



HHS Public Access

Author manuscript

Expert Rev Gastroenterol Hepatol. Author manuscript; available in PMC 2021 November 01.

Published in final edited form as:

Expert Rev Gastroenterol Hepatol. 2020 November ; 14(11): 1061–1067.

doi:10.1080/17474124.2020.1806055.

Implementing psychological therapies for gastrointestinal disorders in pediatrics

Bonney Reed¹, Jessica Buzenski¹, Miranda A.L. van Tilburg^{2,3}

¹Emory University, Children's Pediatric Institute, Atlanta, Georgia

²College of Pharmacy & Health Sciences, Campbell University, Buies Creek NC, School of Medicine, Division of Gastroenterology and Hepatology, University of North Carolina, Chapel Hill NC

³School of Social Work, University of Washington, Seattle, WA

Abstract

Introduction: The brain-gut axis refers to complex and reciprocal interactions that impact symptom presentation and disease course within the GI tract. Psychological therapies included in the treatment of functional gastrointestinal disorders (FGIDs) as well as chronic gut disorders including inflammatory bowel disease (IBD) address environmental and psychological factors impacting patients' symptoms and overall functioning.

Areas covered: Employing a biopsychosocial approach, this review focuses on the evidence for and implementation of psychological therapies across pediatric gastrointestinal disorders.

Expert opinion: By developing a working knowledge of evidence-based psychological therapies applicable to pediatric gastrointestinal disorders, clinicians have the opportunity to comprehensively treat patients' symptoms and distress. Regular communication and coordination between pediatric gastroenterology clinicians and providers of psychological therapies offers the greatest likelihood for successfully implementing psychological therapies into treatment plans.

Keywords

psychological intervention; gastrointestinal; IBD; functional disorders; brain-gut axis

Bonney Reed, PhD, Emory+Children's Pediatric Institute, Atlanta, Georgia

Jessica Buzenski, PhD, Emory+Children's Pediatric Institute, Atlanta, Georgia

Miranda A.L. van Tilburg, PhD, College of Pharmacy & Health Sciences, Campbell University, Buies Creek NC; School of Medicine, Division of Gastroenterology and Hepatology, University of North Carolina, Chapel Hill NC; School of Social Work, University of Washington, Seattle, WA

Declaration of Interests

B Reed receives funding from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) of the National Institutes of Health. M van Tilburg is a consultant for Mahana Therapeutics. The authors have no other relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript apart from those disclosed.

1. Introduction

Across pediatric gastrointestinal disorders, comprehensive treatment plans increasingly include psychological therapies as a core component. Evidence-based psychological therapies target the complex and reciprocal interactions between the enteric nervous system in the gut and the brain, commonly referred to as the brain-gut axis [1–4]. Dysregulation of the brain-gut axis is a core treatment target for psychological therapies aimed at alleviating distress and reducing symptoms associated with gastrointestinal disorders [5]. In the available literature on psychological therapies for pediatric gastrointestinal disorders, a divide often occurs between articles written on FGIDs versus IBD. Focusing within diagnostic categories increases internal validity and specificity but limits generalizability to common processes contributing to symptoms across diagnoses. Increasingly, evidence supports psychological therapies targeting processes common across gastrointestinal disorders, including alterations in pain perception, maladaptive cognitions, physiological hyperarousal, and behavioral avoidance [6]. To the extent that distinct psychological therapies address these common processes in treatment, transdiagnostic symptom improvement is presumably related to addressing common psychological and behavioral processes.

Though the majority of psychological research focuses on cognitive, perceptual, and behavioral factors associated with GI symptoms, research increasingly points to common physiological processes as well. For example, immunological function changes, long accepted as a basic disease process within IBD, are increasingly implicated in functional gastrointestinal and motility disorders [7]. With regard to depression, evidence increasingly suggests that chronic low grade inflammation may drive depressive symptoms through activation of inflammatory neuropsychiatric pathways [8]. Evidence that GI inflammation is present in youth with functional abdominal pain and IBS, though to a lesser degree compared to youth with IBD, suggests that inflammation may be one common driver of increased depressive symptoms across diagnoses [9,10].

Patients and providers alike commonly ask whether psychosocial factors are caused by or the cause of gastrointestinal symptoms. We posit that such reductionistic thinking is neither accurate nor helpful for addressing patient distress. Rather than focusing on the order of symptom onset, psychological therapies with strongest evidence base address current functioning and how interactions between psychosocial factors and gastrointestinal symptoms work to maintain symptoms. For example, presence of pain despite clinically normal bowel function is often thought to be driven by visceral hypersensitivity [11]. Visceral sensitivity has both physiological aspects (increased input from both peripheral and central nervous system) as well as emotional and behavioral aspects (hypervigilance/attention to symptoms and avoidance of situations or places that increase symptoms). Both aspects should be addressed in treatment of pain.

As the field moves towards biopsychosocial treatment for gastrointestinal symptoms, a transdiagnostic approach becomes increasingly appropriate. Prior discussions of psychological treatments in GI disorders have focused on implementation for children with either functional gastrointestinal disorders (FGIDs) [1,4] or inflammatory bowel disease

(IBD) [3,12,13]. The aim of the current review is to provide updated information on the evidence base for psychological treatment focusing on common cognitive, behavioral, emotional, and biological aspects of all pediatric gastrointestinal disorders and provide strategies for their implementation.

2. Psychological therapies for pediatric gastrointestinal disorders

Psychological care for pediatric GI disorders begins with the physician visit. A basic tenet of a brain-gut conceptualization of gastrointestinal disorders is acceptance that symptoms are the result of interactions between psychosocial, gastrointestinal, and biomedical processes. The majority of patients will respond well to explanation of the brain-gut axis and education on how psychosocial functioning and GI symptoms are interrelated. For those patients whose lives continue to be severely impacted by symptoms, integrated psychological treatment as part of a comprehensive treatment plan is ideal. Many families do not respond well to being “sent” to a psychologist as it suggests the symptoms are “all in one’s head,” devaluing the patient’s physical experience. The physician should take time to introduce why psychological care is recommended (learning to cope with the symptoms rather than focusing on curing the cause of the symptoms) and emphasize that their GI physician will remain involved in their care as psychological therapies are implemented, lest they feel abandoned or pushed aside. The psychological therapies reviewed below have been tested in RCTs for the treatment of pediatric gastrointestinal disorders, and will be the focus of our discussion. In addition to reviewing these therapies and their basic tenets, we will discuss novel implementation strategies aimed at increasing access to care.

2.1 Cognitive Behavioral Therapy (CBT).

CBT is a present-focused, short-term psychotherapy based on the premise that thoughts, emotions, and behaviors are interrelated and that by impacting one or more of these domains, an individual can enact change on all domains. Treatment consists of multiple skills applied flexibly based on an individual’s presenting difficulties. For individuals with GI disorders, CBT techniques aim to change maladaptive patterns of emotion, thought, or behavior that contribute to symptom maintenance, maladaptive coping with symptoms, and behavioral avoidance of feared situations. Specific skills taught will vary depending on the patient’s needs, but common therapy techniques used in CBT include increasing awareness of the relationship between our thoughts, emotions, and symptoms; psychoeducation on the brain-gut axis; identification and challenging of irrational beliefs; addressing anxiety; problem solving ways to reduce behavioral avoidance; and experimenting with adaptive coping strategies for managing GI symptoms and other life stressors [14]. As an example, consider an adolescent who fears using the bathroom at school due to beliefs that he will be ridiculed for leaving the classroom or feel embarrassed by physical symptoms that could be observed while in the bathroom (e.g., stomach growls, producing gas, noise associated with stooling). Beliefs that he will be ridiculed represent likely catastrophic thoughts that lead him to avoid school. Further, these catastrophic thoughts increase autonomic arousal, therefore increasing the likelihood that he may experience GI symptoms such as pain or diarrhea. Through treatment with CBT, the patient would be taught to identify and challenge catastrophic thinking patterns contributing to behavioral avoidance. He might be asked to

engage in behavioral “experiments” in which he tests whether peers ridicule him for leaving the classroom to evaluate the validity of his catastrophic thoughts. He also would learn physical relaxation strategies to target autonomic arousal. In pediatric patients, caregivers often provide behavioral support and thus CBT may include parent coaching on strategies for increasing adaptive functioning as well as decreasing parenting behaviors that may inadvertently solicit or reinforce pain [15].

In youth with FGIDs, CBT has demonstrated benefits in reducing pain in patients with functional abdominal pain disorders [16–18] and has been shown to improve parental management of their child’s symptoms [15]. Reductions in parents’ perceived threat of their child’s pain, as well as reductions in children’s own catastrophic thinking about pain, have received support as mechanisms of action leading to reduced symptoms following cognitive behavioral intervention [19]. In addition, adolescents with IBS receiving an exposure-based CBT intervention, which taught them to face their disease-related fears and reduce avoidance behaviors, reported significant reductions in symptoms and improvements in quality of life compared to controls [20]. In youth with IBD, CBT has been shown to be an effective therapy for reducing depressive symptoms [3,13,21]. Further, compared to IBD patients randomized to receive supportive nondirective therapy, those receiving CBT demonstrated greater reductions in disease activity [22]. A group-based CBT coping skills intervention for adolescent girls with IBD demonstrated reductions in somatic symptoms and improvements in coping skills. Additionally, parents reported reductions in irrational thoughts and improved behavioral responses related to their daughter’s physical symptoms [12].

2.2 Gut-directed hypnotherapy.

Gut-directed hypnotherapy is a form of medical hypnosis in which post-hypnotic suggestions are specifically focused on improving gut discomfort [23]. Treatment typically includes 6–12 weekly sessions with a therapist in combination with daily in-home practice using audio recordings. Goals of hypnosis for gastrointestinal disorders include relaxing the automatic reaction to symptoms and increasing perceived control of symptoms. Gut-directed hypnosis may offer suggestions that are incompatible with aversive sensations or symptoms by describing a warm and comforting feeling throughout the abdomen. In an evaluation of long-term benefits of hypnotherapy for adults with IBS, 71% of 204 patients were identified as “initial responders” to treatment. Of these, 81% reported maintained improvements up to 5 years after treatment [24]. In pediatric samples, treatment with gut-directed hypnotherapy has been shown to reduce pain frequency and intensity in patients with functional abdominal pain and IBS [25,26]. As an encouraging alternative to increase access and reduce cost, audio-recorded guided imagery for use within the home has been shown to be superior to standard medical care for the treatment of pediatric abdominal pain [27].

Research on gut-directed hypnotherapy as an adjunct therapy for pediatric patients with IBD is limited by uncontrolled research designs and small samples [28], resulting in difficult to interpret findings. In a prospective trial of adults with quiescent ulcerative colitis randomized to seven sessions of gut-directed hypnotherapy or attention control, those in the hypnosis condition on average experienced 78 days longer to clinical relapse compared to control

[29]. A review published in 2014 highlights the need for larger controlled trials on the emotional and physical effects of gut-directed hypnotherapy for patients with IBD before evidence-based treatment recommendations can be disseminated [30].

2.3 Biofeedback-Assisted Relaxation Training.

In biofeedback, patients learn to control bodily functions that are usually thought to be outside of our consciousness, such as heart rate, skin temperature, and muscle tension. Biofeedback consists of real-time training in which patients are given visual and/or auditory “feedback” on recorded physiological functioning to develop voluntary control over internal processes [31]. Biofeedback is commonly incorporated into a psychological therapy treatment plan and taught as one of several strategies for increasing mind-body awareness, relaxation, and self-efficacy over symptoms. In children with functional dyspepsia associated with duodenal eosinophilia, biofeedback-assisted relaxation training plus medication demonstrated better outcomes on pain intensity, duration of pain episodes, and clinical improvement than children receiving medication alone [32]. In a study of children and adolescents with recurrent abdominal pain, biofeedback with fiber therapy was compared to fiber therapy alone as well as the addition of CBT with and without parental support. Results found that all active treatment groups found greater improvement than the fiber-only treatment group, but no greater benefit was found for the addition of CBT or parental support, demonstrating that the simpler treatment of biofeedback with fiber therapy was effective with the least cost and effort [33]. Heart rate variability biofeedback has shown promise for treatment of pediatric IBS and recurrent abdominal pain, though controlled trials are needed [34]. Biofeedback adapted for rumination syndrome by training adult patients to control abdomino-thoracic muscle activity has also demonstrated effectiveness in reducing rumination episodes [35]. A special case of biofeedback training is pelvic floor biofeedback therapy, which utilizes a manometric or electromyographic (EMG) probe placed in the rectum to treat dyssynergic defecation. These therapies have demonstrated greatest evidence in adult samples, though additional research is needed [14].

2.4 E-treatment/ Telemedicine.

Access to practitioners trained in Psychogastroenterology is a primary barrier to referral and treatment. However, increasing development and evaluation of internet-delivered psychotherapies offers the potential to improve access. In a 2018 meta-analysis of online psychological interventions for adult patients with IBS and IBD, Hanlon and colleagues concluded that online CBT significantly improved gastrointestinal symptom-specific anxiety and lessened functional disability related to symptoms in patients with IBS [36]. Though only two studies of patients with IBD were included, no significant treatment effects were identified. Few studies of e-treatments are available for children. In pediatric patients with recurrent abdominal pain, a CBT internet-based treatment with weekly therapist contact by telephone or email demonstrated clinically significant pain reductions in 71% of participants at 1-month follow-up compared to 19% of participants in the control group [37]. Ljottsen and colleagues tested an internet delivered exposure CBT in children and adolescents [20,38]. Exposure CBT aims to reduce behavioral avoidance of gut sensations through practice of exposure to previously avoided situations, such as eating avoided foods or being

in a situation without immediate access to a toilet. The protocol demonstrated improvements in symptoms of IBS and quality of life [20,38].

3. Emerging psychological therapies for treatment of gastrointestinal disorders

3.1 Mindfulness.

Mindfulness-based techniques have demonstrated benefits to stress reduction and improvement of overall well-being in various adult patient populations (Ballou 2017; Shah, 2019). Mindfulness-based therapy (MBT) uses meditation and relaxation to increase awareness and connection to the current moment or activity, without making any judgments or attempts to change the situation. MBT has been shown to be efficacious in adult patients with IBS [39,40] but no studies in pediatric populations exist. Though more research is needed in GI specific populations, these skills may be used to reduce reactivity to GI symptoms, promoting a calm coping response to what is typically physically and emotionally distressing [41]. When assessed in GI specific populations, well-being attributes that are promoted in mindfulness training were shown to be negatively associated with GI symptoms [42].

3.2 Acceptance and Commitment Therapy.

Acceptance and Commitment therapy (ACT) is described as a treatment that guides patients to adopt positive values and accept adverse situations as part of the overall experience of life. An eight-week ACT program trial with adult IBD patients demonstrated clinically significant reduction in levels of stress and depression in the treatment group compared to IBD treatment as usual [43]. Patients in the ACT groups also reported greater improvement in quality of life. Data in pediatric GI patients is needed, although early evidence from children with chronic pain suggest positive impacts on reports of pain and disability [44].

4. Getting Started and Making it Work

Physicians can locate appropriate psychological services for patients by recruiting and hiring a psychologist to work within the clinic setting or by identifying resources in the community. This not only reduces barriers to initiating treatment, but may also reduce patient resistance or feelings of abandonment by their physician. Useful resources for finding therapists with experience treating GI disorders in the United States are listed below. In addition, many university and/or hospital-based clinics have a psychologist on staff who can provide treatment or is aware of local psychologists in the community with specific health or gastrointestinal knowledge and experience. Simply referring families to seek mental health care on their own is likely not adequate, as therapists without training and experience in treating GI disorders will likely focus on generic stress and anxiety, rather than GI-specific symptoms. Identifying and working closely with suitable providers is important and therefore finding these providers should not be left up to the patient to arrange [14].

Once a relationship with a psychologist is established, communication and collaboration are primary keys to success [45]. To help make this integration a reality, providers working with

a psychologist partner should seek to reach a shared understanding of assessment and treatment for gastrointestinal disorders, develop a workable practice model, address potential billing challenges, and develop scripts that can be used with patients and families to communicate the value of psychological therapies as an important component of care. Interested readers are highly encouraged to read the Best Practice Update published in 2018 by Keefer, Palsson, and Pandolfino [46] on Incorporating Psychogastroenterology Into Management of Digestive Diseases, which offers key talking points for introducing Psychogastroenterology involvement in lay language.

5. Conclusions

Increasing evidence supports the incorporation of psychological therapies into treatment plans for pediatric gastrointestinal disorders. This paper reviewed established therapies to treat gastrointestinal disorders including cognitive behavioral therapy, gut-directed hypnotherapy, and biofeedback-assisted relaxation training, as well as telemedicine and emerging therapies. While integrating psychological therapies into traditionally medically-oriented care can be challenging, the nature of gastrointestinal disorders demands a more comprehensive and coordinated approach that can be tailored to the unique practice setting. In the era of pay-for-performance and capitated care models, integrated care has the potential to improve outcomes and save costs if we can find ways to bring effective psychological treatment into the medical home.

6. Expert Opinion

Though the majority of research on psychological therapies for gastrointestinal disorders has been conducted among youth with FGIDs, there is growing evidence for the application of psychological therapies to address difficulties experienced by youth with IBD. The preponderance of evidence in pediatric FGIDs compared to IBD is not surprising given common occurrence of FGIDs in youth [47,48] and historical perspectives that have linked functional disorders to psychological factors. However, in recent years, more clinicians have realized that youth with IBD are at risk for co-morbid anxiety and depression [49] as well as functional abdominal pain disorders [50].

Psychological treatments in pediatric gastrointestinal disorders, remain unavailable for many patients, except for the few that live close to large academic centers. There are several barriers for treatment. One of the main barriers is the stigma of mental health treatment, especially for children with FGIDs for whom a biological basis of their symptoms is ruled out and referral to a psychologist seems to suggest the symptoms are not real and all in the child's head. Addressing the stigma of mental health will be very important. Even if families are open to treatment, it is often not available. Insurance reimbursement rates are often too low for medical offices to hire well-trained psychologists. If a medical practice wants to hire a psychologist, it is often difficult to find therapists with training in this area. Sending a patient to a general psychologist in the community often leads to focusing on perceived 'anxiety' or 'depression', rather than gut specific treatment, which further increases the stigmatization for families who feel labeled as 'crazy'.

Although there is further need to strengthen the evidence base for psychological therapies in the treatment of gastrointestinal disorders, to increase widespread adoption of psychological therapies for pediatric gastrointestinal disorders, we need to address barriers to treatment. For example, it is inadequate to demonstrate improvements in emotional functioning alone; to truly be supported as a treatment for gastrointestinal disorders, improvements in disease symptoms and daily functioning are necessary. As a next step, specific mechanisms of treatment should be identified (e.g., reductions in maladaptive cognitions [19]) which will allow for the development of targeted interventions based on an individual child's presenting problems. Research on potential physiological mechanisms of treatment are especially needed in pediatric populations. To this end, evaluations of psychological therapies informed by the brain-gut axis should measure changes in inflammatory markers, arousal of the autonomic nervous system, and disease severity. Support for physiological as well as psychological mechanisms of treatment will serve to strengthen theoretical rationale for brain-gut treatments and likely increase acceptance by providers and patients alike. Further, we anticipate that increasing evidence of positive treatment effects will lead to more cost-effective treatments as payors expand coverage for evidence-based therapies.

In the age of COVID-19, additional research to support internet delivered therapies is especially important. As with other disciplines, psychologists treating gastrointestinal disorders were forced to quickly transition to telemedicine, oftentimes with little to no protocols for internet-delivery of treatment. The field will advance by demonstrating the most effective ways to deliver treatment components via telemedicine and how to most effectively disseminate therapies to children and families accessing treatment remotely. We imagine that future telemedicine treatment delivery will leverage technology to integrate sensor-based data and biofeedback equipment. Again, continued reimbursement of telemedicine to deliver psychological therapies to patients with gastrointestinal disorders will be critical.

Finally, we anticipate that recent interest in positive psychological interventions to promote resilience in adults with gastrointestinal disorders will be applicable to pediatrics as well [51]. In fact, parents and pediatric providers will likely be especially eager to integrate strength-based approaches that capitalize on pediatric patients' adaptive coping, positive emotions, and environmental supports. Focusing on a child's strengths rather than weakness may also reduce the stigma associated with mental health treatment. After all, the child is considered to be able to master their symptoms, rather than a deficiency in the child causing the symptoms. By reinforcing positive psychological principles and adaptive coping early, it may be possible to avoid the establishment of maladaptive coping and further distress as patients age into adult care. Relatedly, programs informed by treatment components from psychological therapies are increasingly being designed and evaluated to promote transition readiness for pediatric patients transferring to adult care [52,53]. As pediatric patients with gastrointestinal disorders transfer to adult care, principles from cognitive behavioral therapy such as problem solving to overcome barriers will likely be especially relevant to prepare patients for expected increases in self-management. Research will be needed to evaluate positive psychological interventions designed for pediatric patients and their families, but the future is bright for interdisciplinary treatment of gastrointestinal disorders.

7. Therapist referral sources for adults and children:

Psychogastroenterology

- Rome Foundation GastroPsych offers referral sources and education resources (www.romegipsych.org)

Cognitive Behavioral Therapy:

- Association for Behavioral and Cognitive Therapies (www.abct.org)
- European Association for Behavioural and Cognitive Therapies (<https://eabct.eu>)
- Academy of Cognitive Therapy (www.academyofct.org)
- American Board of Professional Psychology (www.abpp.org)

Gut-directed Hypnosis

- American Society of Clinical Hypnosis (www.asch.net)
- IBShypnosis.com, A Public Information Website (<http://ibshypnosis.com/>)
- National Pediatric Hypnosis Training Institute (www.nphti.org)

Biofeedback

- Biofeedback Certification International Alliance (www.bcia.org)

Pain Management

- The Comfort Ability (www.thecomfortability.com)

7.1 Referral lists for children and adolescents:

Two referral lists are available with therapists delivering psychological treatments to children/adolescents with GI disorders. These lists are available through membership in:

- NASPGHAN (<https://members.NASPGHAN.org>)
- Society of Pediatric Psychology Division 54 Pediatric Gastroenterology Interest Group (<http://www.apadivisions.org/division-54/sigs/gastroenterology/index.aspx>)

7.2 Patient Education Resources

- Stress Effects on the Body: Gastrointestinal System from the American Psychological Association (<https://www.apa.org/helpcenter/stress/effects-gastrointestinal>)
- Mental and Emotional Health for patients with IBD (<https://www.crohnscolitisfoundation.org/mental-health>)
- ImproveCareNow Network Toolkits and Guides including “Finding a Mental Health Provider for Your Child and Teen with IBD” (https://www.improvecarenow.org/toolkits_and_guides)

- Crisis Hotlines and Resources (<https://www.apa.org/helpcenter/crisis>)

Funding

This paper was funded by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) of the National Institutes of Health under Award Number K23DK122115 awarded to B Reed.

Source of Funding: This work was supported by the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) of the National Institutes of Health under Award Number 1K23DK122115-01A1 awarded to the first author.

References

1. Santucci NR, Saps M, van Tilburg MA. New advances in the treatment of paediatric functional abdominal pain disorders. *The Lancet Gastroenterology & Hepatology*. 2019.
2. Reed-Knight B, Mackner LM, Crandall WV. Psychological aspects of inflammatory bowel disease in children and adolescents In: Mamula P, Grossman AB, Baldassano RN, et al., editors. *Pediatric Inflammatory Bowel Disease*. 3rd ed. Cham, Switzerland: Springer; 2017.
3. Levy RL, van Tilburg MA, Langer SL, et al. Effects of a Cognitive Behavioral Therapy Intervention Trial to Improve Disease Outcomes in Children with Inflammatory Bowel Disease. *Inflammatory bowel diseases*. 2016 9;22(9):2134–48. [PubMed: 27542131]
4. Jerson B, Lamparyk K, van Tilburg MAL. A review of psychological treatments for vomiting associated with paediatric functional gastrointestinal disorders. *Curr Opin Pediatr* 2019 7 17.
5. van Tilburg MAL, Carter CA. Integration of Biomedical and Psychosocial Treatments in Pediatrics Functional Gastrointestinal Disorders. *Gastroenterol Clin North Am* 2018 12;47(4):863–75. [PubMed: 30337037]
6. Newton E, Schosheim A, Patel S, et al. The role of psychological factors in pediatric functional abdominal pain disorders. *Neurogastroenterol Motil* 2019 6;31(6):e13538. [PubMed: 30729663]
7. Kindt S, Van Oudenhove L, Broekaert D, et al. Immune dysfunction in patients with functional gastrointestinal disorders. *Neurogastroenterol Motil* 2009 4;21(4):389–98. [PubMed: 19126184]
8. Miller AH, Raison CL. The role of inflammation in depression: from evolutionary imperative to modern treatment target. *Nat Rev Immunol* 2015 12 29;16(1):22–34.
9. Shulman RJ, Eakin MN, Czyzewski DI, et al. Increased gastrointestinal permeability and gut inflammation in children with functional abdominal pain and irritable bowel syndrome. *The Journal of pediatrics*. 2008;153(5):646–50. [PubMed: 18538790]
10. Keely S, Walker MM, Marks E, et al. Immune dysregulation in the functional gastrointestinal disorders. *European journal of clinical investigation*. 2015;45(12):1350–9. [PubMed: 26444549]
11. Faure C, Grunder FR. *Visceral sensitivity*. *Pediatric Neurogastroenterology*: Springer; 2017 p. 39–52.
12. McCormick M, Reed-Knight B, Lewis J, et al. Coping skills for reducing pain and somatic symptoms in adolescents with IBD. *Inflammatory bowel diseases*. 2010;16:2148–57. [PubMed: 20848505]
13. Thompson RD, Craig A, Crawford EA, et al. Longitudinal results of cognitive behavioral treatment for youths with inflammatory bowel disease and depressive symptoms. *Journal of Clinical Psychology in Medical Settings*. 2012 2012/9/01;19(3):329–37. [PubMed: 22699797]
14. Palsson OS, Whitehead WE. Psychological treatments in functional gastrointestinal disorders: a primer for the gastroenterologist. *Clin Gastroenterol Hepatol* 2013 3;11(3):208–16; quiz e22–3. [PubMed: 23103907]
15. Levy RL, Langer SL, Walker LS, et al. Cognitive-behavioral therapy for children with functional abdominal pain and their parents decreases pain and other symptoms. *Am J Gastroenterol*. 2010 4;105(4):946–56. [PubMed: 20216531]
16. Sanders MR, Shepherd RW, Cleghorn G, et al. The treatment of recurrent abdominal pain in children: a controlled comparison of cognitive-behavioral family intervention and standard pediatric care. *Journal of consulting and clinical psychology*. 1994;62(2):306. [PubMed: 8201068]

17. Duarte MA, Penna FJ, Andrade EMG, et al. Treatment of Nonorganic Recurrent Abdominal Pain: Cognitive-Behavioral Family Intervention. *Journal of Pediatric Gastroenterology and Nutrition*. 2006;43(1):59–64. [PubMed: 16819378]
18. Robins PM, Smith SM, Glutting JJ, et al. A randomized controlled trial of a cognitive-behavioral family intervention for pediatric recurrent abdominal pain. *Journal of pediatric psychology*. 2005;30(5):397–408. [PubMed: 15944167]
19. Levy RL, Langer SL, Romano JM, et al. Cognitive mediators of treatment outcomes in pediatric functional abdominal pain. *Clin J Pain*. 2014 12;30(12):1033–43. [PubMed: 24469611]
20. Bonnert M, Olen O, Lalouni M, et al. Internet-Delivered Cognitive Behavior Therapy for Adolescents With Irritable Bowel Syndrome: A Randomized Controlled Trial. *Am J Gastroenterol* 2017 1;112(1):152–62. [PubMed: 27845338]
21. Szigethy E, Kenney E, Carpenter J, et al. Cognitive-behavioral therapy for adolescents with inflammatory bowel disease and subsyndromal depression. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2007;46(10):1290–8. [PubMed: 17885570]
22. Szigethy E, Bujoreanu S, Youk A, et al. Randomized efficacy trial of two psychotherapies for depression in youth with inflammatory bowel disease. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2014;53(7):726–35. [PubMed: 24954822]
23. Rutten JM, Reitsma JB, Vlieger AM, et al. Gut-directed hypnotherapy for functional abdominal pain or irritable bowel syndrome in children: a systematic review. *Arch Dis Child*. 2013 4;98(4):252–7. [PubMed: 23220208]
24. Gonsalkorale W, Miller V, Afzal A, et al. Long term benefits of hypnotherapy for irritable bowel syndrome. *Gut* 2003;52(11):1623–9. [PubMed: 14570733]
25. Vlieger AM, Menko–Frankenhuis C, Wolfkamp SC, et al. Hypnotherapy for children with functional abdominal pain or irritable bowel syndrome: a randomized controlled trial. *Gastroenterology*. 2007;133(5):1430–6. [PubMed: 17919634]
26. Rutten JM, Vlieger AM, Frankenhuis C, et al. Gut-directed hypnotherapy in children with irritable bowel syndrome or functional abdominal pain (syndrome): a randomized controlled trial on self exercises at home using CD versus individual therapy by qualified therapists. *BMC pediatrics*. 2014;14(1):140. [PubMed: 24894077]
27. van Tilburg MA, Chitkara DK, Palsson OS, et al. Audio-recorded guided imagery treatment reduces functional abdominal pain in children: a pilot study. *Pediatrics*. 2009 11;124(5):e890–7. [PubMed: 19822590]
28. Shaoul R, Sukhotnik I, Mogilner J. Hypnosis as an adjuvant treatment for children with inflammatory bowel disease. *Journal of Developmental & Behavioral Pediatrics*. 2009;30(3):268. [PubMed: 19525722]
29. Keefer L, Taft TH, Kiebles JL, et al. Gut-directed hypnotherapy significantly augments clinical remission in quiescent ulcerative colitis. *Alimentary pharmacology & therapeutics*. 2013;38(7):761–71. [PubMed: 23957526]
30. Moser G The role of hypnotherapy for the treatment of inflammatory bowel diseases. *Expert review of gastroenterology & hepatology*. 2014;8(6):601–6. [PubMed: 24819701]
31. Barlow DH. *Principles and practice of stress management*. Guilford Press; 2007.
32. Schurman JV, Wu YP, Grayson P, et al. A pilot study to assess the efficacy of biofeedback-assisted relaxation training as an adjunct treatment for pediatric functional dyspepsia associated with duodenal eosinophilia. *Journal of pediatric psychology*. 2010 9;35(8):837–47. [PubMed: 20185416]
33. Humphreys PA, Gevirtz RN. Treatment of recurrent abdominal pain: components analysis of four treatment protocols. *Journal of pediatric gastroenterology and nutrition*. 2000;31(1):47–51. [PubMed: 10896070]
34. Stern MJ, Guiles RA, Gevirtz R. HRV biofeedback for pediatric irritable bowel syndrome and functional abdominal pain: a clinical replication series. *Appl Psychophysiol Biofeedback*. 2014 12;39(3–4):287–91. [PubMed: 25274501]
35. Barba E, Accarino A, Soldevilla A, et al. Randomized, Placebo-Controlled Trial of Biofeedback for the Treatment of Rumination. *Am J Gastroenterol* 2016 7;111(7):1007–13. [PubMed: 27185077]

36. Hanlon I, Hewitt C, Bell K, et al. Systematic review with meta-analysis: online psychological interventions for mental and physical health outcomes in gastrointestinal disorders including irritable bowel syndrome and inflammatory bowel disease. *Alimentary Pharmacology and Therapeutics*. 2018;48(3):244–59. [PubMed: 29901820]
37. Hicks CL, Von Baeyer CL, McGrath PJ. Online psychological treatment for pediatric recurrent pain: a randomized evaluation. *Journal of pediatric psychology*. 2006;31(7):724–36. [PubMed: 16093516]
38. Bonnert M, Olén O, Lalouni M, et al. Internet-delivered exposure-based cognitive-behavioral therapy for adolescents with functional abdominal pain or functional dyspepsia: a feasibility study. *Behavior therapy*. 2019;50(1):177–88. [PubMed: 30661558]
39. Gaylord SA, Whitehead WE, Coble RS, et al. Mindfulness for irritable bowel syndrome: protocol development for a controlled clinical trial. *BMC Complement Altern Med* 2009 7 28;9:24. [PubMed: 19638214]
40. Naliboff BD, Smith SR, Serpa JG, et al. Mindfulness-based stress reduction improves irritable bowel syndrome (IBS) symptoms via specific aspects of mindfulness. *Neurogastroenterology & Motility*. 2020.
41. Ballou S, Keefer L. Psychological Interventions for Irritable Bowel Syndrome and Inflammatory Bowel Diseases. *Clinical and translational gastroenterology*. 2017 1 19;8(1):e214. [PubMed: 28102860]
42. Farhadi A, Banton D, Keefer L. Connecting Our Gut Feeling and How Our Gut Feels: The Role of Well-being Attributes in Irritable Bowel Syndrome. *J Neurogastroenterol Motil* 2018 4 30;24(2):289–98. [PubMed: 29605984]
43. Wynne B, McHugh L, Gao W, et al. Acceptance and Commitment Therapy Reduces Psychological Stress in Patients With Inflammatory Bowel Diseases. *Gastroenterology*. 2018 11 16.
44. Wicksell RK, Melin L, Lekander M, et al. Evaluating the effectiveness of exposure and acceptance strategies to improve functioning and quality of life in longstanding pediatric pain—a randomized controlled trial. *Pain*. 2009 2;141(3):248–57. [PubMed: 19108951]
45. Riehl ME, Kinsinger S, Kahrilas P, et al. Role of a health psychologist in the management of functional esophageal complaints. *Diseases of the Esophagus*. 2015;28(5):428–36. [PubMed: 26174953]
46. Keefer L, Palsson OS, Pandolfino JE. Best Practice Update: Incorporating Psychogastroenterology Into Management of Digestive Disorders. *Gastroenterology*. 2018 4;154(5):1249–57. [PubMed: 29410117]
47. American Academy of Pediatrics Subcommittee on Chronic Abdominal P, North American Society for Pediatric Gastroenterology H, Nutrition. Chronic abdominal pain in children. *Pediatrics*. 2005 3;115(3):e370–81. [PubMed: 15741363]
48. Robin SG, Keller C, Zwiener R, et al. Prevalence of Pediatric Functional Gastrointestinal Disorders Utilizing the Rome IV Criteria. *J Pediatr* 2018 4;195:134–9. [PubMed: 29398057]
49. Stapersma L, van den Brink G, Szigethy EM, et al. Systematic review with meta-analysis: anxiety and depression in children and adolescents with inflammatory bowel disease. *Alimentary pharmacology & therapeutics*. 2018 9;48(5):496–506. [PubMed: 29984495]
50. Watson KLJ, Kim SC, Boyle BM, et al. Prevalence and Impact of Functional Abdominal Pain Disorders in Children With Inflammatory Bowel Diseases (IBD-FAPD). *Journal of Pediatric Gastroenterology and Nutrition*. 2017;65(2):212–7. [PubMed: 27906801]
51. Keefer L Behavioural medicine and gastrointestinal disorders: the promise of positive psychology. *Nat Rev Gastroenterol Hepatol* 2018 6;15(6):378–86. [PubMed: 29651112]
52. Gray WN, Reed-Knight B, Morgan PJ, et al. Multi-Site Comparison of Patient, Parent, and Pediatric Provider Perspectives on Transition to Adult Care in IBD. *Journal of Pediatric Nursing*. 2018;39:49–54. [PubMed: 29525216]
53. Eros A, Soos A, Hegyi P, et al. Spotlight on Transition in Patients With Inflammatory Bowel Disease: A Systematic Review. *Inflammatory bowel diseases*. 2019 8 24.

Article Highlights

- Across pediatric gastrointestinal disorders, comprehensive treatment plans increasingly include psychological therapies as a core component.
- Evidence supports psychological therapies targeting processes common across gastrointestinal disorders, including alterations in pain perception, maladaptive cognitions, physiological hyperarousal, and behavioral avoidance.
- Psychological therapies with strongest evidence base address current functioning and how interactions between psychosocial factors and gastrointestinal symptoms work to maintain symptoms.
- A basic tenet of a brain-gut conceptualization of gastrointestinal disorders is acceptance that symptoms are the result of interactions between psychosocial, gastrointestinal, and biomedical processes.
- Established therapies to treat pediatric gastrointestinal disorders include cognitive behavioral therapy, gut-directed hypnotherapy, and biofeedback-assisted relaxation training.
- To strengthen the evidence base for psychological therapies in the treatment of gastrointestinal disorders, there is a need for controlled trials evaluating effects on emotional and behavioral functioning as well as disease parameters and overall daily functioning.