problem solving	1.75	1.73	
Step 3: Disease severity × problem solving	.074	.130	.003
Disease severity × affective involvement			.136
Step 1: Family income	−.385	.287	
Site	.088	.846	
Step 2: Disease severity	.120 [†]	.044	
Affective involvement	2.65	1.47	
Step 3: Disease severity × affective involvement	−.061	.118	.002

* p .05[†] p .01

Table 3

Moderator analyses for parent-reported adolescent depressive symptoms on the Child Behavior Checklist (CBCL)

	<i>B</i>	<i>SE B</i>	<i>R</i> ²
Disease severity × problem solving			.062
Step 1: Disease severity	.021	.067	
Problem solving	5.49 *	2.30	
Step 2: Disease severity × problem solving	.074	.173	.001
Disease severity × affective involvement			.051
Step 1: Disease severity	.032	.067	
Affective involvement	4.13 *	2.10	
Step 2: Disease severity × affective involvement	.103	.169	.001

*
p .05