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Gastrointestinal Group Education for Children and Adolescents with Functional Abdominal Pain Disorders—A Feasibility Study of a Brief Intervention

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Abstract: Functional abdominal pain disorders are common and disabling in children, but treatment options are limited. In a pilot study, we aimed to investigate if a brief group education program for pediatric patients with functional abdominal pain disorders and their parents is feasible and acceptable. Group education in adult irritable bowel syndrome has shown large treatment effects, but it has not been evaluated in children. The gastrointestinal (GI) group education, delivered in the clinic to 23 child–parent dyads, consisted of lectures by a pediatric gastroenterologist, a psychologist, and a dietician. Validated digital questionnaires were filled in by children and parents before and after the intervention. Most participants in the GI group education attended all sessions, and credibility in treatment was deemed high. Children's self-reported knowledge of functional abdominal pain disorders increased, and improvements in gastrointestinal symptoms were reported at the end of this study. Our findings indicate that group education for children and adolescents with functional abdominal pain disorders, and their parents, is acceptable and feasible and may improve symptoms. A brief group education program may be of benefit in the management of pediatric functional abdominal pain disorders in several cases and when the family needs more knowledge than can be provided in primary care.

Keywords: GI group education; children; functional abdominal pain disorders; quality of life

1. Introduction

Abdominal pain is common among children and adolescents, and functional abdominal pain disorders (FAPDs) have a globally pooled prevalence of 13% [1–3]. Functional abdominal pain disorders include irritable bowel syndrome (IBS), functional dyspepsia (FD) and functional abdominal pain–not otherwise specified (FAP-NOS). These disorders are defined according to the Rome IV criteria [4]. In all FAPDs, except abdominal migraine, abdominal pain occurs at least four times per month over a period of at least two months. In IBS, the abdominal pain is related to defecation or associated with a change in stool

frequency or stool form. Symptoms of FD are bothersome postprandial fullness, early satiation, epigastric pain or epigastric burning. FAP-NOS is defined as recurrent abdominal pain not only related to menstruation or intake of food. An additional requirement for all FAPDs is that the symptoms are not, after careful evaluation, fully explained by any other medical condition [4]. The pathophysiology of FAPDs is obscure and considered multifactorial [5–7].

Children with FAPDs often have a low quality of life and extensive and costly health care consumption and are at increased risk of comorbidity in terms of mental illness or other pain disorders [8–10]. School absenteeism is common in this group [11]. The risk of prolonged and chronic symptoms is increased if the family find it hard to understand and accept the functional nature of the disorder [12].

There are limited medical treatment options for pediatric patients with FAPDs [13–15]. Evidence that pharmacological and dietary interventions lead to symptomatic relief is insufficient [16–19]. Randomized controlled trials on online exposure-based cognitive behavioral treatment (internet-CBT) for children and adolescents with FAPDs have shown positive long-term results [20,21]. CBT has become well tolerated, accepted and effective in treating pain conditions, such as migraines, in children [22]. However, due to the high prevalence of FAPDs, this type of treatment may not be an available option for all children and adolescents with FAPDs. Furthermore, internet-CBT may work best for children and adolescents with increased levels of fear and avoidance behaviors related to the abdominal symptoms [23,24]. The objective of this study was to examine a short intervention, gastrointestinal (GI) group education for pediatric FAPDs, which could be one of the first options in a model of stepwise individualized approach [25]. In adults, brief group education for IBS has shown a significant positive effect regarding gastrointestinal symptoms, quality of life and decreased mental illness, for example, reduced anxiety and depression [26]. These programs typically include education about gastrointestinal anatomy and physiology, dietary factors, stress, acceptance and coping. Cost-effective and attainable interventions are required to reduce the negative impact of FAPDs. A brief group education program may be sufficient for a large group of children and adolescents suffering from FAPDs.

We have found no previous studies on brief GI group education in the management of pediatric FAPD.

2. Results

2.1. Description of Sample

The participants in this pilot study of GI group education consisted of 23 children and adolescents living in Stockholm. The majority were girls, and the mean age was 11.9 years (SD = 2.5). There was no significant difference regarding age or gender between included and not included patients. The mean duration of abdominal symptoms in our sample was 6.5 years (range 1–14). Baseline characteristics are described in Table 1.

Table 1. Participant characteristics at baseline.

	Included (*n* = 23)	**Not Included (*n* = 15)**	***p*** [a]
Children			
Age in years, M (SD); range	11.9 (±2.5); 9–17	12.9 (±2.8); 9–18	0.346
Girl, *n* (%)	14 (61)	9 (60)	0.959
Ethnicity, *n* (%)			
Born in Sweden	22 (96)		
At least one parent born outside Sweden	6 (26)		
Duration of abdominal problems in years, M (SD); range	6.5 (3.5); 1–14		
Diagnosis, *n* (%)			
IBS [b]	12 (52)		
FD [c]	6 (26)		
FAP-nos [d]	5 (22)		
Referring care unit, *n* (%)			
Secondary care	22 (96)		
Tertiary care	1 (4)		

Table 1. *Cont.*

	Included (n = 23)	Not Included (n = 15)	p [a]
At least one parent with abdominal problems, n (%)	7 (30)		
Medications for abdominal symptoms [e], n (%)	15 (65)		
Depression CDI-S $\geq$ 3 [f], n (%)	11 (48)		
Parents (n = 23)			
Education, n (%) [g]			
High school < 3 years	0		
High school $\geq$ 3 years	7 (30)		
University $\geq$ 3 years	16 (70)		

Note: All estimates are mean, M, (SD) or n (%) unless otherwise specified. [a] Differences between included and not included referred patients were explored using independent samples t-test. [b] IBS, irritable bowel syndrome. [c] FD, functional dyspepsia. [d] FAP-nos, functional abdominal pain–not otherwise specified. [e] Macrogol, Inolaxol®, Omeprazol, Novalucol®, Iberogast, and Colpermin®. [f] Cut-off indicating diagnostic level of depression. [g] High school education < 3 years = vocational education, ≥3 years = preparing for university studies. University $\geq$ 3 years represents a bachelor's degree or above.

2.2. Primary Aim, Feasibility and Acceptability

Sixteen of the participants (70%) were present at both sessions. The main reason for non-attendance was symptoms of infection (a restriction at the time due to the ongoing COVID-19 pandemic). No participant actively withdrew from the program, although nine children (39%) did not complete post-intervention assessments online to the full extent. Self-reported knowledge about FAPDs and satisfaction with current knowledge were used as a proxy for feasibility, and these significantly improved immediately after intervention, according to patients as well as their parents, with a large effect size (Table 2). Most adolescents and their parents rated the intervention as credible; the C-scale mean for both children and parents was 29.0 (SD = 9.8 and SD 8.5, respectively = 10.35).

Table 2. Self-assessment results for children attending the 4 h GI group education program.

	Pre *M*, (*SD*)	Post *M*, (*SD*)	Pre vs. Post		6 m Follow-Up, *M*, (*SD*)	Pre vs. 6 m Follow-Up	
	n = 23	n = 14	p [a]	d [b] [95% *CI*]	n = 15	p [a]	d [b] [95% *CI*]
C-scale [c]		29.00 (9.8)					
PedsQL Gastro [d]	63.9 (18.6)	71.7 (13.9)	0.003 *	−0.69 [−1.14, −0.23]	72.2 (16.5)	0.009 *	−0.60 [−1.03, −0.15]
PedsQL QOL [e]	72.9 (14.8)	76.2 (13.5)	0.008 *	−0.61 [−1.06, −0.16]	79.1 (14.9)	0.029 *	−0.49 [−0.92, −0.05]
BRQ-C [f]	37.1 (15.3)	34.4 (15.2)	0.045 *	0.44 [0.01, 0.87]	31.1 (12.7)	0.037 *	0.46 [0.03, 0.89]
CSI gastro [g]	11.8 (5.5)	10.0 (4.8)	0.007 *	0.63 [0.17, 1.07]	8.9 (5.3)	0.007 *	0.62 [0.17, 1.06]
Self-reported knowledge [h]	2.2 (2.2)	5.6 (3.0)	<0.001 *	−1.12 [−1.63, −0.58]			
Self-reported satisfaction [h]	2.7 (2.5)	5.8 (2.8)	<0.001 *	−0.84 [−1.31, −0.35]			
Faces intensity [i]	5.1 (2.5)	4.9 (2.9)	0.418		5.1 (2.8)	1.0	
Pain frequency [j]	3.2 (2.0)	2.5 (2.0)	0.096		2.5 (1.8)	0.041 *	0.45 [0.02, 0.88]
Pain-free days [k]	2.5 (2.3)	3.1 (2.5)	0.144		3.4 (2.5)	0.063	
CDI-S [l]	3.3 (3.6)	3.1 (4.0)	0.610		3.5 (4.2)	0.650	
SCAS-S [m]	15.6 (9.7)	14.4 (9.1)	0.130		14.1 (7.9)	0.353	
						Post vs. 6 m follow-up	
School absence [n]		1.2 (1.2)			1.2 (1.3)	0.805	
School leaving [o]		0.7 (0.8)			0.8 (1.0)	0.773	
Medication, abdominal symptoms [p]		1.2 (1.3)			1.1 (1.2)	0.668	
SAQ [q]		3.5 (1.0)			4.1 (1.4)		

Note: All estimates and test-statistics are based on ITT using imputation according to "Last observation carried forward" (LOCF) for any missing data. [a] We tested for differences pre-intervention, post-intervention and at the 6-month follow-up using paired t-tests. Significant changes are marked with asterisks (*). [b] Cohen's D, standardized mean difference (SMD). [c] C-scale, Credibility Rating Scale with five items rated on a 11-point scale from 0 (not at all) to 10 (very). [d] PedsQL gastro, Pediatric Quality of Life Inventory Gastrointestinal symptoms™ (scored 0–100). Higher scores are indicative of fewer symptoms. [e] PedsQL QOL, Pediatric Quality of Life Inventory™ (scored 0–100). Higher scores are indicative of higher quality of life. [f] BRQ-C, Behavioral Responses Questionnaire–Child adapted version™ (scored 11–77). Higher scores are indicative of a higher degree of avoidance. [g] CSI gastro, Children's Somatization Inventory gastro™ (scored 0–28). Higher scores are indicative

of more symptoms. [h] VAS, visual analogue scale (0–10). [i] Faces intensity, degree of pain the last week (scored 0, 2, 4, 8 and 10). Higher scores are indicative of more intense pain. [j] Pain frequency, number of days with pain the last week (scored 0–7). [k] Pain-free days, number of days without pain the last week (scored 0–7). [l] CDI-S, Children's Depression Inventory™ short version (scored 0–20). Higher scores are indicative of more depressive symptoms. [m] SCAS-S, Spence Children's Anxiety Scale™ child adapted version (scored 0–54). Higher scores are indicative of more anxiety. [n] School absence, degree of school absenteeism, due to pain or other gastrointestinal symptoms, in the last month (scored 0–4). [o] School leaving, number of days the student left school early, due to pain or other gastrointestinal symptoms, in the last month (scored 0–4). [p] Medication, abdominal symptoms, number of days medicating due to pain or other gastrointestinal symptoms the last month (scored 0–4). [q] SAQ, Shortform Assessment for Children, measuring improvement after intervention (scored 0–6).

2.3. Secondary Aim, Results of Outcome Measures

2.3.1. Children and Adolescents

All results of the children's outcome measures are presented in Table 2. Children participating in group education reported improvements in gastrointestinal symptoms, quality of life and avoidance behavior as measured by the PedsQL gastro, PedsQL QOL (Table 2, Figure 1) and BRQ at measurement post-intervention. The improvements were stable or further increased at the 6-month follow-up. The changes were statistically significant with small to moderate effect sizes.

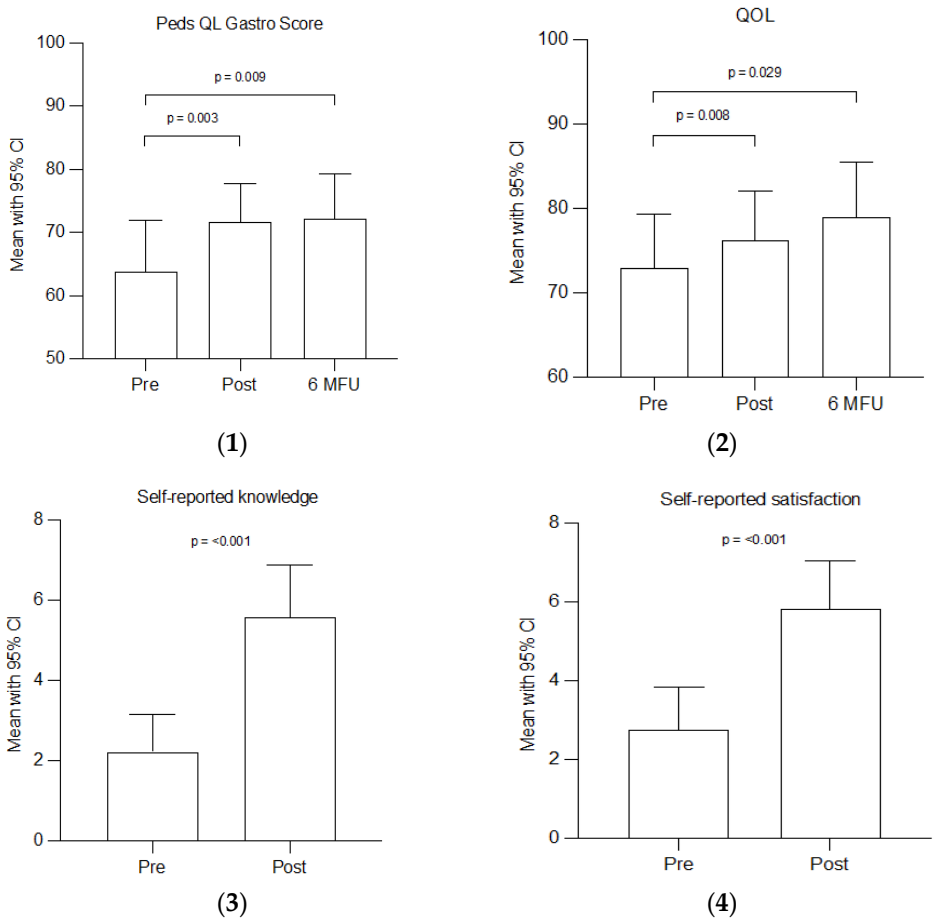

Figure 1. Differences pre-intervention, post-intervention and at the 6-month follow-up (6 MFU). (**1**) Peds QL Gastro (Pediatric Quality of Life Inventory Gastrointestinal symptoms™ (scored 0–100). Higher scores are indicative of fewer symptoms). (**2**) QOL (Pediatric Quality of Life Inventory™ (scored 0–100). Higher scores are indicative of higher quality of life). (**3**) Self-reported knowledge VAS (visual analogue scale (0–10)). (**4**) Self-reported satisfaction with their level of knowledge about FAPDs, VAS (visual analogue scale (0–10)).

Improvement in terms of gastrointestinal symptoms, as measured by the CSI gastro, reached statistical significance with moderate effect sizes post-intervention and at the 6-month follow-up compared to baseline. Pain frequency decreased significantly at the 6-month follow-up compared to baseline (Cohen's $d = 0.45$). The children's satisfaction with their level of knowledge about FAPDs also increased significantly after intervention, with a large effect size (Table 2, Figure 1). On the self-assessment questionnaire (SAQ, seven-point scale), children reported an overall improvement post-intervention.

2.3.2. Parents

All results of the parents' outcome measures are presented in Table 3. At measurement post-intervention, one parent replied only to the C-scale questionnaire with extreme values, becoming an outlier, and was excluded from further analyses at post-intervention ($n = 14$ at post-treatment). Parents reported a significant improvement in their child's gastrointestinal symptoms (PedsQL gastro) post-intervention and a further improvement at follow-up 6 months later, with a large effect size from pre-intervention to the 6-month follow-up. According to the parents, the children's quality of life (PedsQL QOL) was significantly improved at the 6-month follow-up compared to baseline, with a moderate effect size. Parents reported a significant improvement in terms of the children's gastrointestinal symptoms, as measured by the CSI gastro, with a moderate effect size post-intervention. The follow-up at 6 months suggested further improvement, with a large effect size from pre-intervention to 6 months follow-up. In general, the results were similar between children and their parents.

Table 3. Assessment results for parents attending the 4 h GI group education program together with their children.

	Pre ***M*, (*SD*)**	**Post** ***M*, (*SD*)**	**Pre vs. Post**		**6 m Follow-Up,** ***M*, (*SD*)**	**Pre vs. 6 m Follow-Up**	
	***n* = 23**	***n* = 15**	***p*** [a]	***d*** [b] **[95% *CI*]**	***n* = 18**	***p*** [a]	***d*** [b] **[95% *CI*]**
Parent on child's symptoms C-scale [c]		29.0 (8.5)					
Parents PedsQL Gastro [d]	56.2 (16.9)	63.2 (15.8)	0.002 *	−0.73 [−1.19, −0.27]	69.8 (15.8)	<0.001 *	−0.90 [−1.38, −0.40]
Parents PedsQL QOL [e]	71.1 (18.0)	74.3 (18.8)	0.078		82.2 (12.4)	0.012 *	−0.57 [−1.01, −0.12]
CSI gastro [f]	10.6 (5.9)	8.8 (5.2)	0.027 *	0.49 [0.05, 0.92]	6.5 (4.7)	<0.001 *	0.86 [0.37, 1.33]
GSRS [g]	27.3 (18.7)	28.1 (19.0)	0.508		27.4 (14.8)	0.987	
SCAS-P [h]	25.0 (21.7)	23.0 (22.4)	0.151		18.3 (13.3)	0.104	
Parent's self-assessment $n = 16$							
Parent's own self-reported knowledge [i]	3.0 (2.4)	5.9 (2.7)	<0.001 *	−1.03 [−1.53, −0.51]			
Parent's own self-reported satisfaction [i]	2.7 (2.4)	6.2 (2.8)	<0.001 *	−1.01 [−1.51, −0.50]			

Note: All estimates and test statistics are based on ITT using imputation according to "Last observation carried forward" (LOCF) for any missing data. [a] We tested for differences pre-intervention, post-intervention and at the 6-month follow-up using paired *t*-tests. Significant changes are marked with asterisks (*). [b] Cohen's D, standardized mean difference (SMD). [c] C-scale, Credibility Rating Scale with five items rated on an 11-point scale from 0 (not at all) to 10 (very). [d] PedsQL gastro, Pediatric Quality of Life Inventory Gastrointestinal symptoms™ (scored 0–100). Higher scores are indicative of fewer symptoms. [e] PedsQL QOL, Pediatric Quality of Life Inventory™ (scored 0–100). Higher scores are indicative of higher quality of life. [f] CSI gastro, Children's Somatization Inventory gastro™ (scored 0–28). Higher scores are indicative of more symptoms. [g] GSRS, Gastrointestinal Symptom Rating Scale™ (scored 13–91). Higher scores are indicative of more symptoms. [h] SCAS-P, Spence Children's Anxiety Scale™, full version (scored 0–114). Higher scores are indicative of more anxiety. [i] VAS, visual analogue scale (0–10).

3. Discussion

To the best of our knowledge, no previous study has investigated a brief group education program specifically tailored for children and adolescents with FAPDs. We

conducted an open pilot trial to evaluate the feasibility, acceptability, and potential efficacy of a brief group education program in 23 pediatric patients with FAPDs.

Previous studies targeting pediatric FAPDs with internet-delivered exposure-based CBT (internet-CBT) have used similar inclusion criteria and outcome measures, but the intervention evaluated was 8 weeks psychotherapy compared to the current 4 h educative intervention. Thus, internet-CBT is a more intensive intervention. The ratings of treatment credibility and satisfaction with intervention in the current study are comparable to the previous studies on CBT [20,24,27,28]. Furthermore, we saw a significant effect in the sample regarding reductions in self-reported gastrointestinal symptoms and increased quality of life, indicating that GI group education has the potential to be an effective intervention. As far as we know, this is the first study investigating GI group education in children and adolescents with FAPDs, both in terms of delivery format and treatment content. In a systematic review with adult patients with IBS, 65% of the participants stated that they wanted to learn more about their condition [29]. In a pediatric setting, GI group education on FAPDs may satisfy the need for more knowledge, not only for the patients but also the parents. The parents of children previously hospitalized due to FAPDs wished for a diagnosis of a condition that could be treated and had concerns that there was an underlying undetected condition triggering the pain [30]. Children with long-standing abdominal pain are frustrated by not having a diagnosis and by the lack of available treatment [31]. The GI group education explains the FAPD diagnoses and that there are treatments, but rarely medications, to handle the pain.

The strengths of this study were a careful confirmation of the Rome IV diagnosis, performed with self-administered questionnaires, and acceptable adherence. Most of the outcome measures were assessed online at home; thus, the response bias is assumed to be low. The intervention followed a protocol and was given in a routine care setting. This pilot study has limited generalizability due to the small sample size and the uncontrolled design. Consequently, the results must be interpreted with caution and verified in a larger randomized controlled trial, which could be achieved more effectively with digital participation. There is a possibility that children with more committed parents were overrepresented in the study group, which may have led to higher adherence. Moreover, one of four groups was assessed at baseline after the summer holidays. This possibly decreased the reported degree of school absenteeism in this group, and, moreover, FAPDs have seasonal variation, with lower incidence in the summer [32]. Due to the COVID-19 pandemic, the groups were smaller than originally planned and only one parent per child could participate. Furthermore, restrictions concerning infectious symptoms most likely caused lower group attendance.

GI group education may thus potentially become a valuable tool as one of the first steps in a stepped care model for children and adolescents with FAPDs. We also believe that our intervention, both in terms of format and treatment content, is suitable for online education. A recent study with adult patients with IBS has shown that internet-delivered education is non-inferior when compared to face-to-face group education [33]. The promising results from this pilot study regarding acceptability, feasibility, and potential efficacy make the intervention a suitable candidate for a larger randomized controlled trial in a digital format. Such an intervention is also under development by the authors.

4. Material and Methods

The primary aim of this study was to investigate the feasibility and acceptability of a GI group education program, consisting of brief education on FAPDs and related physiology, dietary factors, stress, acceptance, and coping, for children, adolescents, and their parents. A secondary aim was to explore any potential clinical efficacy of the GI group education. This study was registered on clinicaltrials.gov (reg.no: NCT04294420).

4.1. Study Design, Recruitment, Setting, and Participants

This was an open single-center pilot study with no control group in a pre-test–pos-test design. The study size of 23 children and adolescents aged 8–17 years was regarded as appropriate to explore the feasibility of the intervention. The participants were recruited from specialized pediatric outpatient clinics from all over Stockholm between January and August 2020 (Table 1). Eligibility criteria were age 8–17 years and FAP-NOS, IBS, or FD, according to the Rome IV criteria. Participants with abdominal migraine were not included due to the difference in symptomatic pattern. The diagnosis was established by the treating physician before referral. Moreover, the following normal tests were required: full blood count, erythrocyte sedimentation rate, serum immunoglobulin-A-transglutaminase antibodies, and urine dipstick. If severe diarrhea was present, a normal fecal calprotectin test (<100 µg/g) was also requested. Exclusion criteria were concurrent severe psychiatric conditions, e.g., suicidality or psychotic disorders, serious medical conditions that required immediate treatment, and insufficient skills in the Swedish language. The flow of participants is shown in Figure 2.

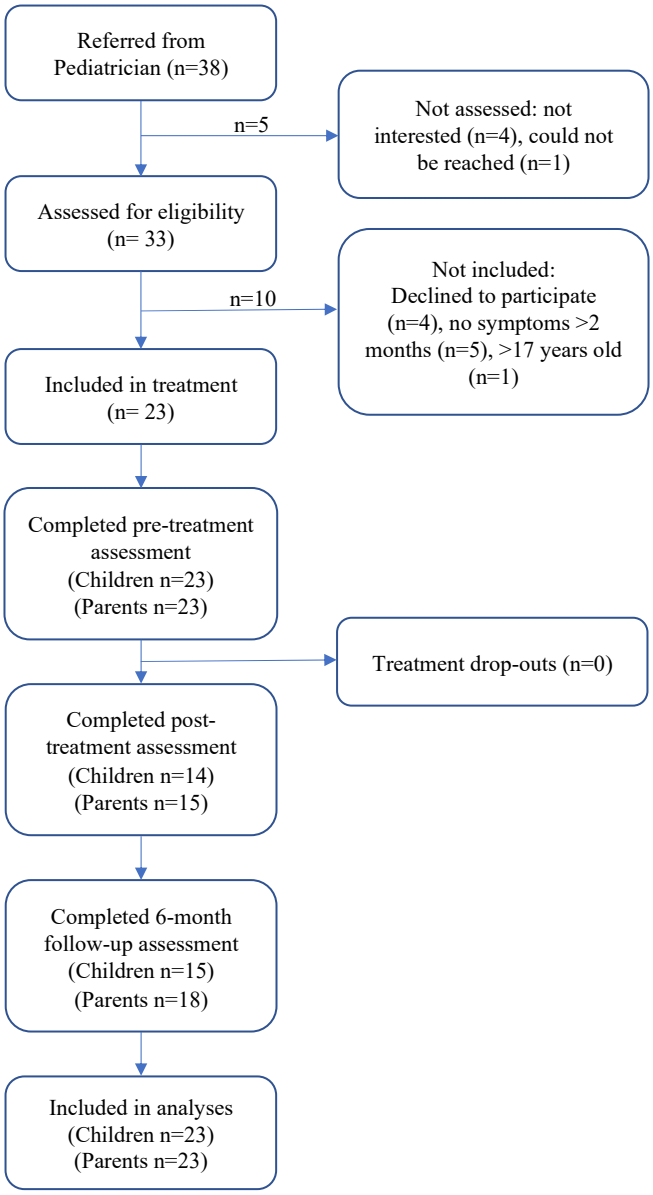

Figure 2. Flow of participants through the study.

Written information was sent with the invitation to pediatric outpatient clinics in Stockholm County two months before the start of enrollment, where the aim of the study and eligibility criteria for study inclusion were presented. The invitation also stated that the recipients may approach the researchers directly with any further questions. When an electronic referral was received at the site (Liljeholmen's Pediatric Outpatient Clinic in Stockholm, Sweden) with the title "FAPD group education", electronic medical records were reviewed by one of the authors (EL). If the eligibility criteria were fulfilled and no exclusion criteria were found, potential participants were screened in telephone interviews to validate that the symptoms were accurate according to the Rome IV criteria for IBS, FAP, or FD. Demographic data were extracted from the electronic medical record and, if necessary, supplemented during the interview. Both the child/adolescent and their caregiver were interviewed and given information about the study and about the voluntariness of consent. Once the letter of consent was signed and returned to the researchers, user IDs and passwords were handed to the participants to enable them to perform the online survey. All referring doctors received information about whether their patient was included or not and an explanation if applicable.

4.2. Collection, Handling, and Data Protection

Collection of data, in terms of intervention results, was handled through an encrypted data handling program, BASS. Patients and their parents filled in the outcome measures, i.e., multiple questionnaires based on validated rating scales. BASS is built to collect and store online data safely for clinical interventional studies and is a part of the Core Facilities at the Karolinska Institutet.

The telephone interview (EL) on the frequency and duration of abdominal pain was documented in the electronic medical record, together with the file reference of this study. All personal data were handled confidentially, and all participants were given an anonymous participant ID. All personal data and the code key linking the data to the participant ID were stored in an electronic research platform, to which only the researchers had access.

4.3. Outcome Measures

4.3.1. Feasibility

The Credibility Rating Scale, C-Scale, includes five items rated on a 11-point scale from 0 (not at all) to 10 (very). The scale was slightly adapted and included items such as "How sure are you that this intervention can successfully decrease your abdominal symptoms?" and "How much do you expect to improve due to this intervention?". The maximum total score was 55 [34]. Improvement of self-rated knowledge and satisfaction with current knowledge about FAPDs were regarded as a proxy for acceptance of the education. Self-rated knowledge was manually assessed before the first session and directly after the second session with a visual analogue scale (VAS) from "no knowledge at all" (0) to "very substantial knowledge" (10), and satisfaction with current knowledge about FAPDs was assessed from "not satisfactory at all" (0) to "very satisfactory" (10). The placement of the mark was measured in centimeters and then used as a continuous variable, 0.0–10.0 cm [35].

4.3.2. Children's Outcome Measures Assessed

All outcomes (except for VAS) were collected through BASS. All baseline characteristics were collected as described above. Due to the feasibility design in this small sample, the clinical effect in the sample was exploratory and included the following outcomes: gastrointestinal symptoms measured by the Pediatric Quality of Life Gastrointestinal Symptom Scale (PedsQL Gastro), quality of life measured by the Pediatric Quality of Life Inventory (PedsQL QOL), behavioral avoidance measured by the Behavioral Responses Questionnaire (BRQ-C), and gastrointestinal symptoms measured by the Children's Somatization Inventory gastro (CSI gastro) [36–39]. Child-rated pain intensity was measured by the

Faces Pain Rating Scale [40], child-rated pain frequency measured by the question "How many days during the last week did you have pain or discomfort?", and pain-free days, the number of days without pain the last week, and gastrointestinal symptom profile were measured by a shortened version of ROME-IV [4]. Depressive symptoms were measured by the Child Depression Inventory (CDI-S) and anxiety was measured by the Spence Children Anxiety Scale—short version (SCAS-S) [41,42]. School absenteeism during the last month was examined with two questions. 1. Absence: how many hours the child was absent from school due to pain or other gastrointestinal symptoms. 2. Leaving: how many times the child went home from school due to pain or other gastrointestinal symptoms. Medication due to abdominal symptoms was measured by asking the child about the number of days they used medication due to pain or other gastrointestinal symptoms in the last month. Improvement after intervention was measured by the self-assessment questionnaire (SAQ).

4.3.3. Parent's Outcome Measures

Outcome measures included the C-Scale, PedsQL gastro, PedsQL QOL, BRQ-C and CSI gastro. These questionnaires were identical to the children's versions except for the parents being asked about the symptoms of their child. Parents reported their children's anxiety, as measured by the Spence Children Anxiety Scale (SCAS-P). Parents' own gastrointestinal symptoms were measured with the Gastrointestinal Symptom Rating Scale (GSRS). The parents' VAS assessments on GI knowledge were identical to the children's version.

4.4. Intervention and Content

The GI group education was provided by a pediatric gastroenterologist (AU), a psychologist (MB), and a dietician (JW), all experienced clinicians. The setting was the Liljeholmen's Pediatric Outpatient Clinic in Stockholm, Sweden, for two face-to-face sessions of 2 h. Participants were divided into four education groups consisting of 5 to 6 child–parent dyads. Groups were age matched, 8–12 years of age or 13–17 years of age. Because of restrictions due to the COVID-19 pandemic, only one parent per child could participate and groups were kept small. No digital remote participation was allowed, and no compensation was paid for participation. The GI group education was general and provided to child and one parent together. The language and approach were adapted to the age of participants, but the same educational material was used.

First session (Two 50 min lectures):

1. Pediatric gastroenterologist (AU). Introduction and presentation of participants. Basic anatomy and physiology about the gastrointestinal tract, etiology, and diagnostics of FAPDs.
2. Pediatric dietician (JW). Lifestyle and dietary factors such as eating regular meals, avoiding long intervals between meals, taking time for meals, and eating in a calm environment. Information on foods that can trigger symptoms, for example, food allergy and food intolerance such as FODMAPs (fermentable, oligosaccarides, disaccarides, monosaccarides, and polyoles). Explaining that excessive limitation of large food groups should be avoided, since it can lead to nutritional deficiencies and impaired growth.

Second session (Two 50 min lectures):

1. Pediatric gastroenterologist (AU). Explaining how to become an "expert of one's own disease", that is, getting to know one's symptoms and when medicines and doctor's appointments are needed. Presentation of the gut–brain axis, stress, protective factors, and brief information about evidence-based treatment.
2. Pediatric psychologist trained in CBT (MB). General information about psychological factors regarding abdominal pain, acceptance, and coping. Principles of CBT, how fear of gastrointestinal symptoms and avoidance behavior affect symptoms.

4.5. Statistical Analysis

All statistical analyses were conducted with SPSS® 27. Continuous data were presented as mean and standard deviation (SD) and categorical data as frequencies and percentages. Paired *t*-tests were performed to detect any within-group differences between baseline and post-intervention and between baseline and 6-month follow-up. Independent samples *t*-tests and Fisher's exact tests were used to detect significant differences between included (n = 23) and not included referred patients (n = 15). All p-values were two-sided, and the level of significance was set at <0.05. Effect sizes and 95% confidence intervals of changes between assessments were calculated as within-group d (i.e., the standardized mean difference, SMD). Effect sizes were categorized according to Cohen's suggestion where small, medium, and large effect sizes are $d \geq 0.20$, 0.50, and 0.80, respectively [43]. To make use of all available data, we used imputation according to last observation carried forward (LOCF) in SPSS to impute any missing sum scores at the post-intervention and follow-up assessments.

5. Conclusions

Our findings indicate that GI group education for children and adolescents with FAPDs, and their parents, is acceptable and feasible and may improve symptoms. Most children with FAPDs are seen in primary and secondary care, where knowledge on FAPDs is sometimes scarce. In several cases, a brief group education program could be of benefit in the management of FAPDs, especially when the family finds it difficult to discriminate between functional and structural gastrointestinal disorders. The findings in this study need to be confirmed in a randomized controlled study.

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Institutional Board Review: This study was conducted in accordance with the Declaration of Helsinki and approved by the Regional Ethical Board in Stockholm, Sweden, on 30 December 2019 (Dnr: 2019-05417) for studies involving humans.

Informed Consent Statement: Informed consent was obtained from all caregivers of the subjects involved in the study. Written informed consent has been obtained from the patients and parents to publish this paper.

Data Availability Statement: All authors had access to the study data. The data presented in this study are available on request from the corresponding author. The data are not publicly available to protect study participant privacy.

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Abbreviations

CBT	Cognitive behavioral therapy
FAPDs	Functional abdominal pain disorders

FD	Functional dyspepsia
GI	Gastrointestinal
FAP-NOS	Functional abdominal pain–not otherwise specified
IBS	Irritable bowel syndrome
VAS	Visual analogue scale

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