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ORIGINAL PAPER

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Abstract
Background Chronic pediatric headache disorders are pervasive, debilitating, and associated with high rates of comorbid anxiety disorders. The combination of headaches and anxiety presents unique challenges for clinicians. Cognitive behavioral therapy (CBT) is a promising treatment for pediatric headache, however, available treatments fail to adequately address comorbid psychopathology resulting in less than optimal response rates.
Objective This case study illustrates the use of a family-based CBT for treating comorbid pediatric headache and anxiety disorders.
Methods A 10 year old boy with chronic daily headache was evaluated and treated as part of the Children's Headache and Anxiety Management Program (CHAMP). The patient and his parents were evaluated by an independent evaluator (IE) at pre- and post-treatment and one-month follow-up. Evaluations consisted of structured interviews as well as parent and child self-report measures of headache and anxiety symptoms and impairment. At baseline the child met diagnostic criteria for chronic headache disorder, separation (SAD), and generalized anxiety disorders (GAD), and had significant symptoms of obsessive–compulsive disorder (OCD). Treatment included 8 conjoint sessions of CBT.
Results Post-treatment evaluation revealed a significant reduction in headache-related severity and disability (but not frequency), and loss of initial GAD (but not SAD) diagnosis. By the one-month follow-up, the child no longer met criteria for any anxiety disorder and was no longer disabled by headaches. The case highlights how CHAMP may be effective in reducing headache and anxiety symptoms and associated impairment.
Conclusions This case illustrates the challenges in treating this population and suggests specific interventions that might enhance treatment outcome.

Keywords Children · Headaches · Anxiety · Cognitive behavioral therapy · Parenting

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Introduction

Chronic pediatric headache disorders are pervasive and debilitating. An estimated 10% to 30% of youth experience weekly headaches that account for several hundred school absences each month and are associated with lower academic performance (Egger et al. 1998; Stang and Osterhaus 1993). Chronic headaches are associated with higher rates of sleep disturbance, excessive daytime sleepiness (Bursztein et al. 2006; Miller et al. 2003), social withdrawal, and higher levels of family conflict (Abu-Arefeh and Russell 1994; Breuner et al. 2004; Frare et al. 2002; White and Farrell 2006). Furthermore, pediatric headaches pose a heavy burden on the healthcare system. Each year, over 10 million children are seen in primary care and emergency departments because of headaches, and headaches are the third most common reason for referral to emergency departments (Bulloch and Tenebein 2000; Kabbouche et al. 2008). If ineffectively treated, chronic pediatric headaches can persist into adulthood (Bille 1997; Brna et al. 2005). Given the high prevalence and economic, societal, and personal costs of headaches, effective treatments are needed.

Behavioral treatments, such as relaxation training and biofeedback have demonstrated efficacy in reducing headache frequency and severity (Holden et al. 1999), however, there is room for improvement given that many youth remain symptomatic after these treatments (Allen et al. 2002; Andrasik et al. 2003; Bussone et al. 1998; Powers et al. 2001; Smith et al. 1991). Cognitive-behavioral therapy (CBT) has demonstrated efficacy with a wide range of pediatric medical and psychiatric conditions and has been successfully applied to pediatric headaches (Kroener-Herwig and Denecke 2002; Palermo et al. 2009, 2010; Trautmann and Kroner-Herwig 2010). The empirical literature examining CBT for pediatric headache disorder is growing and results are promising. Across studies, the majority of children treated with CBT report significant improvement in headache frequency and severity. However, many youth continued to have clinically significant headaches and treatment has not been consistently associated with a reduction in medication usage (Griffiths and Martin 1996). One reason for less than optimal response rates may be that key factors that maintain headaches (i.e., psychiatric comorbidity and parental accommodation) are not adequately addressed in treatment.

It is well documented that youth with chronic headaches have high rates of comorbid psychopathology (Larsson and Sund 2005; Pakalnis et al. 2005; Seshia 2004; Vulic-Prtoric and Macuka 2006). One study found that 84% of youth with chronic headaches had a comorbid psychiatric disorder, most commonly anxiety (35%) and depressive (23%) disorders (Liakopoulous-Kairis et al. 2002). Treatment of children with headache disorders and comorbid psychopathology is complex but necessary to achieve optimal outcomes. Indeed, evidence suggests that untreated psychiatric comorbidity is associated with poor treatment outcome in children with chronic headache (Guidetti et al. 1998). In addition, evidence suggests that children's pain-related disability is exacerbated by parental reinforcement of sick-role behavior (Peterson and Palermo 2004) and that parental involvement in treatment may enhance outcomes for youth with chronic headaches (Allen and Shriver 1998). Parent pain behavior management training may enhance treatment outcome by enlisting the support of parents and working with them to adjust environmental contingencies that maintain illness behavior. Unfortunately, most behavioral treatments for headaches do not adequately train parents on how to eliminate sick-role behaviors.

Taken together, current behavioral treatments for pediatric headache disorders have two shortcomings which may explain why many youth remain symptomatic and few achieve

full remission. First, the majority of behavioral treatments fail to adequately address the etiological, maintaining, and exacerbating role of psychiatric comorbidity (primarily anxiety symptoms/disorders). Second, most behavioral treatments do not adequately incorporate the parents as agents of change in the therapeutic process. To address the real world needs of children with chronic headache disorders and comorbid psychiatric symptoms and improve outcomes, a broader treatment model is needed to provide a framework for refining existing behavioral treatments and informing clinicians on how best to intervene with these children.

The purpose of the present case study is to present and illustrate an intervention model that draws on the existing literature and provides a framework for incorporating a comprehensive set of treatment strategies designed to reduce comorbid headache and psychopathology in youth. While the intervention strategies are not new, they are applied to a case that represents the real-world presentation of youth with headache disorders in a way that will assist clinicians in determining how to manage these common clinical challenges. The paper concludes with a discussion of clinical implications as well as recommendations for practitioners who work with children afflicted with headaches and anxiety.

The Intervention Model

Current understanding of the co-occurrence of pediatric headache and psychiatric symptoms is informed by the biopsychosocial model of chronic pain (Gatchel et al. 2007). Within this framework, children's headache pain is viewed as multidetermined and influenced by a combination of biological, psychological (anxiety), and social/environmental factors (parenting behaviors). This model guided the development of the Children's Headache and Anxiety Management Program (CHAMP) which is a family-based intervention grounded in cognitive-behavioral and operant conditioning theories. This theoretical framework and supporting empirical literature were used to guide the selection of intervention strategies. CBT skills target the core symptoms of headaches and anxiety (cognitive, somatic, and behavioral) and include: cognitive strategies (i.e., cognitive restructuring to reduce maladaptive cognitions related to pain and anxiety), somatic strategies (i.e., relaxation training), and behavioral strategies (e.g., having children engage in activities despite pain, facing anxiety provoking situations). Using a family-based approach, these skills are taught to both parent and child and parents also learn operant learning strategies to encourage adaptive coping during headache and anxiety-provoking episodes. Specifically, parents learn pain behavior management skills (i.e., to eliminate reinforcement of sick-role and avoidant behavior) and contingency management (i.e., to eliminate parental accommodation by rewarding healthy and brave behavior). In addition, parents are provided with psychoeducation to address other parenting behaviors that may maintain pain and anxiety (e.g., overprotection). Compared to a traditional medical model, this model emphasizes the reciprocal relationships among pain, affect, and parenting and includes a set of therapeutic strategies that can be tailored to meet the specific needs of pediatric headache patients who (more commonly than not) present with untreated psychopathology. The intervention, applied to a case, is described in greater detail following a brief description of the assessment procedures and the patient's background and diagnostic profile.

Methods

After several failed therapies, Brian and his mother were referred to the CHAMP study by a neurologist in a regional headache treatment center. They presented for treatment in the CHAMP research study in the spring of 2010. The study was supported by a grant from the Migraine Research Foundation and the study protocol was approved by the institutional review board. Prior to the initial evaluation, Brian and his parents provided informed consent/assent. The initial evaluation consisted of a semi-structured diagnostic interview, clinician administered measures, and several parent and child self-report measures of headache and anxiety symptoms and impairment. Measures were selected based on their ability to assess symptoms and disorders to determine eligibility, identify treatment targets based on hypothesized treatment mediators (i.e., parenting behaviors), and monitor treatment progress in terms of functional impairment.

Measures of Symptoms and Disorders

Anxiety Disorders Interview Schedule: Child and Parent Versions (ADIS-IV-C, ADIS-IV-P; Silverman and Albano 1996). The ADIS-IV assesses a broad range of disorders in youth and possesses the best psychometric profile for diagnosing childhood anxiety disorders of available diagnostic measures (Rapee et al. 1994; Silverman et al. 2001). ADIS interviews were conducted by doctoral and master's level independent evaluators (IEs) who received rigorous training as part of a larger clinical trial.

Clinical Global Impression-Severity (CGI-S) and Improvement (CGI-I) Scales (Guy 1976). The CGI scales are IE-rated measures of global anxiety severity and improvement for the past week and are commonly used in clinical trials. Parallel measures were constructed to evaluate overall severity and improvement of headaches for the past week.

Screen for Child Anxiety Related Emotional Disorders (SCARED; Birmaher et al. 1997, 1999). The SCARED is a widely used self-report measure of pediatric anxiety symptoms with parallel child and parent versions. The SCARED has solid psychometric properties (Birmaher et al. 1997, 1999; Muris et al. 1998) and is sensitive to treatment response (Birmaher et al. 2003).

Daily Headache and Anxiety Diary. A daily diary was used to track the frequency, severity, and duration of headache episodes and anxiety symptoms, as well as medication use and missed school/activities. Daily headache diaries are reliable and valid measures of pediatric pain perception (Allen and Mathews 1998; McGrath 1987). Severity ratings range from 0 (no pain/no anxiety) to 10 (the most severe pain/anxiety).

Measures of Functional Impairment

Pediatric Migraine Disability Assessment (PedMIDAS; Hershey et al. 2001, 2004). The PedMIDAS is the most commonly used IE-administered measure of pediatric migraine disability/impairment and includes four "disability grades:" 0–10 = little to no disability, 11–30 = mild disability, 31–50 = moderate disability, and >50 = severe disability. The measure has sound psychometric properties and is sensitive to treatment response (Hershey et al. 2001, 2004).

Global Assessment Scale for Children (CGAS; Shaffer et al. 1983). The CGAS is a widely used clinician-rated measure of global functioning with sound psychometric

properties (Green et al. 1994). The scale ranges from 1 to 100 with values indicating the degree to which symptoms interfere with overall functioning. Higher scores indicate better functioning.

Measure of Parenting Behaviors

Adult's Responses to Children's Symptoms (ARCS; Van Slyke and Walker 2006). The ARCS is a measure of parenting behavior in response to child illness and includes parallel parent and child versions. Only the Protect subscale was used because it assesses parenting behaviors most associated with reinforcement of illness-related behavior and this was a primary treatment target. The scale consists of items that assess the extent to which parents, as a result of the child's headaches, limit the child's activities (e.g., let child sleep late or stay home from school), grant special privileges (e.g., bring the child special treats or gifts), and relinquish the child from responsibilities (e.g., doing the child's chores for him/her). Internal consistency for this scale is adequate (alpha = .87) (Van Slyke and Walker 2006).

Patient Presentation

At the time of the initial evaluation, Brian (name and identifying information changed to protect confidentiality) was a 10 year old, Caucasian boy who lived with his biological parents and older sister. His developmental history was normal and his medical history was unremarkable with the exception of headaches. Brian was enrolled in the 4th grade and his academic performance was above average. Prior to his illness, he was outgoing, had several good friends, and was active in the local children's theater, swimming, and soccer. Based on information obtained from the initial evaluation, Brian met diagnostic criteria for chronic daily headache (CDH), generalized anxiety disorder (GAD), separation anxiety disorder (SAD), and had significant but subclinical obsessive compulsive (OC) symptoms. A brief description of his core headache and anxiety symptoms and associated impairment is presented below.

Headache History

Brian reported new onset of daily headaches beginning in the fall of 2009 with headache severity fluctuating from mild to severe throughout the day. Neurological disease was ruled out with imaging. Within several weeks of the onset of CDH, Brian was leaving school early every day due to worsening of headaches. Shortly thereafter, his mother withdrew him from school and began home-schooling him. Brian wanted to return to school but was worried that his headaches would get worse. His mother quit her job in order to stay home with him and devote all of her time to monitoring and managing his headaches. Around this time, Brian also stopped engaging in most social and recreational activities and began sleeping approximately 15 hr/day. In addition, he avoided many situations (e.g., crowded places, birthday parties, soccer practice) for fear that the noise or commotion might trigger or worsen a headache. His parents tried to eliminate potential headache triggers by controlling the lighting and noise level in their home, limiting his time outside in the heat, permitting him to sleep late, withdrawing him from school and allowing him to have a shortened home-school day with frequent breaks. Brian's parents acknowledged that they

reinforced his illness behaviors by giving him special attention, doing his chores for him, and reducing expectations for completing school work. Past treatments included various over-the-counter analgesics (Tylenol, Advil, Ibuprophen) and allergy medications (Claritin) as well as prescription agents including Pamelor (nortriptyline) and Topamax (topiramate). These latter medications were quickly discontinued after 1 week due to side-effects including increased anxiety and skin rashes. In addition, Brian's mother sought out nontraditional therapies including chiropractics, acupuncture, and liver and parasite cleanses. None of these interventions were successful in reducing the frequency or severity of headaches. At time of evaluation, Brian was taking "as needed" (PRN) administrations of Midrin (isometheptene, dichloralphenazone and acetaminophen) or Dolgic (acetaminophen and butalbital). He reportedly used these medications 5/7 days per week on average. These medications were somewhat effective in reducing headache pain but the effects were temporary and Brian complained of sedating side effects. During the trial, Brian's medication use was carefully monitored.

Anxiety History

Brian had a history of anxiety since early childhood though prior to the current evaluation he was never diagnosed or treated for anxiety. In terms of GAD symptoms, he worried extensively about his school performance (e.g., getting good grades, making mistakes, upsetting his teachers), making others proud of him, and never getting in trouble at home or school. Brian also worried about how well he was doing in recreational activities including sports, drama, and choir. He worried about being injured or killed in a number of situations including riding in elevators and being in tall buildings. Due to excessive worry, he was easily fatigued, unable to concentrate, emotionally labile, and complained of chronic muscle aches and difficulty sleeping. Prior to the evaluation, neither Brian nor his parents recognized the extent of his worry and the detrimental impact it was having on his emotional and physical health.

In terms of SAD symptoms, Brian described having a strong feeling that "something bad will happen" to him or his family when they were not together. He avoided sleeping alone and in the dark for fear that ghosts, monsters, or kidnappers would hurt him or take him away from his family. Brian explained that, when he is not with his family, he "feels miserable" because he cannot sleep, relax, or have fun due to worries that he might not see them again. He cried when he spoke about his sister's plans to attend a sleep-away camp for several weeks during the upcoming summer and stated that he worried about something bad happening to her. To prevent distress, there was a great deal of accommodation. He was allowed to miss sports practices and games, social activities, and choir if a family member was not able to accompany him. His parents made special arrangements with their church for him to be in the same Bible study class with his sister even though the class was intended for older children. His mother had a tendency to under-estimate the negative impact of his anxiety stating that she thought it was "sweet" that he wanted to be with his family all the time.

Finally, in terms of OC symptoms, Brian regularly experienced distress when his hands were soiled. He requested hand sanitizer several times a day and his mother kept bottles of sanitizer in the car, throughout their home, in her purse, and in his classroom. His mother stated that she accommodated his compulsive hand washing/sanitizing because she thought it was "cute" that a little boy would be so concerned about having clean hands. Brian and his mother denied that these symptoms produced any distress for him because his compulsive behaviors were always accommodated by having hand sanitizer available.

The CHAMP Treatment

Therapists

The authors developed the treatment manual, child workbook, and served as co-therapists for Brian and his family. The workbook included handouts that were used in session, out-of-session assignments, and daily headache and anxiety diaries.

Course of Treatment

A total of 8 conjoint sessions were completed. Each session after the first began with a symptom check-in and review of out-of-session assignments, including the daily headache and anxiety diary and parenting behavior diary (which are assigned at the end of each session) and each session (except the first) included an in-session behavioral exposure. The out-of-session practice tasks (after the first session) included new behavioral exposures and continued practice of the exposures completed in previous sessions. Below is a brief description of the content covered in each session.

Session 1

Session Objectives

To establish rapport and instill hope, provide psychoeducation about headaches and anxiety, and identify healthy lifestyle habits that may reduce headaches.

Session Skills

The therapists provided psychoeducation about headaches and anxiety, taught the family how to identify key signs of headaches/anxiety, and presented an overview of the CHAMP model and intervention strategies. To illustrate, we explained that anxiety and headaches show up in three ways: negative thoughts about danger/threat ("I might get hurt") and/or inability to tolerate pain ("I can't go to the party, I might get a headache and it will never go away"), bodily reactions (e.g., heart beating faster, stomachaches, trembling), and behaviors (e.g., fidgeting, crying, and avoidance). We emphasized that *avoidance* increases and maintains anxiety as well as headache-related disability and will therefore be a primary treatment target. Next, the importance of healthy habits was reviewed and potential health-related headache triggers (e.g., sleep, hydration, exercise, nutrition) were identified as targets for change. During the session, Brian complained of a moderately severe headache and stated that he was tired. In response, his parents rubbed his back, gave him sunglasses to wear, gave him a caffeinated drink, and suggested that he put his head down and rest. Based on these observations and data from the initial evaluation, it was clear that unintentional parental reinforcement of illness behavior would be a target of treatment. Finally, Brian's parents conveyed their reluctance to accept our conceptualization of his illness (i.e., that there is a reciprocal relationship between anxiety and headaches and that avoidance maintains anxiety and illness behavior) and minimized the role of anxiety in the course of his illness. To address their concerns, we provided empathy and reassurance that we understood parents were doing what they believed was best for their child and that

anxiety is very common and sometimes difficult to identify. We discussed how traditional medical interventions had not provided symptom relief and that, since chronic illness-related behaviors and disability are reinforced by environmental factors, we were optimistic that a behavioral approach could provide some symptom relief.

Out-of-Session Assignments

Increase water intake to 8 glasses a day and reduce sleep to 10 h/day. To improve his mood and level of physical activity, Brian was asked to engage in one pleasurable activity each day and complete the headache and anxiety diaries.

Session 2

Session Objectives

Review CHAMP model, begin plan for reducing avoidance, and teach contingency management skills to parents.

Brian's Progress

Brian's diaries indicated no change in the frequency or severity of headache or anxiety episodes during the past week. He reported daily headaches and an average severity rating of 8 for headaches and 7 for anxiety (on a 0–10 scale where "0" indicates no pain/no anxiety and "10" indicates the most severe pain/anxiety). He used his PRN medications five times during the past week. Brian reported that he increased his daily intake of water to 8 glasses but continued to sleep 12–15 hr/day. He attempted to engage in pleasurable activities but reported that he never really enjoyed them because he always had a headache and was worried about something bad happening.

Session Skills

After reviewing the model, the therapists provided a rationale for reducing avoidance related to headache episodes and anxiety-provoking situations. Specifically, we described how "*Running away from things that make you feel scared or nervous reduces your anxiety and makes you feel better in the short term, but in the long term, running away actually increases anxiety because you never have a chance to learn that you can handle the anxiety and that all of those terrible things that anxiety tricks you into believing are often not true. So, if you want to shrink your anxiety, you have to face your fears. The same is true for headaches. When you avoid doing things because of headaches, you teach yourself that you are incapable of doing things because you're ill and you begin to see yourself as "sick and helpless."* The therapists worked with Brian and his parents to develop a hierarchy (i.e., a list of situations, in order from least to most difficult, that are avoided due to headaches and/or anxiety) for behavioral exposures. The therapists explained that, in order to reach a goal—like facing a big fear or functioning in spite of headaches, it helps to break it down into small, manageable steps. Brian's hierarchy items are listed in Table 1. Next, Brian's parents were taught contingency management skills which included a discussion of how parents can help children make behavioral changes by using positive reinforcement

(e.g., attention, praise, rewards) to increase the frequency of well and brave behaviors while withdrawing parental attention/reinforcement to reduce pain and anxiety related behaviors (e.g., avoidance). Finally, parenting behaviors that can maintain child illness and anxiety symptoms were described. Specifically, it was explained that: (a) parental over-control (i.e., behaviors that are restrictive, overprotective, and lacking in autonomy granting) minimizes children's opportunities to develop autonomy and a sense of mastery and this can exacerbate anxiety and dependence. Thus, parents were asked to monitor these behaviors using the parenting diary and begin to allow Brian greater autonomy by encouraging him to complete his morning and evening routines independently; and that (b) parental accommodation and reinforcement of sick-role behavior maintain child symptoms. It was explained that "*When children are chronically ill and receive special rewards or are permitted to miss out on responsibilities or activities, they may come to believe that they cannot function during headache episodes. Overtime, it becomes more rewarding to be sick than to be healthy. On the other hand, when parents encourage children to function in spite of headaches, they will reinforce coping behavior as opposed to illness-related behavior- and that will reduce disability. We are going to shift the focus toward healthy behavior and make that more rewarding*." Brian's parents were asked to

Table 1 Goals for behavioral exposures: Brian's hierarchy

Target symptom	Situation	Level of difficulty (0–8)
Headache	Complete 30 min blocks of school work	3
	Attend soccer practice (with a parent)	3
	Play in soccer games	3
	Attend birthday parties	4
	Attend school for half days	5
	Spend time in crowded places	6
	Attend school for a full day	7
	Return to school full time	8
Anxiety	Ride in elevator with family	2
	Rub flour on hands and refrain from washing for 5 min	3
	Attend soccer practice/game without a family member present	4
	Rub dirt on hands and refrain from washing for 5 min	4
	Practice being assertive with family	4
	Limit use of hand sanitizer	5
	Ride elevator alone	5
	Attend play date without a family member present	6
	Practice being assertive with friends	6
	Sleep upstairs, in the dark, alone	7
	Attend Bible study class without a family member present	7
	Refrain from asking questions before going to a new place	7
	Spend weekend with grandparents	8
	Attend sleepovers	8

Level of difficulty ranges from 0 to 8 where 0 is not at all challenging and an 8 is extremely challenging

use the parenting diary to monitor these behaviors so they could receive specific instructions during upcoming sessions on ways to eliminate these behaviors.

Out-of-Session Assignments

Complete 30 minute blocks of schoolwork and attend soccer practice (with parents) for at least 30 minutes.

Session 3

Session Objectives

Teach relaxation exercises and parent pain behavior management strategies.

Brian's Progress

Brian and his parents reported having "a good week" with a mild reduction in anxiety (average severity rating = 7) and headache severity (average severity rating = 6) but no change in headache frequency. Despite having pain, Brian did not use any medication (OTC or prescription) and explained that he wanted to try to "live with the pain and not feel like I'm in a fog." Behaviorally, Brian increased his level of daily activity by attending one soccer practice, singing in a church concert, and completing his daily schoolwork assignments. During the discussion about anxiety-provoking situations, his parents indicated that they were able to see how anxiety was playing a role in his daily life and might be making his headaches worse. Nonetheless, they had difficulty allowing him to complete his morning and evening routines independently explaining that if *they* do them, they will get done correctly and more efficiently. In response, the therapists explained, "*We understand that parents sometimes exercise more control because they want things to go smoothly for their children and think it's easier if they do everything themselves. However, in the end it may inadvertently teach children that they are incapable of doing things for themselves and it prevents them from mastering skills, like independent self-care, that parents find important and want their children to learn*."

Session Skills

The concept of physiological tension and its association with headaches and anxiety was provided. The therapists explained that "*Having too much anxiety can lead to a build-up of tension in the body. However, you can control the tension in your muscles and your whole body. Learning how to relax your body can help you lower your heart rate and blood pressure; slow down your breathing; reduce stress and negative feelings like anxiety, anger, and irritability; reduce headaches and stomachaches; and can even help you sleep better.*" The therapists taught Brian and his parents deep diaphragmatic breathing exercises and progressive muscle relaxation (PMR) which consisted of gently tensing and relaxing all the muscle groups from head to toe. Next, Brian's parents were taught specific parent pain behavior management strategies (see Allen and Shriver 1998) which consisted of: encouraging activity during headaches; expecting Brian to attend school, do chores, participate in activities (e.g., practices, clubs); not permitting a reduced work load; praising and rewarding activity such as attending soccer and doing homework; limiting status

checks (i.e., asking whether he has a headache and how he is feeling); recognizing and rewarding his independent coping behavior; and shifting attention away from illness behavior and toward wellness behavior. Finally, Brian completed an in-session exposure consisting of riding the elevator several times until his self-reported level of anxiety decreased to a minimal level.

Out-of-Session Assignments

Practice relaxation and attend soccer practice (without parents), play in soccer game (with family present), attend a birthday party for at least 30 minutes, and rub flour over hands and refrain from washing for 5 minutes. Brian's mother was assigned the task of contacting the school to arrange for him to be gradually reintegrated into his classroom.

Session 4

Session Objectives

Teach cognitive restructuring.

Brian's Progress

Brian's diaries indicated slight but continued improvement in average anxiety (severity = 5) and headache (severity = 5) symptoms. Although there was no change in headache frequency, the family was very enthusiastic about Brian's progress and attributed his reduction in symptoms to the parents giving him more attention when he is "powering through his headaches," their insistence that he function in spite of headaches, and the behavioral exposures which have helped to reduce some of his anxiety and make him feel more confident. He used medication on two occasions during the preceding week and explained that he took the medication to ensure that his headache would not stop him from enjoying a friend's birthday party or catching up on his schoolwork.

Session Skills

The clinicians introduced the concept of negative "self-talk" related to headaches and anxiety. Brian and his family were taught to identify negative thoughts ("*I can't go to the party because it will be too noisy and my headache will get even worse and I'll feel terrible*"), challenge distorted thoughts using Socratic questioning and examining evidence to support or dispute the thoughts (e.g., what is the evidence for and against that thought? What might happen instead? Even if your headache gets worse, could you survive it?), and generate coping thoughts ("*I'm going to try to stay at the party as long as I can. Even if it's loud and I get a headache, I'll still get to see my friends and I might have a good time*"). They were instructed to ask the following types of questions in order to examine the validity or helpfulness of thoughts: what's the worst thing that could happen? Is it really that bad? Is it likely to happen? Would I feel bad forever? Is it going to matter a week, a month, or a year from now? Is this thought helpful? What could be positive about the situation? What's another way to think about it? The answers to these questions can help increase doubt about scary thoughts and generate more realistic, coping thoughts. During the session, Brian, like many children his age, had some difficulty identifying his negative

thoughts about headaches and anxiety-provoking situations. When asked what was scary about a particular situation (e.g., returning to school), he responded by stating: "*I don't know. I'm not thinking about anything. I just know that I feel scared.*" The therapists explained that it can be difficult to identify thoughts and that it is a skill that requires a lot of practice. Sometimes, it is easier to identify scary thoughts in the moment when facing a fear or feeling nervous. To help him practice, his parents were taught how to use Socratic-type questioning to help elicit the nature of his fears during the behavioral exposures and any other times when he was feeling anxious. Finally, the in-session exposures included riding the elevator to the top floor of our 9 story building several times until he reported no anxiety and rubbing dirt over his hands for several minutes and refraining from washing or using hand sanitizer. The goal was for Brian to refrain from washing his hands for 5 minutes or until his level of anxiety reduced to a minimal level. However, he seemed to have forgotten about the dirt on his hands and only washed them after using the restroom an hour later.

Out-of-Session Assignments

Get hands dirty and delay washing for longer intervals, reduce the use of hand sanitizer to once a day, role play being assertive with family members, attend a play date without a family member, and attend school for one-half day. During these exposures, Brian was asked to identify and challenge negative self-talk.

Session 5

Session Objectives

Teach problem-solving skills.

Brian's Progress

Diaries indicated a continued reduction in average anxiety (severity = 4) and headache (severity = 4) symptoms and impairment. Furthermore, for the first time since the onset of his CDH, Brian reported 1 day with no headache and only used pain medication one time during the past week because the overall severity of headaches was "more manageable." Brian was praised for getting caught up with his schoolwork and successfully attending school for one-half day. Despite his success, Brian was reluctant to return to school for longer periods of time. The therapists reviewed CHAMP skills and focused on helping him identify and challenge his distorted beliefs. Brian acknowledged that he was worried that "*Everyone is going to be looking at me and wondering where I've been…they're going to think there's something wrong with me.*" We examined the likelihood of his fear ("*since you haven't been in school for 5 months, there's a good chance that they will look at you and notice that you're back*") and used Socratic-questioning to facilitate alternative explanations/outcomes ("*How do you know that people will be thinking bad things about you when they look at you?*" "*What are some other things that they may think when they see you?*" "*Will anyone be happy to see you back in school?*"). By the end of this process, Brian determined that there was little evidence to support his fear that people will think poorly of him and that many of his peers may react to him in a positive way. He was able to develop helpful/coping thoughts about returning to school ("*It will be fun to see my friends*

again. If people look at me, it's probably just because they're curious about where I've been, and that's normal"). The therapists recommended that he write a list of coping thoughts (e.g., "*Even if I get a headache, I can handle it*," "*Maybe my friends and teachers will be happy to see me*") on a note card so that he could carry it with him throughout the day and refer to it whenever he started to feel anxious. In addition, his parents were making progress in terms of rewarding coping behavior and removing reinforcers for illness/avoidant behavior. As one example, Brian's mother explained how she did not pay attention (or give in) to Brian's attempts to delay his return to school. Instead, she told him how proud she was that he was being so courageous and that she was excited for him to earn a "family game night" as a reward for his effort. In addition, his parents were encouraging him to complete morning and evening routines independently, engage in more daily activities, and were no longer asking for status checks.

Session Skills

To teach problem-solving it was explained that higher levels of stress can come from having too many problems (e.g., conflict with parents, siblings, and peers), letting problems build up, and not having a good method for solving problems. Becoming a better problem-solver can reduce conflicts and stress/anxiety which can, in turn, reduce headaches. Next, the family was taught problem-solving skills by using the *SOLVE* method where S = Settle down (it is better to try to solve problems when you are calm), O = Own the problem (identify the part of the problem that is under your control), L = List solutions (be creative and brainstorm solutions without judging them), V = Vote for one solution based on the pros and cons of each one, E = Engage in the best solution and evaluate the outcome. If the problem is not solved, go back to the list and choose another solution. After practicing the SOLVE method in session, Brian engaged in his in-session exposures which included riding the elevator alone (which no longer elicited any anxiety) and role-playing being assertive with friends. He stated that the role-play was helpful because it gave him a chance to practice what he wanted to say and that made him feel more confident.

Out-of-Session Assignments

Sleep upstairs alone, sleep in dark room, practice being assertive with friends, attend Bible study class alone, spend at least 20 minutes in a crowded place, attend school for a half day three times, and ask no more than 2 questions when facing an "unknown" situation (to reduce reassurance-seeking behaviors).

Sessions 6–8

Session Objectives

Review skills and discuss relapse prevention strategies.

Brian's Progress

Brian and his parents reported a steady reduction in average anxiety (severity = 2) and headache (severity = 3) symptoms over the last few sessions. He also reported several days with no headache, less pain medication use (an average of one OTC pain pill per week

for each of the 3 weeks), increased level of physical activity (playing soccer and/or swimming daily), and improved sleep patterns (averaging 9–10 hours of sleep each night). In terms of school attendance, he successfully attended three half-days of school during week 6, 4 out of 5 full days during week 7, and attended the full week during week 8. He reported no anxiety when riding elevators, and only minimal anxiety with sleeping alone in the dark, entering new situations, or when his hands were dirty. He was no longer using hand sanitizer. Brian also reported a positive experience when he confronted his friends and had to be assertive. His progress throughout treatment was reviewed and the family expressed satisfaction with Brian's accomplishments.

Session Skills

All CHAMP skills and parenting strategies were reviewed and the therapists discussed the importance of continued practice and relapse prevention. The goal of relapse prevention is to teach parents to anticipate recurrences of symptoms and to be proactive by continuing to practice coping skills in order to minimize the likelihood of a full relapse. It was explained that "*Sometimes when we learn something new, it's easy to fall back into old habits—we call this a 'slip.' Occasional slips are normal and common. Slips do not mean that all you learned has been forgotten or was not helpful. So, if you have a slip, you should keep it in perspective and not let it get you upset. Then, you should get back on track and continue using your CHAMP skills. Face your fears when they are still small. Engage in activities in spite of headaches. If you want to prevent these slips from happening in the first place, you have to practice. The more you practice, the better you will get*" (adapted from Silverman et al.1999). Next, we generated a list of situations that may happen in the future that could lead to a slip and developed a plan to cope with them before they happen. For example, Brian said he was worried about his sister going to sleep away camp during the upcoming summer. We discussed how he could apply CHAMP skills to develop a coping plan. His final plan consisted of challenging anxious thoughts, generating coping thoughts, relaxing his body when he feels tense, and using problem-solving skills to cope with missing her (e.g., he can call her once a day, write her letters, talk to his parents about missing her, engage in fun activities with friends). During the in-session exposure, Brian practiced being assertive by engaging in several role-plays in which he had to confront his friends whom he felt were taking advantage of him by using his toys without permission and ignoring his requests to clean up after themselves when they came to his house to play. Each role-play became increasingly more difficult as we became more confrontational to help him face his fears of being rejected by his friends for standing up for himself.

As termination approached, it was clear that Brian still had difficulty with separation events and his mother continued to engage in overprotective behaviors such as imposing limits on the amount of time he spent away from her, arranging to have his play dates at their home (as opposed to allowing him to play at a friend's house), and attending his soccer practice even after he demonstrated that he was able to go alone. This pattern and the potential consequence of reinforcing his separation anxiety were gently raised with his parents. She stated that she was aware of this but felt "lost" since she had quit her job and was devoting nearly all of her time to caring for him and home-schooling him. Her sacrifices were acknowledged and we used problem-solving skills to help her generate a plan for returning to work and granting Brian more autonomy and independence.

Out-of-Session Assignments

Continue practicing all CHAMP skills and behavioral exposures including attending school, separating from his family, attending sleepovers, visiting grandparents for the weekend, etc.

Results

Treatment Outcome and One-Month Follow-Up

Changes in Child Symptoms and Diagnoses

After 8 sessions, Brian no longer met diagnostic criteria for GAD, however, he continued to have clinically significant SAD as well as daily (but less severe) headaches. His OCD symptoms persisted at the subclinical level but were less bothersome. At the one-month follow-up evaluation, he reported only minimal symptoms, no longer met criteria for any anxiety disorder diagnosis, and was considered very much improved by the independent evaluator (IE). Figures 1, 2, and 3 display changes in IE determined diagnoses, child and parent report of anxiety symptoms, and severity ratings for headaches and anxiety across the three assessments. The pattern of findings indicating reductions in headache and anxiety symptoms and impairment was consistent across all IE-administered measures (ADIS, CGI-I) as well as parent and child reports (SCARED, Daily Headache and Anxiety Diary).

Changes in Child Functional Impairment

Headache-related disability according to the PedMIDAS decreased from 270 (severe disability) at pre-treatment, to 39 (moderate disability) at post-treatment, to 3 (no disability) at the one-month follow-up. IE-rated assessment of global functioning (CGAS) improved at each assessment and indicated minimal interference in functioning by the end of treatment and follow-up. Finally, by post-treatment, Brian was no longer taking any prescription medication for his headaches and was back in school full time just before the end of the school year. These functional improvements were maintained at the one-month follow-up. Anecdotally, Brian's mother was contacted 6 months post-treatment to discuss this case study and she reported that he was going to school full time with no hesitation, had minimal anxiety, infrequent headaches, was not taking any pain medication, and that she was able to return to work.

Changes in Parent Behavior

Both Brian and his mother reported a decline in the frequency of parenting behaviors that serve to accommodate his headaches and reinforce his illness-related behavior via secondary gain (Fig. 4). Specifically, she was no longer relinquishing him from chores, permitting him to sleep late or miss school, engaging in status checks, or giving special attention during pain episodes.

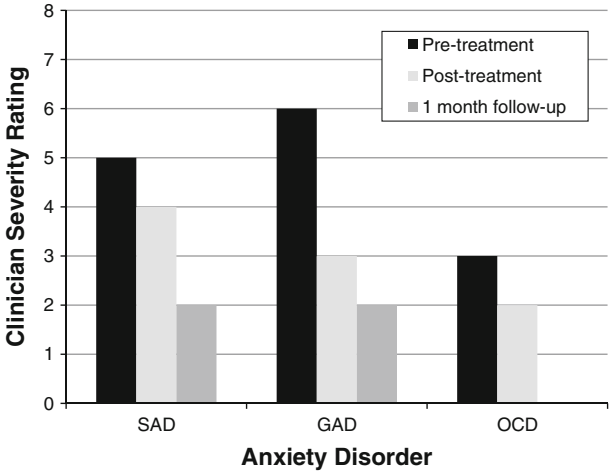

Fig. 1 Clinician severity ratings (CSRs) for anxiety disorders based on the Anxiety Disorders Interview Schedule (ADIS). CSRs of *4–8* indicate a clinically significant anxiety disorder, CSRs of *1–3* indicate subclinical levels of anxiety symptoms, and a CSR of 0 indicates normative anxiety

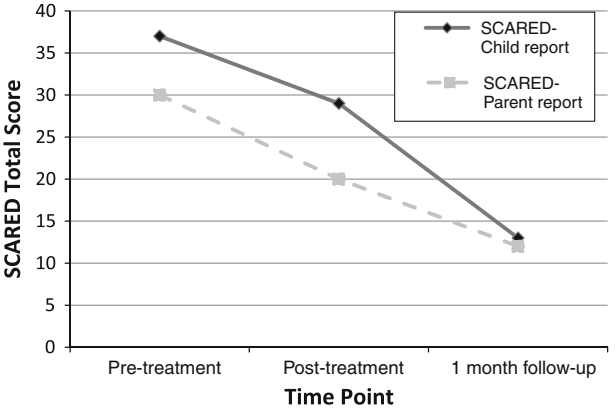

Fig. 2 Changes in child and parent report of total anxiety symptoms as measured by the Screen for Anxiety Related Emotional Disorders (SCARED). A SCARED total score ≥ 25 indicates clinically significant anxiety

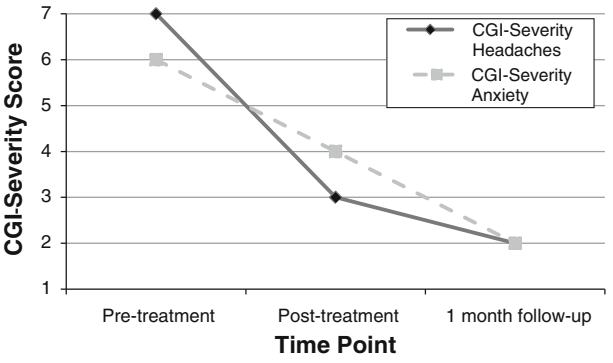

Fig. 3 Changes in independent evaluator (IE) rated severity of anxiety and headache symptoms as measured by the Clinician Global Impression—Severity scale (CGI-S) where *1* Normal, *2* Borderline ill, *3* Mildly ill, *4* Moderately ill, *5* Markedly ill, *6* Severely ill, *7* Extremely ill

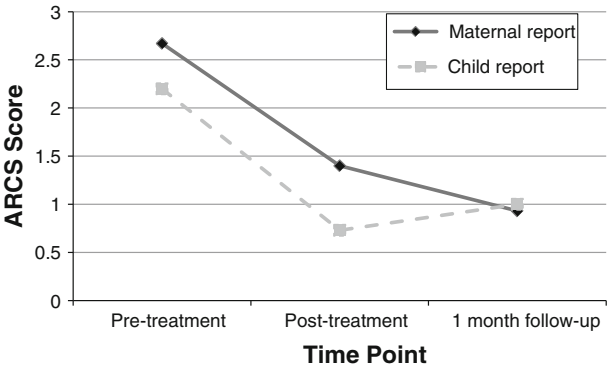

Fig. 4 Changes in maternal accommodation/reinforcement of child headache-related behavior based on the Protect subscale of the Adult Responses to Children's Symptoms (ARCS). The scale ranges from 0 to 3 with higher mean ratings indicating more maternal accommodation and reinforcement of the child's illness-related behavior

Discussion

The case presented highlights the issues involved in identifying and treating comorbid headaches and anxiety. This case was selected for its relevance to the real world presentation of children with chronic headaches for whom the contributory role of anxiety is often overlooked. Of relevance for the pediatric clinician is the lack of awareness (on the part of the parents, child, and previous medical providers) regarding the extent, severity, and impairment associated with anxiety symptoms. This may be due to a tendency for many parents to focus exclusively on physical symptoms while ignoring psychological symptoms. Perhaps due to stigma, some families are resistant to suggestions that psychological dysfunction may be related to physical symptoms. As a result, parents may not communicate mental health concerns to their pediatric medical providers. Pediatric practitioners would be well served to be on the lookout for anxiety when children complain of chronic headaches. Indeed, there is some evidence that anxiety may precipitate headache episodes (Seshia 2004), however, the relationship between anxiety and headaches is most likely reciprocal in nature. Thus, pediatric medical providers should routinely screen for psychological dysfunction and make appropriate referrals when warranted.

From this case, many lessons were learned. First, anxiety reduction skills were particularly effective in reducing Brian's overall functional impairment. Although he continued to have daily, but less severe, headaches, he "got his life back" and was able to go to school, play with other kids, attend birthday parties, play in soccer games, etc. Second, this case also highlights the tremendous burden of the child's illnesses and the role of parental accommodation in maintaining the child's symptoms and illness-related behavior. Parental involvement was a critical component of treatment. Brian's parents were unintentionally reinforcing his illness behavior and accommodating his headaches and anxiety. Shifting the environmental contingencies was necessary so that healthy and brave behaviors were rewarded (reinforced), while illness and avoidant behaviors were extinguished (not reinforced). Although parental involvement in behavioral treatments is not widely practiced for CDH, the benefits have been demonstrated in the treatment of pediatric headache (Allen and Shriver 1998) and anxiety (see Barrett et al. 1996; Suveg et al. 2006 for review).

A goal of this case study was to describe the application of a family-based CBT for children with comorbid headaches and anxiety. The findings presented are very preliminary, based on a single case with a short one-month follow-up, and subject to threats to validity. Changes in functional impairment as measured by the PedMIDAS are unusually extreme. Brian's pre-treatment PedMIDAS score was especially elevated because Brian had not attended school, engaged in school work at home, or participated in any social or recreational activities for several months prior to enrolling in the CHAMP study. Such a high score suggests severe disability, which was accurate for this case; however such an extreme score may not generalize to the majority of children with chronic headaches. Furthermore, Brian continued to make additional treatment gains during the interim between the post-treatment evaluation and the one-month follow-up. It is possible that these gains can be attributed to his continued practice of the CBT skills, positive changes in parenting behaviors, and our emphasis during the last two sessions on relapse prevention and preparing for future challenges. However, it cannot be ruled out that Brian's reduction in headaches, anxiety, and functional impairment may have been due to other factors such as spontaneous remission, reduction in medication usage (some medications may exacerbate headaches with overuse), or alleviation of stress associated with going to multiple doctor visits each week and not feeling satisfied with the treatments offered. In addition, the follow-up evaluation was conducted during the summer when there tends to be fewer stressors for school-aged children and children tend to spend more time engaging in recreational activities. A longer follow-up is needed to determine the durability of his treatment response.

Nonetheless, this case highlights the importance of evaluating the mental health of children with physical complaints and enhancing outcomes by targeting psychological and familial factors. Although medication management of chronic headaches and anxiety can be effective, many children and families may be dissatisfied with medications or reluctant to try them and prefer a behavioral treatment. Our CHAMP treatment protocol offers these families and their treatment providers a viable adjunctive (or alternative) behavioral approach which may lessen the need for medication. The CHAMP intervention yielded a positive outcome for this case and is currently being evaluated on a larger scale.

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