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EDITORIAL

Social learning contributions to the etiology and treatment of functional abdominal pain and inflammatory bowel disease in children and adults

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Abstract

This paper reviews empirical work on cognitive and social learning contributions to the etiology and treatment of illness behavior associated with functional abdominal pain and inflammatory bowel disease. A particular emphasis is placed on randomized controlled trials, the majority of which are multi-modal in orientation, incorporating elements of cognitive behavioral therapy, social learning, and relaxation. Based on this review, we offer methodological and clinical suggestions: (1) Research investigations should include adequate sample sizes, long-term follow-up assessments, and a credible, active control group. (2) Standard gastrointestinal practice should include, when appropriate, learning opportunities for patients and family members, for example, instruction regarding the encouragement of wellness behavior.

Key words: Functional abdominal pain; Cognitive behavioral therapy; Social learning; Irritable bowel syndrome; Inflammatory bowel disease; Illness behavior

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SOCIAL LEARNING CONCEPTUALIZATION OF ILLNESS BEHAVIOR

How people react to health conditions, both acute and chronic, has sometimes been described as "illness behavior"[1]. Inappropriate illness behavior has several forms. In one extreme, an individual may fail to notice sensations indicative of a serious condition requiring attention or refuse to let even serious symptoms interrupt his or her normal routine. The other extreme may involve misinterpreting normal somatic sensations as symptoms of disease and seeking unnecessary medical treatment for minor complaints. Both ends of the continuum are of concern to health care providers: Denial may lead individuals to postpone diagnostic investigations, or not engage in activities, which would improve well-being. Preoccupation with illness, on the other hand, creates a costly burden on the individual and the health care system[2]. In the case of children, inappropriate parental reactions to children's expressions of discomfort may also contribute to a worsening of the disease experience and possibly even worsening of the disease itself[3]. Our research focuses on increasing appropriate and decreasing inappropriate illness behaviors in response to somatic sensations.

Social learning theory provides a strong conceptual framework for understanding much of the development and maintenance of illness behavior. In brief, behavior and thoughts exist in a particular form because of an individual's learning history. Thus, if we could know someone's complete learning history, including every experience (which of course, given the complexity of human experience, is impossible), an individual's thoughts and behavior would be recognized to be totally rational. While the theory can get quite complex, a core principle is the following: We internalize rules, or beliefs, which guide us to seek rewards and avoid negative consequences. Some patients may not have had the opportunity to learn beliefs which would be most beneficial to them. Other patients may operate under rules, which may have had some rational basis in the past, but have now changed.

From this perspective, illness behaviors such as effective coping strategies or somatic complaints may be learned and maintained in large part because they produce social rewards[4-7]. According to this model, a patient's illness behaviors may result in increased positive consequences for the patient, such as expressions of support, caring, or concern, or decreased negative events such as fewer demands for participation in taxing household activities or chores. This model does not imply that either direction of response indicates the symptoms of illness are not present or "real", nor does it imply a conscious attempt to manipulate such contingencies.

Much of the empirical research examining this model has been conducted with patients suffering from chronic pain, where solicitous responses have been shown to be related to increased pain, activity, and disability[8-12]. While direct causal relationships are difficult to establish in such research, this theoretical model may account in part for the perpetuation of dysfunction and the excess disability seen in many patients with chronic pain, and possibly other chronic conditions, where the level of dysfunction appears to exceed that expected from observed pathophysiology.

CHILDHOOD SOCIAL LEARNING EFFECTS ON ADULT ILLNESS BEHAVIOR

Miller[13] and Whitehead[14,15] suggested that such learning might occur during childhood if parents rewarded somatic complaints and/or modeled illness behavior. Moreover, the learning model predicts a relationship between the specific somatic symptoms, which were rewarded during childhood, and the symptoms reported as an adult. Turkat[16] found evidence for the effect of modeling in diabetic patients, patients with chronic headaches[17] and in a small group of healthy subjects[18].

Several studies have interviewed adults about their experiences as children, and found higher reported rates of reinforcement and modeling for illness behavior during childhood among adults with Irritable Bowel Syndrome (IBS, a condition characterized by abdominal pain or discomfort and altered bowel habits occurring in the absence of underlying disease pathology) compared to asymptomatic control groups[15,19-21].

CHILDHOOD SOCIAL LEARNING EFFECTS ON CHILDHOOD ILLNESS BEHAVIOR

Our research provides evidence to support the effects of social learning on childhood illness behavior in general, and gastrointestinal symptoms in particular. Utilizing a health maintenance organization (HMO) automated database, we found that the children of adult IBS patients made 25% more health care visits per year than the children of control parents. Visits for gastrointestinal complaints occurred more often in the children of IBS parents, but GI-related visits made up only 22% of the excess health care visits[22].

In a subsequent prospective study[23], we also tested whether children whose mothers sought medical care for IBS during the two years prior to enrollment would show more illness behavior than control children. We compared the case children (i.e., children of women with IBS) to the control children (i.e., children of mothers without current symptoms or history of IBS), with respect to the number and types of GI symptoms reported by the child. We interviewed 296 case children from 208 families, and 335 control children. Measures of illness behavior were numbers of symptoms (reported by children) and school absences and medical clinic visits in the previous 3 mo reported by their mothers. We found that case children reported more bothersome gastrointestinal symptoms than control children, more frequent stomachaches, more school absences for GI symptoms, and more physician visits for gastrointestinal symptoms. These differences remained significant after adjusting for potential mediators.

To test the hypothesis that the findings in these studies could be explained by a genetic predisposition to illness, we examined data from a twin registry containing 6060 twin pairs. Regression analysis showed that the presence of IBS in the respondent's parents made a larger contribution to the risk of having IBS than did the presence of IBS in one's twin[24], and a study with a United Kingdom twin database provided confirmation of the influence of social learning over heredity in the development of IBS[25].

Further support for social learning comes from our research into the relationship between specific parental responses and children's behavior. We found that higher levels of parental solicitousness in response to their children's illness behaviors were related to key outcomes, specifically, higher levels of children's symptoms and disability as measured by school days missed[23]. Predictors of maternal solicitousness, in turn, included several maternal characteristics: non-Caucasian race, lower educational status, not being married or partnered, and perceiving the child's condition as more severe[26].

Other researchers have also explored the relationship between children's pain and parental influences[27,28]. Parents of children seen in a pediatric rheumatology clinic reported high levels of pain[29]. Furthermore, children's levels of pain were related to parents' seeking treatment for pain and parents' pain-related interference with activities. More recently, a study of parent-child interactions during exercise tasks in children with fibromyalgia or with juvenile rheumatoid arthritis as well as healthy controls, showed that parental discouragement of coping in response to child pain or task-related complaints was associated with less time on task for all children[30].

The effects of the social environment on illness have been heavily researched in some gastrointestinal disorders in children. Stone and Barbero[31] and Oster[32] noted that children with recurrent abdominal pain where no physiological basis can be found are significantly more likely than children without this condition to have parents who complain of abdominal pain. Hill and Blendis[33] reported that these children also come from large families in which somatic complaints are more likely to have been rewarded by attention. Our data support this[34].

Walker and her colleagues provide further support for the importance of social learning processes in the development of illness behavior. In studies of patients referred to a pediatric gastroenterology clinic for evaluation of abdominal pain, Walker's group found that these families were characterized by a higher frequency of non-specific somatic symptoms[35], gastrointestinal disorders, and other health problems[36] than was observed in the families of well patients. Furthermore, there was a significant positive association between severity of somatic symptoms in recurrent abdominal pain patients and similar symptoms in their parents[37]. This significant association between child and parent symptoms held for both maternal and paternal symptoms, suggesting that modeling by either parent may play a role in the development of

Table 1 Controlled trials of CBT in adults with irritable bowel syndrome

Authors	Design	Sample size	Outcome
Corney *et al*[62] (1991)	CBT *vs* SMT. FU at 4 & 9 mo	42	CBT = SMT
Greene *et al*[64] (1994)	CBT *vs* SMT. FU at 3 mo	20	CBT > SMT
Payne *et al*[65] (1995)	CBT *vs* Self-help support group *vs* SMT. FU at 3 mo	34	CBT > Self-help > SMT
Drossman *et al*[68] (2003)	CBT *vs* education, and desipramine *vs* placebo (parallel studies). No FU	431	CBT > education; desipramine: placebo
Boyce *et al*[61] (2003)	CBT *vs* relaxation training *vs* SMT. FU at 12 mo	105	CBT = Relaxation training = SMT
Blanchard *et al*[66] (2007)	Group CBT *vs* Self-help support group *vs* SMT. FU at 3 mo	210	CBT = Support group > SMT
Kennedy *et al*[63] (2006)	Multicenter primary care intervention by nurses. Open label. CBT + mebeverine *vs* mebeverine alone.	149	CBT + mebeverine > Mebeverine alone at 3 & 6 mo FU

SMT: standard medical care with symptom self-monitoring; FU = follow up; Mebeverine: anticholinergic for inhibition of smooth muscle contractions.

the functional complaints characteristic of children with chronic abdominal pain. Additional support for the effects of modeling came in a subsequent study[38] in which higher levels of paternal somatic symptoms were associated with continuation of the children's somatic symptoms one year following a clinic evaluation for recurrent abdominal pain. Maternal somatic complaints also predicted symptom continuation, but only for boys in families with high levels of negative life events. Finally, in a laboratory study, Walker recently found higher levels of pain complaints in children whose parents were trained to give attention to symptom talk, and the effect of this attention was more pronounced in pain patients than well children[39].

COGNITIVE-BEHAVIORAL INTERVENTIONS FOR CHRONIC SOMATIC PAIN IN ADULTS

Cognitive-behavioral interventions for chronic pain have used a multimodal approach, which addresses symptom-related cognitions, physiological arousal, and activity restructuring. Compas *et al*[40] reviewed the empirical support for these treatments for chronic pain. They concluded that, based on studies meeting criteria for randomized controlled treatment trials, operant-behavioral therapy and cognitive behavioral therapy qualified as efficacious treatments in decreasing disability, physical and psychological dysfunction, and level of pain. When compared with wait-list, no-treatment, or standard medical care control groups, operant behavioral interventions produced improvements in function[41-44], decreases in pain reports[42,43], and decreases in medication use[42]. In controlled studies of patients with chronic pain syndrome and low back pain, CBT resulted in improved activity levels and psychological functioning[42,45-47] and decreased pain reports[42,45,47].

More recent reviews of the literature provide additional evidence that CBT reduces pain, distress, and improves function in patients with chronic pain[48-50], and that intensive multidisciplinary biopsychosocial rehabilitation improves function and reduces pain in patients with chronic pain[51]. In a review of treatments for abdominal pain, Blanchard[52] concluded that the empirical literature also supports the positive effects of CBT in patients with IBS. More time-limited applications of CBT have also proven efficacious. In a randomized controlled trial[53], a four session CBT intervention resulted in significantly improved pain and functioning in patients with chronic temporomandibular joint disorder pain compared to controls, and these gains were maintained at 6 and 12 mo follow-up. Evidence is also accumulating that cognitive-behavioral interventions result in improved outcomes in children and adolescents with chronic pain[54,55], including pain due to specific medical conditions such as sickle cell disease[56].

A common feature of these treatment programs has been to incorporate the concepts of social learning theory into the interventions by training the spouse, significant other, or family member to increase positive responses for coping strategies, activity and well behaviors, and to reduce maladaptive solicitous responses to pain behaviors. Involvement of the partner in behavioral treatments for pain has long been recommended[6] and is frequently incorporated into multidisciplinary pain treatment programs[57,58]. Several controlled studies have documented that partner involvement in cognitive-behavioral treatment resulted in significant improvement in psychological and physical functioning in patients with chronic arthritic pain[59,60].

COGNITIVE-BEHAVIORAL STUDIES ON THE TREATMENT OF FUNCTIONAL GASTROINTESTINAL DISEASES

Table 1 summarizes controlled trials of CBT in adults with IBS. The majority of studies which have compared CBT to standard medical care (SMT)[61-63] or SMT plus symptom self-monitoring while waiting to receive CBT treatment[64-66], have found CBT to be superior, although the trials by Corney *et al*[62] and Boyce *et al*[61] are exceptions. However, caution should be exercised in interpreting this as strong evidence for the efficacy of CBT, since there is reason to believe that randomizing patients to receive SMT who have previously failed to respond to SMT, or assigning them to monitor symptoms while waiting to receive treatment, creates a negative expectation for benefit and tends to exaggerate differences between groups[67].

Three adult studies compared CBT to an active control group: The Drossman study[68] showed CBT to be superior to an educational control when outcomes were evaluated at the end of treatment; however, no follow-up data have been reported. Two studies[65,66], both from the same group, compared CBT to a self-help support group, which has a high degree of credibility for IBS patients. One of these studies showed CBT to be superior to the support group[65], but the total sample size was relatively

Table 2 Pediatric intervention studies for children with recurrent abdominal pain

Authors	Sample	Intervention	Design	# sessions	Comparison sample	Outcome for intervention group relative to comparison
Finney *et al*[71] (1989)	16 children with RAP (age 6-13)	1-5 components, tailored to each child: self-monitoring, limited reinforcement of illness behavior, relaxation training, prescribed dietary fiber, required school attendance	Case control	M = 2.5 visits plus 1-6 phone calls	16 untreated children with RAP matched for gender (age 4-18)	-improvement or resolution of pain symptoms (parent-report) -decreased school absences -decreased health care utilization[1]
Robins *et al*[72] (2005)	69 children with RAP (age 6-16)	CBT family including pain management, relaxation, distraction, parental encouragement of wellness behavior	RCT	5	Standard care (29 of the total 69)	-decreased pain (child- and parent-report) -fewer school absences
Sanders *et al*[69] (1989)	16 children with RAP (age 6-12)	CBT including self-monitoring, social learning, relaxation	RCT wait-list control	8	Wait-list control (8 of the total 16)	-decreased pain (child-report and maternal observation) -more pain-free days (child-report) -fewer pain behaviors (teacher observation) -fewer behavioral problems (parent-report)
Sanders *et al*[73] (1994)	44 children with RAP (age 7-14)	CBT including contingency management and self-management	RCT	6	Standard care (4-6 sessions)	-more pain-free days (child-report) -fewer pain behaviors (parental observation) -less pain-related interference (child- and parent-report)
Scharff & Blanchard (1996)[70] cited in Blanchard (2001)[52]	10 children with RAP (age 8-13)	Random assignment to social learning or stress management/relaxation	crossover	4	---	-decreased pain intensity (child-report) -decreased pain frequency (parent-report)

[1] In this study, the comparison group was used only as a reference for health care utilization, not the other outcome variables.

small (*n* = 10 to 12 per group). A larger study[66] failed to show any difference between CBT and the support group, although this might have been explained by the different modes of delivering CBT (group *vs* individual sessions). Taken together, these 7 studies provide suggestive but not compelling evidence for the efficacy of CBT. Other published studies evaluated multimodal psychological treatments for IBS, but the outcomes for these trials have been mixed.

There has also been limited intervention literature using CBT to treat children with recurrent abdominal pain (Table 2). While overall results have been quite positive, the research is characterized by methodological weaknesses, including low sample size[69-71], inadequate standard medical care control groups which do not control for intervention time and attention[72,73], or both.

The pediatric studies reviewed in Table 2 suggest that a cognitive behavioral approach, which includes a social learning component for treatment of the FGIDs, may be efficacious. Additionally, Sanders *et al*[73] note that research is needed which evaluates the effects of a briefer, more cost-effective program which could easily be incorporated into routine practice. Finally, Sanders *et al*[73] conclude with a recommendation for research which investigates the role of other potential predictors of outcome, such as child and family characteristics.

COGNITIVE-BEHAVIORAL INTERVENTIONS FOR INFLAMMATORY BOWEL DISEASE

The research on cognitive behavioral interventions for IBD has focused primarily on teaching patients coping strategies and stress management skills. Much of the research has also been limited by small sample sizes and inadequate control groups. In an early randomized trial, Milne, Joachim, and Niedhardt[74] assigned 80 IBD patients to a relaxation training or control group. There was no control for therapist attention. Self-reports of stress and disease activity dropped for the treatment group, but not the control group. Garcia-Vega and Fernandez-Rodriguez[75] assigned a total of 45 patients to one of two stress management groups (therapist or self-directed) or usual medical care. Patients in both self-management groups showed reductions in some gastrointestinal symptoms and tiredness, while the conventional medical group did not. Schwarz and Blanchard[76] compared a multi-component CBT intervention (consisting of IBD education, relaxation, biofeedback, and cognitive coping) to a symptom monitoring control group. The number of subjects in each group was small (10 and 11 respectively), and findings were mixed, not clearly showing a superior effect for the CBT group. In an uncontrolled study, Mussell *et al*[77] tested a 12-session cognitive behavioral group therapy intervention on 28 patients which included education about IBD, training in cognitive coping strategies, and progressive muscle relaxation. A significant decrease in worries and concerns related to disease was found for ulcerative colitis, but not Crohn's patients. Depressive coping also decreased in women, but not men. Education, often a component of CBT programs, was not effective by itself in reducing anxiety or improving quality of life in a group-based patient education program for IBD patients[78]. In 2001, Maunder and Esplen[79] stated that there was no consensus about the most appropriate psychosocial interventions for people with IBD. Similarly, in a comprehensive review, Levenstein[80] also concluded that, to date, research on the psychological and behavioral approaches to IBD treatment were disappointing. Small sample sizes, uncontrolled studies, and variation in treatment modalities likely provide a basis for these conclusions and demonstrate the need for further research in this area. This suggests the need for well-designed, randomized, controlled studies to address whether such interventions may be effective in improving function and adjustment in patients where there also is an organic etiology for symptoms.

TREATMENT AND RESEARCH RECOMMENDATIONS

Based on this review, it seems appropriate to recommend integrating a cognitive behavioral approach into gastroenterology practice with adults. This would include both cognitive and relaxation components. The cognitive component would begin with an assessment of the patient's ideas about his/her illness. It would then be appropriate to work with the patient to reduce the negative effects of symptoms, by challenging and changing beliefs and ways of viewing the world which have an adverse effect on these symptoms. This is done by first having the patient understand interactions between thoughts and feelings and recognize the role that illness beliefs and behavior play in the experience of symptoms. Relaxation training should also be incorporated, with the goal of teaching patients to reduce the physical effects of stress and anxiety.

Studies with children have been less extensive, but the preliminary results with children indicate that a reasonable current recommendation for children would be similar. However, with children, of course, parents should be involved in any intervention strategies. Their cognitions about and response to their children's symptoms should be assessed and addressed. They could also be considered to assist with relaxation strategies.

Future research on the effectiveness of CBT with children and adults should meet the following minimum standards: (1) Include an adequate sample size to insure that the study is both generalizable and that there is sufficient power to detect a clinically meaningful effect. The sample size should be chosen prior to study initiation. (2) Assess maintenance of treatment effects by including a follow-up assessment at least 6 mo after the conclusion of treatment. (3) Include a credible control group (not SMT or wait list control) and assess whether subjects find the active and control groups equally credible[81]. (4) Include IBS symptom reduction as one of the outcome measures. The primary outcome may be a global rating of satisfaction with treatment or adequate relief of symptoms, but this should be confirmed by showing that treatment is also associated with a clinically meaningful reduction in gastrointestinal symptoms.

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