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# BMJ Open Home-based guided hypnotherapy for children with functional abdominal pain and irritable bowel syndrome in primary care: study protocol for a randomised controlled trial

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## ABSTRACT

**Introduction** Children often present to primary care with functional abdominal pain (FAP) or irritable bowel syndrome (IBS), and around half still have abdominal complaints 1 year later. Hypnotherapy is an evidence-based treatment that is used in specialist care, but it lacks evidence in primary care. This study will investigate the (cost) effectiveness of home-based guided hypnotherapy for children with FAP or IBS in primary care.

**Methods and analysis** We report the design of a pragmatic randomised controlled trial among children aged 7–17 years, diagnosed with FAP or IBS by their general practitioner (GP), with assessments over 12 months. The control group will receive care as usual (CAU) by their GP (eg, communication, education and reassurance), while the intervention group will receive CAU plus 3 months of home-based guided hypnotherapy via a website. The primary outcome will be the proportion of children with adequate relief from abdominal pain/discomfort at 12 months, analysed on an intention-to-treat basis. Secondary outcomes will include the adequacy of pain relief at 3 and 6 months, pain/discomfort severity, pain frequency and intensity, daily functioning and impact on function, anxiety and depression, pain beliefs, sleep disturbances, school absence, somatisation, and healthcare use and costs. We must include 200 children to determine a 20% difference in those with adequate relief (55% control vs 75% intervention).

**Ethics and dissemination** The Medical Ethics Review Committee of the University Medical Center Groningen, the Netherlands, approved this study (METc2020/237). The results will be disseminated to patients, GPs and other stakeholders via email, a dedicated website, peer-reviewed publications and presentations at national and international conferences. We plan to collaborate with the Dutch Society of GPs to implement the results in clinical practice.

**Trial registration number** NCT05636358.

## INTRODUCTION

### Background and rationale

Children often present to primary care with functional gastrointestinal symptoms, such as functional abdominal pain (FAP) or

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Early management of functional abdominal pain and irritable bowel syndrome through home-based guided hypnotherapy may prevent symptoms becoming chronic.
- ⇒ Exercises are learnt using digital media (eHealth) and fit well with the target population of young, digitally skilled patients.
- ⇒ Our pragmatic design has high external generalisability and will provide useful information on the (cost) effectiveness of home-based guided hypnotherapy in a real-world setting.
- ⇒ The internal validity may be low due to a lack of blinding, with the potential that children in the control group will seek alternative treatment.

irritable bowel syndrome (IBS), that cannot be explained by an organic condition and risk becoming chronic.<sup>1–4</sup> These disorders are associated with reduced quality of life (QoL), school absence, sleep disturbances, anxiety and depression.<sup>5–6</sup> However, our limited understanding of their exact pathophysiology and the role of multiple factors in maintaining the complaints can make their management challenging.<sup>7–8</sup> Given that secondary healthcare use and parental productivity loss appear to drive the estimated annual healthcare costs of €2512 per child,<sup>9</sup> adequate early treatment in primary care could reduce symptoms and the need for referral.

The general practitioner (GP) functions as a gatekeeper to specialist care in the Netherlands, similar to systems in Canada and the UK.<sup>10</sup> Therefore, children with FAP or IBS usually present first in primary care, where a GP determines the diagnosis by excluding organic causes based on clinical history and physical examination.<sup>11–13</sup> The guideline for

FAP published by the Dutch Society of GPs (*Nederlands Huisartsen Genootschap*; NHG), which recommends good communication, education and reassurance, may not be sufficient for all children.<sup>14 15</sup> Around half of these children still report abdominal complaints after 1 year,<sup>3</sup> underlining the difficulty of treatment.

Children with FAP or IBS may receive psychosocial interventions in specialist paediatric care due to the strong association between functional symptoms and psychological factors (eg, stress).<sup>12 13 15–17</sup> Hypnotherapy is one such option that involves a therapist inducing a hypnotic state by guiding a patient to respond to suggestions.<sup>18–20</sup> Studies measuring brain responses in adults with IBS show that hypnotherapy may influence gut motility and normalise visceral sensitivity,<sup>21 22</sup> though the mechanisms behind its effect on functional abdominal symptoms are poorly understood. Hypnotherapy is generally considered safe. Limited trials report side effects or adverse events, but some rare, mild to moderate adverse events have been reported.<sup>23</sup> Indeed, hypnotherapy should always be performed by a trained professional.<sup>24 25</sup> Research in children and adolescents has found that hypnotherapy significantly reduces abdominal pain and symptom scores.<sup>18 19 24</sup> Other research in children has proven the non-inferiority of home-based guided hypnotherapy compared with face-to-face therapist-guided hypnotherapy at 12 months (adequate pain relief in 75% and 87%, respectively), though with lower effectiveness among children with long-term symptoms.<sup>26</sup> The earlier use of hypnotherapy could maximise its benefits, especially if delivered in primary care. Indeed, home-based guided hypnotherapy could improve how GPs manage children with FAP or IBS, potentially leading to a better prognosis, fewer unnecessary referrals and reduced costs. However, evidence of its (cost) effectiveness in primary care is lacking.

## Hypothesis

We hypothesise that, compared with care as usual (CAU) alone, home-based guided hypnotherapy plus CAU will be more (cost) effective for achieving adequate relief from abdominal pain and discomfort in children with FAP or IBS.

## METHODS AND ANALYSIS

### Study design

We present the *ZelfHy* (*ZelfHypnose*; self-hypnosis) study, a pragmatic randomised controlled trial designed to determine the (cost) effectiveness of home-based guided hypnotherapy plus CAU compared with CAU alone for children with FAP or IBS in primary care. Recruitment has already begun, with eligible children being randomised to either the intervention group or the control group and followed for 12 months ([figure 1](#)). This protocol is reported according to the Standard Protocol Items: Recommendations for Interventional Trials guidelines<sup>27</sup>

and the extended Consolidated Standards of Reporting Trials statement for pragmatic trials.<sup>28</sup>

### Study population

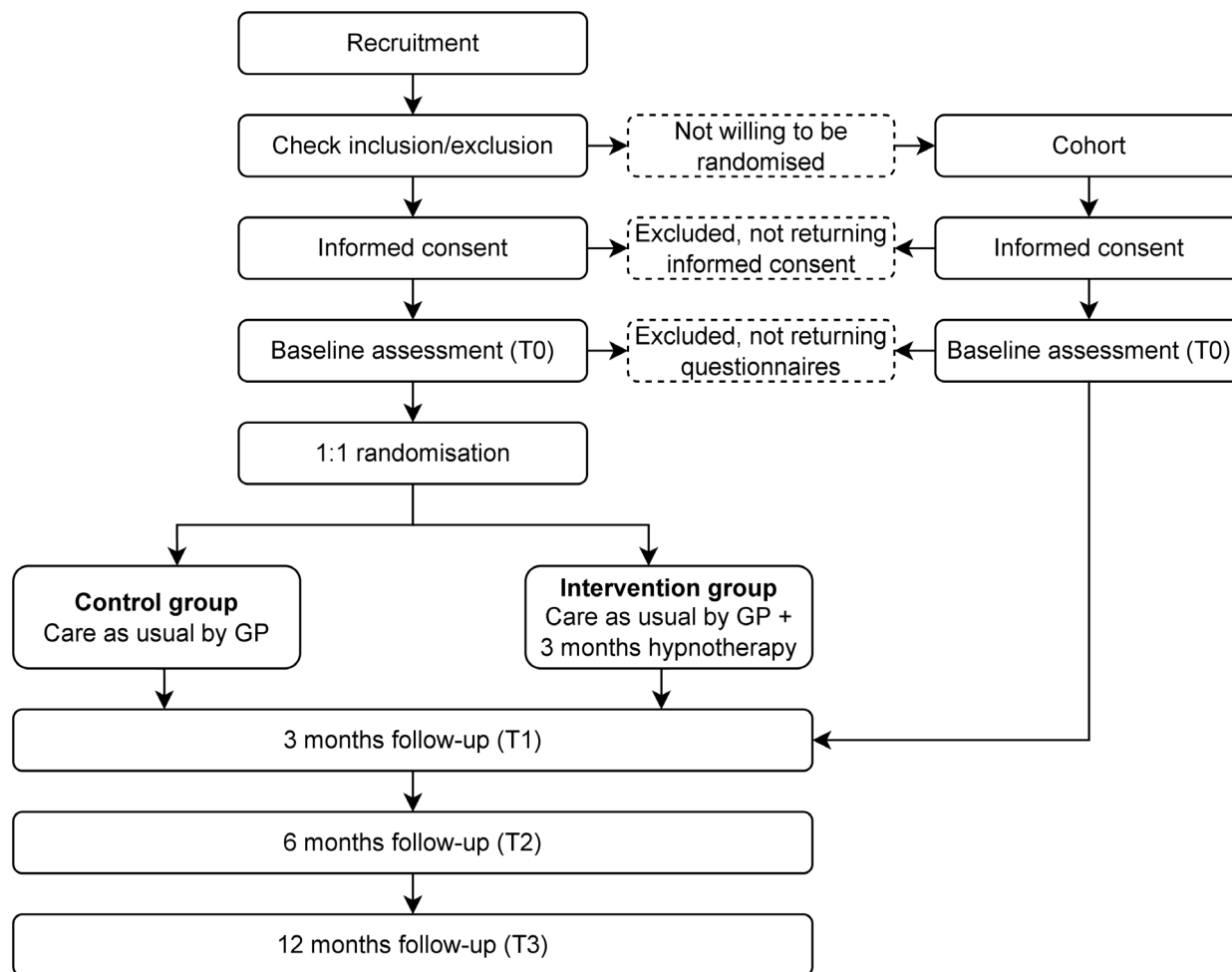
The inclusion criteria are as follows: age 7–17 years; attending a GP with chronic gastrointestinal symptoms (eg, recurrent abdominal pain for  $\geq 2$  months or  $\geq 2$  episodes in the past 2 months); and GP-diagnosed FAP or IBS. GPs base their diagnosis on the following definition: abdominal pain for which the GP does not presume underlying tissue damage, somatic causes, or metabolic or anatomic abnormalities based on medical history and physical examination.<sup>14</sup> An overview of the Dutch guideline including definitions of FAP and IBS is shown in online supplemental file 1. Those with a concomitant organic gastrointestinal disease, abdominal symptoms treated by a paediatrician, intellectual disability, psychotic disorders, a history of hypnotherapy in the past year, or poor comprehension of the Dutch language are excluded. Children who prefer not to randomise can choose to enter a parallel observational cohort study in which they complete the same questionnaires.

### Recruitment

We invited GPs either from the Academic General Practitioner Development Network (*Academisch Huisarts Ontwikkel Netwerk*) or through professional connections. Participating GPs are then asked to recruit study participants during consultations by informing eligible children about the trial and providing written information. Additionally, GP assistants are performing retrospective searches in GP registration databases each month for potentially eligible children, using a search strategy based on International Classification of Primary Care codes (online supplemental file 2). Primary care practices in the Netherlands have been recruiting children since November 2020, and although we had aimed to complete recruitment by September 2022, slow recruitment has necessitated that we extend the end date to September 2023. This slow recruitment by GPs before 1 July 2022 (only 30 children) also led us to expand the routes to participation. Since then, we have now provided information via schools, social media, local media (eg, newspapers and radio) and different interest groups (eg, for parents and IBS groups) to allow self-referral by interested children and/or parents via the study website. The research team then makes contact by telephone, sends the appropriate information and informed consent forms, and asks them to make an appointment with their GP.

### Data collection

GPs check the study eligibility criteria using specific forms, irrespective of the recruitment method and send these to the research team. The research team sends the appropriate information and consent forms to children recruited via their GP. A researcher then contacts each child by phone to resolve queries and complete the Rome IV Diagnostic Questionnaire (parent version if  $< 12$



**Figure 1** Study design. General practitioners (GPs) screen children for eligibility before randomisation to the control and intervention groups.

years, child version if  $\geq 12$  years).<sup>29</sup> The research team only sends the baseline questionnaires after obtaining written informed consent from the participant. After receiving the completed questionnaire, they randomise the participant and inform them of their allocation by phone. Follow-up questionnaires are sent at 3, 6 and 12 months. All questionnaires can be completed in around 30 min on paper or via the REDCap (Research Electronic Data Capture) website.<sup>30</sup> REDCap sends automatic email reminders after 7 and 14 days if the questionnaires are not completed. After 21 days, researchers remind the participants by phone and ask whether the child has experienced adequate relief from abdominal pain/discomfort (primary outcome). Despite the low risk of (severe) adverse events, we have accommodated spontaneous reporting. All study-related and participant information is stored securely at the study site in locked file cabinets that can only be accessed by researchers.

### Randomisation, allocation and blinding

We use a computer-generated 1:1 randomisation list with varying block sizes (4, 6 and 8) and stratification by age (<12 years or  $\geq 12$  years). An independent methodologist (M R de Boer, PhD) manages the randomisation list

and treatment allocation. The nature of the intervention precludes blinding of the GPs, children and parents, but researchers performing the statistical analyses will be blinded to group allocation.

### Intervention

#### Care as usual

All children receive GP-based CAU according to the NHG guideline for abdominal pain in children,<sup>14</sup> which includes communication, education and reassurance. The guideline advocates realistic treatment goals that focus on pain management, rather than pain resolution and appropriate follow-up. Since this is a pragmatic trial, we have not restricted the treatments offered by GPs. Online supplemental file 1 provides an overview of the guideline, which is provided to all participating GPs.

#### Hypnotherapy by self-exercises

Children in the intervention group receive CAU and are asked to perform home-based guided hypnotherapy for 3 months. Before starting the exercises, a researcher arranges an online video call with the child and parent(s) to explain hypnotherapy, how it can help reduce abdominal pain and how they can access the exercises.



**Table 1** Examples of hypnotic suggestions

Aim	Examples of hypnotic suggestions
Normalising gut functions	'Every day, by practicing your deep breathing, slowly in and out, your belly will feel more and more relaxed'.
Ego strengthening	'You can notice that you can keep this nice feeling of confidence with you, for as long as you want, and that you can use this whenever you want to help yourself'.
Relaxation	'Pull your shoulders backwards and hold on, feel the tension, and with a deep sigh, [hypnotherapist makes the sound of a relaxing sigh] you let go completely. And you can feel how nice it can be to let go of all this stress and fuss, and how good this feels for your belly'.

Additionally, the child and parent(s) are instructed not to discuss the pain anymore.<sup>31</sup>

We use an existing home-based guided hypnotherapy programme, as described elsewhere,<sup>31</sup> with adjustments. The programme comprises one breathing and progressive relaxation exercise and four visualisation exercises: 'the favourite place', 'the rainbow planet' or 'air balloon' (depending on age), 'the beach without worries', and 'the slide'. Exercises have been recorded by a hypnotherapist in a digital audio format (MP3). Table 1 provides examples of the hypnotic suggestions. The language is adapted to the child's age, with one version each for children aged <12 years and ≥12 years. Both versions are of equal intensity (eg, exercise duration) and are feasible for all relevant age groups.<sup>31 32</sup> We include the instructions and exercises for both versions in a newly designed, responsive, login-protected website. Instructions are directly visible on the home page and vary each week. For example, children are instructed to listen to the first two exercises for the first 2 weeks, with a new exercise introduced every week or 2 weeks. Children can choose what exercise they follow and can repeat it as many times as they want. However, they are asked to listen to the exercises at least five times per week, for 15–20 min per day, over 3 months. To improve compliance, they receive automatic email reminders from the website after 14 and 28 days of inactivity.

### Outcomes

Table 2 gives an overview of the outcome measures and covariates used in this study. The outcomes are based on a recommended set of variables for clinical trials of paediatric FAP disorders.<sup>33</sup> Demographic data are obtained from the inclusion form, and outcomes are measured at baseline and at 3, 6 and 12 months' follow-up (T0, T1, T2 and T3, respectively). Parents complete the questionnaires for children aged <12 years, while children aged ≥12 years complete the questionnaires themselves, with parental help as needed. Parents always complete the costs questionnaires.

### Primary outcome

The primary outcome is the proportion of children with adequate relief of abdominal pain/discomfort at 12 months. The child or parent(s) are asked whether relief from abdominal pain or discomfort has been adequate during the past week, compared with baseline, on a

dichotomous scale (yes/no). Self-reported adequate relief is a validated outcome measurement in other trials of IBS treatment.<sup>34</sup>

### Secondary outcomes

#### *Adequate pain relief at 3 and 6 months*

The proportion of children with adequate relief of abdominal pain/discomfort at 3 and 6 months will be assessed using the same dichotomous scale as the primary outcome.

#### *Severity of pain/discomfort*

The severity of abdominal pain and/or discomfort in the past week is assessed using an 11-point Numerical Rating Scale (NRS-11) from 0 (no pain) to 10 (worst pain). This scale provides valid and reliable scores in children and adolescents with chronic pain.<sup>35 36</sup>

#### *Pain intensity and frequency*

Participants record their abdominal pain or discomfort for seven consecutive days in a diary to aid recall,<sup>36</sup> as recommended and often used in other trials of childhood FAP or IBS.<sup>31 36</sup> Pain intensity is assessed using an affective facial pain scale,<sup>37 38</sup> where the faces range from showing no pain at all (score 0) to the most severe pain (score 3). Pain frequency is assessed by asking how long the pain lasted per day, ranging from no pain (score 0) to >2 hours (score 3). The frequency and intensity scores are then totalled for 7 days, giving ranges of 0–21 per score.<sup>26</sup>

#### *Quality of life*

The KIDSCREEN-52 is a reliable and valid health-related QoL questionnaire that measures the impact of abdominal pain on daily functioning and QoL.<sup>39–41</sup> It comprises 52 items covering 10 dimensions: physical well-being, psychological well-being, moods and emotions, self-perception, autonomy, relations with parents and home life, social support and peers, school environment, social acceptance (bullying) and financial resources. Participants rate behaviour frequency or attitude intensity in the past week on 5-point Likert scale. Higher scores correspond to better health-related QoL and well-being.

#### *Anxiety and depression*

Symptoms of anxiety and depression are assessed by a short version of the Revised Child Anxiety and Depression Scale (RCADS-25), which is a valid and reliable

**Table 2** Overview of outcome parameters and covariates

Primary outcome	Source	T0	T1	T2	T3
Adequate pain relief at 12 months	Binary yes/no question				x
<b>Secondary outcomes</b>					
Adequate pain relief at 3 and 6 months	Binary yes/no question		x	x	
Severity of pain/discomfort	NRS-11	x	x	x	x
Pain frequency and intensity	Abdominal pain diary	x	x	x	x
Daily functioning and impact	KIDSCREEN-52	x	x	x	x
Anxiety and depression	RCADS-25	x	x	x	x
Pain beliefs	PBQ	x	x	x	x
Sleep disturbances	Sleep self report	x	x	x	x
School absence	Study questionnaire*	x	x	x	x
Somatisation	CSI	x	x	x	x
Utility	EQ-5D-Y	x	x	x	x
Costs	Adjusted iPCQ an iMCQ Medical records	x	x	x	x
<b>Evaluation of intervention</b>					
Usage of intervention†	Study questionnaire*		x	x	x
Quality of exercises†	Study questionnaire*		x		
<b>Covariates</b>					
Age	Study inclusion form	x			
Severity of pain/discomfort	NRS-11	x			
Treatment expectations	Study questionnaire*	x			

\*The study questionnaires were created specifically for this research.  
 †Only for intervention group.  
 CSI, Children's Somatisation Inventory; EQ-5D-Y, EuroQol Five Dimensions Health Questionnaire Youth; iMCQ, iMTA Medical Consumption Questionnaire; iPCQ, iMTA Productivity Cost Questionnaire; NRS-11, Numerical Rating Scale-11; PBQ, Pain Beliefs Questionnaire; RCADS-25, Revised Anxiety and Depression Scale-25.

instrument in Dutch populations.<sup>42</sup> The child or parent indicates how often each of the 20 anxiety and 5 depression items applies on 4-point scale from 0 (never) to 3 (always). Higher scores indicate more symptoms of anxiety and/or depression.

#### *Pain beliefs*

The paediatric Pain Beliefs Questionnaire (PBQ) includes 32 items that assess beliefs about abdominal pain.<sup>43</sup> Each item consists of a pain belief statement with responses ranging from not true at all (score 0) to very true (score 4). The PBQ comprises three subscales: pain threat (20 items), problem-focused coping efficacy (6 items) and emotion-focused coping efficacy (6 items). A higher score on the pain threat scale indicates a stronger belief that their abdominal pain is a threat. Higher scores on both coping subscales indicate stronger beliefs in their ability to cope with pain using problem-focused or emotion-focused strategies.

#### *Sleep disturbances*

Sleep disturbances are measured using three items from the Dutch Sleep Self Report questionnaire: 'Do you fall asleep in about 20 min?' (score reversed), 'Do you wake

up at night when your parents think you are asleep?' and 'Do you feel sleepy during the day?'.<sup>44</sup> Children or parents then indicate the frequency in the past week as: rarely (0–1 times), sometimes (2–4 times) and usually (5–7 times). Higher scores indicate more sleep disturbances.

#### *School absence*

The cost questionnaire includes an item about school absence in the past 3 months due to abdominal pain/discomfort. Where absence has occurred, they are asked to report the number of days the child actually attended and should have attended.

#### *Somatisation*

We use the Children's Somatisation Inventory to assess somatisation,<sup>45</sup> which includes 35 items on physical symptoms. Scores range from 0 (no problems) to 4 (a lot), and higher scores indicate more somatic complaints. The Dutch version has good psychometric properties.<sup>46</sup>

#### *Cost-utility*

The generic EuroQol Five Dimensions Health Questionnaire Youth (EQ-5D-Y) is being used for the cost-utility calculations.<sup>47</sup> It contains a descriptive questionnaire and

a visual analogue scale. The descriptive system covers five dimensions (ie, mobility, self-care, doing usual activities, pain or discomfort, and emotions). Each dimension is rated on three levels: no problems (1 point), some problems (2 points) and a lot of problems (3 points). Children use a visual analogue scale that ranges from 0 to 100 to rate their overall health (ranging from the worst to the best imaginable health). The EQ-5D-Y is feasible, reliable and valid for children aged 8 years and older.<sup>48</sup> Parents of children aged <12 years receive and complete a proxy version of the questionnaire.

### Costs

Parents provide information on both medical and non-medical costs using adapted versions of the iMTA Productivity Cost Questionnaire and iMTA Medical Consumption Questionnaire.<sup>49</sup> This covers visits to healthcare providers, prescribed medication and hospital admissions, and out-of-pocket expenses (eg, over-the-counter medication, child care, productivity losses and travel costs). In addition, researchers screen the medical records of participating children from 3 months before to 12 months after baseline, seeking to identify the number of GP visits, medication prescriptions, referrals to healthcare providers, hospital admissions and interventions for FAP.

### Evaluation of intervention

#### Usage of intervention

The website is used to collect usage data and measure adherence in the intervention group. This includes the frequency and duration of intervention use (eg, when and for how long children log in) plus data on selected exercises (eg, the exercise chosen and duration). Children are encouraged to attempt the exercises using their own imagination, without listening to the exercises. Children with technical expertise may prefer to listen to the exercises in another way (eg, downloaded). Given that this is not registered on the website, the follow-up questionnaires include an item about whether and how often children performed the exercises without using the website.

#### Quality of exercises

At 3 months, children in the intervention group rate the quality of each exercise with an overall score from 0 (bad) to 10 (excellent) and describe what they liked about the exercises and what they think could be improved.

### Covariates

The prespecified covariates are age (<12 and ≥12 years), baseline pain/discomfort severity and treatment expectations. Children and parents are asked to give their expectations of self-hypnosis by rating whether it will improve symptoms on an 11-point scale from 0 (not at all) to 10 (complete recovery). They are also asked whether they have a (strong) preference for either CAU alone or home-based guided hypnotherapy plus CAU.<sup>31</sup>

### Sample size calculation

We expect adequate relief in 55% of the CAU group and 75% of the intervention group at 12 months,<sup>3,26</sup> indicating a required difference of 20% to define treatment success. Therefore, a minimum of 90 children per group will be needed to detect treatment success with 80% power at the 5% significance level. Allowing total loss to follow-up of 10%, we aim to include 100 children per group (200 in total).

### Statistical analysis

#### Clinical effectiveness

We will use appropriate descriptive statistics to describe baseline characteristics in both groups. Estimates of treatment effects (proportions, adjusted mean differences or ORs, as appropriate) will be presented with 95% CIs and p values. All outcomes will first be analysed on an intention-to-treat basis, including all children by the group to which they were randomised. We will then perform per-protocol analyses, including children who did not perform hypnotherapy in the control group and children who started at least four out of five exercises in the intervention group, based on usage data from the website.

The primary outcome will be analysed by logistic multilevel regression modelling, considering relevant covariates. The secondary outcomes will be analysed by logistic (dichotomous variables) and linear (continuous variables) multilevel analyses to investigate the longitudinal relationship between groups. Analysis will be at the patient level for repeated measures in time (baseline, 3, 6 and 12 months), again considering relevant covariates.

#### Economic evaluation

Costs will be calculated from a societal perspective with a time horizon of 12 months. Healthcare consumption will be assessed based on current Dutch guidelines for economic evaluation,<sup>50</sup> calculating the cost for use of the intervention website based on the true resources used. We will perform both cost-effectiveness and cost-utility analyses to compare costs and effects between treatment groups. The cost-effectiveness analysis will include the primary outcome, calculating an incremental cost-effectiveness ratio with the added costs or savings expressed per additional patient with adequate symptoms relief. The cost-utility analysis will use the EQ-5D-Y outcome and express the added costs per additional quality-adjusted life year gained. Finally, we will perform bootstrap re-sampling for both cost analyses to produce confidence intervals, and we will plot cost-effectiveness planes and acceptability curves.

### Patient and public involvement

We collaborated with the Dutch Child and Hospital Foundation (*Stichting Kind en Ziekenhuis*) and incorporated their recommendations in the grant proposal, patient information letters and recruitment strategies. They have also agreed to help disseminate our results to the public. The foundation's Child Advisory Board evaluated the

user experience of the website before it was finalised for the study. Additionally, we asked eight children with FAP or IBS about the primary outcome and used their recommendations to inform our choice of ‘adequate relief’ for this purpose.

## ETHICS AND DISSEMINATION

### Ethical approval and consent to participate

The Medical Ethics Review Committee of the University Medical Center Groningen has reviewed and approved the ZelfHy study (METc2020/237). Protocol amendments are communicated to the ethics committee and participating GPs as needed. To meet the requirements of Dutch law for medical research (*Wet Medisch Onderzoek*), participating GPs are asked to agree to study protocol adherence and either parents (age <12 years), parents and the child (age 12–15 years) or the child only (age 16–17 years) are asked to provide written informed consent (online supplemental file 3).

### Dissemination

Newsletters concerning study progress and any interim results are being disseminated to participants and participating GPs via the study website and email. The study findings will also be presented at (inter)national conferences and published in peer-reviewed journals, ensuring dissemination of the results to relevant stakeholders, such as GPs (NHG), paediatricians (Dutch Association for Child Paediatrics) and patients (Child and Hospital Foundation, Dutch Digestive Foundation and thuisarts.nl). Study data will be made available on request.

## DISCUSSION

The home-based guided hypnotherapy provided in this trial represents an eHealth intervention, delivering or enhancing health services and information through the internet and related technologies.<sup>51</sup> Moreover, eHealth for psychological interventions represents an emerging clinical resource when treating children and adolescents with chronic diseases,<sup>52–55</sup> proving ideal for use in primary care due to the accessibility and low cost of the exercises. Most adults with IBS prefer remote over face-to-face hypnotherapy, but this has not been studied in children or adolescents.<sup>56</sup> A combination of this eHealth strategy with GP communication and education may help empower patients to take control of their own health and learn to manage their symptoms without the help of others.<sup>57 58</sup> This strategy supports current efforts to help children with functional complaints learn to manage, rather than completely remove, pain. Despite the expected suitability of our intervention for children with FAP or IBS in primary care, several potential issues warrant further discussion.

The primary outcome could raise questions because the European Medicines Agency and Food and Drug Administration recommend using a NRS as the primary

outcome when assessing abdominal pain.<sup>59 60</sup> However, these recommendations are based on studies in adults, with none measuring validity or appropriateness for children. Given that there is also a lack of evidence about the optimal treatment outcome in children, we have based our outcomes on recommendations for clinical trials in children with FAP or IBS. These allow the use of an overall measure of change with treatment, a meaningful clinically important difference and a percentage change in symptoms.<sup>36</sup> We therefore selected adequate relief as our primary outcome, which corresponds to an overall measure of change with treatment, because treatment in primary care aims to reduce the burden of abdominal pain or discomfort (eg, reducing school absence). Because hypnotherapy aims to reduce both abdominal pain and discomfort, we believe that adequate relief of pain/discomfort is the best outcome measure. Supporting our choice, healthcare professionals, children and parents ranked adequate relief as one of the most important outcome measures.<sup>33</sup>

This trial benefits from using a pragmatic approach characterised by strong applicability and external generalisability to real-world practice. However, this not only has low internal validity due to the lack of blinding and potential for suboptimal adherence but also precludes aetiological conclusions about the isolated effect of hypnotherapy in primary care.<sup>61 62</sup> To increase our understanding for primary care implementation, we plan to supplement this research with a qualitative evaluation of the acceptability of, and facilitators and barriers related to, home-based guided hypnotherapy.

Recruitment according to our initial protocol was hampered by fewer children than anticipated presenting to GPs with functional abdominal complaints, probably due to a higher threshold to see a GP for non-acute complaints during the COVID-19 pandemic. Therefore, we adjusted the recruitment strategy to allow self-referral by children and/or parents. Although this could result in the inclusion of children with less severe complaints, which could in turn influence the primary outcome, we still require that these children visit their GP to optimise comparability. We are keeping track of how patients are recruited to allow later evaluation of differences by the strategy used. Furthermore, we chose to rely on the GP’s assessment of FAP or IBS, in line with current practice in primary care, which also increases the external validity in terms of generalisability. Studies in specialist paediatric care often include children with FAP or IBS based on the Rome criteria, which may differ from our study population. However, by measuring the Rome criteria at baseline, we can evaluate differences between children with and without FAP or IBS according to this standard.

In summary, this protocol describes our approach to study the (cost) effectiveness of home-based guided hypnotherapy for children with FAP or IBS in primary care. In the absence of comparable research in this setting, this study could lead to hypnotherapy being



recommended as a supplement to GP-delivered CAU and could improve outcomes for these challenging disorders.

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#### REFERENCES

- Gieteling MJ, Lisman-van Leeuwen Y, van der Wouden JC, *et al.* Childhood nonspecific abdominal pain in family practice: incidence, associated factors, and management. *Ann Fam Med* 2011;9:337–43.
- Presentations of abdominal pain in Australian general practice. *Aust Fam Physician* 2004;33:968–9.
- Lisman-van Leeuwen Y, Spee LAA, Benninga MA, *et al.* Prognosis of abdominal pain in children in primary care -- a prospective cohort study. *Ann Fam Med* 2013;11:238–44.
- Rasquin A, Di Lorenzo C, Forbes D, *et al.* Childhood functional gastrointestinal disorders: child/adolescent. *Gastroenterology* 2006;130:1527–37.
- Scharff L. Recurrent abdominal pain in children: a review of psychological factors and treatment. *Clin Psychol Rev* 1997;17:145–66.
- Korterink JJ, Diederik K, Benninga MA, *et al.* Epidemiology of pediatric functional abdominal pain disorders: a meta-analysis. *PLoS One* 2015;10.
- Chiou E, Nurko S. Management of functional abdominal pain and irritable bowel syndrome in children and adolescents. *Expert Rev Gastroenterol Hepatol* 2010;4:293–304.
- Spee LAA, Lisman-van Leeuwen Y, Benninga MA, *et al.* Predictors of chronic abdominal pain affecting the well-being of children in primary care. *Ann Fam Med* 2015;13:158–63.
- Hoekman DR, Rutten J, Vlieger AM, *et al.* Annual costs of care for pediatric irritable bowel syndrome, functional abdominal pain, and functional abdominal pain syndrome. *J Pediatr* 2015;167:1103–8.
- Thomson S, Osborn R, Squires D, *et al.* *International profiles of health care systems*. Australia, Canada, Denmark, England, France, Germany, Iceland, Italy, Japan, The Netherlands, New Zealand, Norway, Sweden, Switzerland, and the United States, 2011.
- Spee LAA, Lisman-Van Leeuwen Y, Benninga MA, *et al.* Prevalence, characteristics, and management of childhood functional abdominal pain in general practice. *Scand J Prim Health Care* 2013;31:197–202.
- Rajindrajith S, Zeevenhooven J, Devanarayana NM, *et al.* Functional abdominal pain disorders in children. *Expert Rev Gastroenterol Hepatol* 2018;12:369–90.
- Korterink J, Devanarayana NM, Rajindrajith S, *et al.* Childhood functional abdominal pain: mechanisms and management. *Nat Rev Gastroenterol Hepatol* 2015;12:159–71.
- Albeda FW, Berger MY, Burgers JS, *et al.* NHG-standaard buikpijn bij kinderen. 2012. Available: <https://richtlijnen.nhg.org/standaarden/buikpijn-bij-kinderen#volledige-tekst>
- Rutten J, Korterink JJ, Venmans L, *et al.* Guideline on functional abdominal pain in children. *Ned Tijdschr Geneesk* 2017;161:D781.
- Weydert JA, Shapiro DE, Acra SA, *et al.* Evaluation of guided imagery as treatment for recurrent abdominal pain in children: a randomized controlled trial. *BMC Pediatr* 2006;6:1–10.
- Gulewitsch MD, Müller J, Hautzinger M, *et al.* Brief hypnotherapeutic-behavioral intervention for functional abdominal pain and irritable bowel syndrome in childhood: a randomized controlled trial. *Eur J Pediatr* 2013;172:1043–51.
- Newlove-Delgado TV, Martin AE, Abbott RA, *et al.* Dietary interventions for recurrent abdominal pain in childhood. *Cochrane Database Syst Rev* 2017;3.
- Rutten J, Korterink JJ, Venmans L, *et al.* Nonpharmacologic treatment of functional abdominal pain disorders: a systematic review. *Pediatrics* 2015;135:522–35.
- Gulewitsch MD, Schlarb AA. Comparison of gut-directed hypnotherapy and unspecific hypnotherapy as self-help format in children and adolescents with functional abdominal pain or irritable bowel syndrome: a randomized pilot study. *Eur J Gastroenterol Hepatol* 2017;29:1351–60.
- Gonsalkorale WM, Whorwell PJ. Hypnotherapy in the treatment of irritable bowel syndrome. *Eur J Gastroenterol Hepatol* 2005;17:15–20.
- Lowén MBO, Mayer EA, Sjöberg M, *et al.* Effect of hypnotherapy and educational intervention on brain response to visceral stimulus in the irritable bowel syndrome. *Aliment Pharmacol Ther* 2013;37:1184–97.
- Lyszczek M, Karkhaneh M, Gladwin KK, *et al.* Adverse events of Mind-body interventions in children: a systematic review. *Children (Basel)* 2021;8.
- Gordon M, Sinopoulou V, Tabbers M, *et al.* Psychosocial interventions for the treatment of functional abdominal pain disorders in children: a systematic review and meta-analysis. *JAMA Pediatr* 2022;176:560–8.
- Medicine SOI. Mind-Body therapies in children and youth. *Pediatrics* 2016;138.
- Rutten JMTM, Vlieger AM, Frankenhuis C, *et al.* Home-Based hypnotherapy self-exercises vs individual hypnotherapy with a therapist for treatment of pediatric irritable bowel syndrome, functional abdominal pain, or functional abdominal pain syndrome: a randomized clinical trial. *JAMA Pediatr* 2017;171:470–7.
- Chan A-W, Tetzlaff JM, Altman DG, *et al.* Spirit 2013 statement: defining standard protocol items for clinical trials. *Ann Intern Med* 2013;158:200–7.
- Zwarenstein M, Treweek S, Gagnier JJ, *et al.* Improving the reporting of pragmatic trials: an extension of the CONSORT statement. *BMJ* 2008;337.
- Hyams JS, Di Lorenzo C, Saps M, *et al.* Functional disorders: children and adolescents. *Gastroenterology* 2016.

- 30 Harris PA, Taylor R, Minor BL, *et al.* The redcap Consortium: building an international community of software platform partners. *J Biomed Inform* 2019;95:103208.
- 31 Rutten J, 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 Pediatr* 2014;14:140–40.
- 32 van Tilburg MAL, Chitkara DK, Palsson OS, *et al.* Audio-recorded guided imagery treatment reduces functional abdominal pain in children: a pilot study. *Pediatrics* 2009;124:e890–7.
- 33 Zeevenhooven J, Rexwinkel R, Van Berge Henegouwen VWA, *et al.* A core outcome set for clinical trials in pediatric functional abdominal pain disorders. *J Pediatr* 2020;221:115–22.
- 34 Mangel AW, Hahn BA, Heath AT, *et al.* Adequate relief as an endpoint in clinical trials in irritable bowel syndrome. *J Int Med Res* 1998;26:76–81.
- 35 Castarlenas E, Jensen MP, von Baeyer CL, *et al.* Psychometric properties of the numerical rating scale to assess self-reported pain intensity in children and adolescents: a systematic review. *Clin J Pain* 2017;33:376–83.
- 36 Saps M, van Tilburg MAL, Lavigne JV, *et al.* Recommendations for pharmacological clinical trials in children with irritable bowel syndrome: the Rome Foundation pediatric Subcommittee on clinical trials. *Neurogastroenterol Motil* 2016;28:1619–31.
- 37 See MC, Birnbaum AH, Schechter CB, *et al.* Double-Blind, placebo-controlled trial of famotidine in children with abdominal pain and dyspepsia: global and quantitative assessment. *Dig Dis Sci* 2001;46:985–92.
- 38 Vlieger AM, Menko-Frankenhuis C, Wolfkamp SCS, *et al.* Hypnotherapy for children with functional abdominal pain or irritable bowel syndrome: a randomized controlled trial. *Gastroenterology* 2007;133:1430–6.
- 39 Ravens-Sieberer U, Gosch A, Rajmil L, *et al.* KIDSCREEN-52 quality-of-life measure for children and adolescents. *Expert Rev Pharmacoecon Outcomes Res* 2005;5:353–64.
- 40 Europe TKG. *The KIDSCREEN Questionnaires - Quality of life questionnaires for children and adolescents. Handbook.* Lengerich: Prabst Science Publishers, 2006.
- 41 Ravens-Sieberer U, Gosch A, Rajmil L, *et al.* The KIDSCREEN-52 quality of life measure for children and adolescents: psychometric results from a cross-cultural survey in 13 European countries. *Value Health* 2008;11:645–58.
- 42 Muris P, Meesters C, Schouten E. A brief questionnaire of DSM-IV-defined anxiety and depression symptoms among children. *Clin Psychol Psychother* 2002;9:430–42. 10.1002/cpp.347 Available: <http://doi.wiley.com/10.1002/cpp.v9:6>
- 43 Stone AL, Walker LS, Laird KT, *et al.* Pediatric pain beliefs questionnaire: psychometric properties of the short form. *J Pain* 2016;17:1036–44.
- 44 Steur LMH, Grootenhuis MA, Terwee CB, *et al.* Psychometric properties and norm scores of the sleep self report in Dutch children. *Health Qual Life Outcomes* 2019;17.
- 45 Walker LS, Garber J, Greene JW. Somatization symptoms in pediatric abdominal pain patients: relation to chronicity of abdominal pain and parent somatization. *J Abnorm Child Psychol* 1991;19:379–94.
- 46 Meesters C, Muris P, Ghys A, *et al.* The children's somatization inventory: further evidence for its reliability and validity in a pediatric and a community sample of Dutch children and adolescents. *J Pediatr Psychol* 2003;28:413–22.
- 47 Wille N, Badia X, Bonsel G, *et al.* Development of the EQ-5D-Y: a child-friendly version of the EQ-5D. *Qual Life Res* 2010;19:875–86.
- 48 Ravens-Sieberer U, Wille N, Badia X, *et al.* Feasibility, reliability, and validity of the EQ-5D-Y: results from a multinational study. *Qual Life Res* 2010;19:887–97.
- 49 Bouwmans C, Krol M, Severens H, *et al.* The imta productivity cost questionnaire: a standardized instrument for measuring and valuing health-related productivity losses. *Value Health* 2015;18:753–8.
- 50 Hakkaart-van Roijen L, Van der Linden N, Bouwmans C, *et al.* In opdracht van zorginstituut nederland geactualiseerde versie. In: *Kostenhandleiding: Methodologie van kostenonderzoek en referentieprijzen voor economische evaluaties in de gezondheidszorg.* 2015.
- 51 Eysenbach G. What is e-health? *J Med Internet Res* 2001;3.
- 52 Fisher E, Law E, Dudeney J, *et al.* Psychological therapies (remotely delivered) for the management of chronic and recurrent pain in children and adolescents. *Cochrane Database Syst Rev* 2019;4.
- 53 Lau N, Waldbaum S, Parigoris R, *et al.* EHealth and mHealth psychosocial interventions for youths with chronic illnesses: systematic review. *JMIR Pediatr Parent* 2020;3.
- 54 Bonnert M, Olén O, Lalouni M, *et al.* Internet-Delivered cognitive behavior therapy for adolescents with irritable bowel syndrome: a randomized controlled trial. *Am J Gastroenterol* 2017;112:152–62.
- 55 Lalouni M, Ljótsson B, Bonnert M, *et al.* Clinical and cost effectiveness of online cognitive behavioral therapy in children with functional abdominal pain disorders. *Clin Gastroenterol Hepatol* 2019;17:2236–44.
- 56 Noble H, Hasan SS, Simpson V, *et al.* Patient satisfaction after remotely delivered gut-directed hypnotherapy for irritable bowel syndrome during the COVID-19 era: implications for future practice. *BMJ Open Gastroenterol* 2022;9.
- 57 Anderson RM, Funnell MM. Patient empowerment: reflections on the challenge of fostering the adoption of a new paradigm. *Patient Educ Couns* 2005;57:153–7.
- 58 Patient empowerment -- who empowers whom? *The Lancet* 2012;379:1677.
- 59 U.S. Department of Health and Human Services Food and Drug Administration Center for Drug Evaluation and Research. Guidance for industry: irritable bowel syndrome-clinical evaluation of drugs for treatment. 2012. Available: <https://www.fda.gov/regulatory-information/search-fda-guidance-documents/irritable-bowel-syndrome-clinical-evaluation-products-treatment>
- 60 Committee for Medicinal Products for Human Use. Guideline on the evaluation of medicinal products for the treatment of irritable bowel syndrome. 2014. Available: [https://www.ema.europa.eu/en/documents/scientific-guideline/guideline-evaluation-medicinal-products-treatment-irritable-bowel-syndrome-revision-1\\_en.pdf](https://www.ema.europa.eu/en/documents/scientific-guideline/guideline-evaluation-medicinal-products-treatment-irritable-bowel-syndrome-revision-1_en.pdf)
- 61 Ford I, Norrie J. Pragmatic trials. *N Engl J Med* 2016;375:454–63.
- 62 Patsopoulos NA. A pragmatic view on pragmatic trials. *Dialogues Clin Neurosci* 2011;13:217–24.