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A randomized controlled trial of an audio-based treatment program for child anxiety disorders

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ABSTRACT

The aim of this study was to investigate the efficacy of an audio-based cognitive-behavioural therapy (CBT) program for child anxiety disorders. Twenty-four children aged 5–11 years were randomly allocated into either the audio-based CBT program condition (Audio, $n = 12$) or a waitlist control (WL; $n = 12$) group. Outcome measures included a clinical diagnostic interview, clinician-rated global assessment of functioning, and parent and child self-report ratings of anxiety and internalisation. Assessments were conducted prior to treatment, 12 weeks following treatment, and at 3-month follow-up. Results indicated that at post-assessment, 58.3% of children receiving treatment compared to 16.7% of waitlist children were free of their *primary* diagnosis, with this figure rising to 66.67% at the 3-month follow-up time point. Additionally, at post-assessment, 25.0% of children in the treatment condition compared to .0% of the waitlist condition were free of *all* anxiety diagnoses, with this figure rising to 41.67% for the treatment group at 3-month follow-up. Overall, the findings suggest that the audio program tested in this study has the potential to be an efficacious treatment alternative for anxious children.

The high prevalence rates and chronic course of youth anxiety disorders are alarming, particularly given the later mental health difficulties and myriad of negative consequences that occur when they are left untreated (Anderson, Williams, McGee, & Silva, 1987; Ferdinand & Verhulst, 1995; Kessler et al., 2011; Newman, Kenardy, Herman, & Taylor, 1996). Although a wealth of evidence lends support for cognitive behaviour therapy (CBT) in treating anxiety disorders in children and adolescents (Silverman, Pina, & Viswesvaran, 2008), the vast majority do not receive the treatment they need (Collins, Westra, Dozois, & Burns, 2004; Essau, 2005; Green, Hunt, & Stain, 2012; Merikangas, He, Brody, et al., 2010; Merikangas, He, Burstein et al., 2010; Sawyer et al., 2001).

So why do young people fail to receive assistance for their mental health concerns? It would seem that there are a variety of patient-level factors as well as organisational concerns. Fears about confidentiality, inadequate knowledge of services, discomfort in disclosing health concerns, high service costs, extensive waiting lists, limited mental health literacy, the stigma associated with receiving mental health care, family constraints (in terms of time, accessibility, and finance), additional parental responsibilities, single parenting, and parental unemployment have all been implicated (Booth et al., 2004; Boyd et al., 2007; Owens et al., 2002). Those living in rural areas have even higher levels of unmet need for treatment (Lin, Goering, Offord, Campbell, & Boyle, 1996; Parikh, Wasylenki, Goering, & Wong, 1996; Wang et al., 2005) and a longer delay in help-seeking (Boyd et al., 2007; Green et al., 2012) due to limited availability of specialist mental health services and distance between services and place of residence (Aisbett, Boyd, Francis, Newnham, & Newnham, 2007; Green et al., 2012).

Unfortunately, the delay between onset of psychological problems and receiving effective treatment is associated with poorer outcomes (Aisbett et al., 2007; Conus & McGorry, 2002). Consequently, creative and innovative approaches in the dissemination of CBT-based interventions are being explored and the current challenge facing researchers and practitioners is to develop, and subsequently employ, more accessible methods of psychological treatments for youth in need. Thus far, both bibliotherapy and computerised programs have been investigated as potential

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alternatives to face-to-face therapy within pediatric populations.

With respect to bibliotherapy, there is scant research conducted with children (Rapee, Abbott, & Lyneham, 2006). Rapee et al. (2006) investigated the impact of parents acting as therapists in a trial of bibliotherapy for child anxiety and found some evidence for its efficacy relative to a waitlist, but not when compared to a standard group CBT condition. A subsequent study investigated the same bibliotherapy program with the addition of telephone calls or emails from a therapist to the parent and found that it produced superior outcomes compared to no treatment, and equivalent outcomes to other studies using traditional face-to-face therapy (Lyneham & Rapee, 2006).

Other studies investigating bibliotherapy for youth anxiety disorders have produced similar results. Cobham (2012) compared children 7–14 years of age with an anxiety disorder receiving therapist-supported bibliotherapy, individual therapy, and a wait-list condition. Overall, children in the two active treatments demonstrated a significantly greater decrease in anxiety symptoms compared to those in the wait-list condition, with no significant differences between the two therapy conditions. A family centred study conducted on a bibliotherapy program called 'Strongest Families' that was designed to reduce symptoms of ODD, ADHD, and anxiety in children between the ages of 3–12 years (McGrath et al., 2011), found that although significant treatment effects were not found at post-treatment (120 days), the treatment group held significantly fewer anxiety diagnoses at follow-up (240 days) and at the 1-year assessment point compared to the waitlist group. Finally, a very recent pilot study investigated the efficacy of bibliotherapy in treating specific phobias in young children (Lewis, Amatya, Coffman, & Ollendick, 2015). Treatment involved parents reading a story about night-time fears and completing activities prescribed in the book. Assessments took place at baseline, post-treatment, and one-month follow-up, with results revealing that eight of the nine children demonstrated clinically significant improvements in anxiety at post- and follow-up assessment points.

As noted above, computerised therapy has also been developed as an alternative to traditional face-to-face therapy, and there are an increasing number of programs being designed to target youth anxiety disorders. The first to translate CBT into an online format were Spence and colleagues (Donovan & March, 2014a, 2014b; March, Spence, & Donovan, 2009; Spence et al., 2006, 2011). Their BRAVE–ONLINE programs are Internet-based CBT treatment programs for pre-schoolers (3–6 years), children (7–12 years), and adolescents (13–17 years). There have now been four randomised controlled trials conducted with the BRAVE-ONLINE programs. The programs have been found to be significantly more efficacious than a waitlist control for pre-schoolers, children and adolescents (Donovan & March, 2014a, 2014b; March et al., 2009; Spence et al., 2006, 2011) and equally as effective as face-to-face therapy (Spence et al., 2011).

In addition to the BRAVE-ONLINE programs, a number of other computer-based programs have been developed for youth anxiety disorders. For example, Khanna and Kendall (2010) developed a CD-ROM program called Camp Cope-A-Lot, for children aged 7–13 years with anxiety. The program involves half of the sessions being conducted via computer and half with a face-to-face therapist. Findings support the program as being equally efficacious as clinic-based CBT, with high satisfaction reported by participants (Khanna & Kendall, 2010). Also using a CD-ROM delivery mode, is the Cool Teens Program (Cunningham, Rapee, & Lyneham, 2006). Early evidence of efficacy was supported through a case series of five adolescents (Cunningham et al., 2006), with a later randomised controlled trial of the program further demonstrating its effectiveness (Wuthrich et al., 2012). For a systematic review of computer-based programs for anxiety disorders, please see Donovan and March (2014a, 2014b).

Bibliotherapy and computer-based alternatives to the more traditional face-to-face delivery of CBT for youth anxiety disorders have a number of advantages and disadvantages. Bibliotherapy is able to reach large numbers of people, is highly cost-effective, can facilitate autonomy and individuality by decreasing reliance on mental health professionals, and can serve educative and preventative functions (Rosen, 1987). Additionally, bibliotherapy for child anxiety is typically implemented at home with a caregiver and can therefore be incorporated into the child's daily routine under the guidance of a parent (Rapee et al., 2006). The advantages of using parents as therapists include: parental knowledge of their child's functioning, fears, and areas of concern; the trust and rapport that children already have with their parent and; the frequency with which the parent is present in a child's life. Similarly, computer-based interventions offer a number of advantages. They are more cost-effective, accessible, anonymous, and families are able to complete treatment anywhere where they have access to a computer and at their own pace. Computerised interventions are appealing to young people and may also provide new treatment opportunities for physically disabled patients who are unable to travel for mental health treatment (Rochlen, Zack, & Speyer, 2004). Thus, both bibliotherapy and computer-based therapy alternatives circumvent many of the barriers that traditional clinic-based therapies face.

Despite the advantages of bibliotherapy and computer-based therapies however, there are also disadvantages associated with these approaches. With respect to bibliotherapy, dropout appears to be a problem. Indeed, Rapee et al.'s (2006) investigation indicated greater dropout rates compared to traditional group therapy and the waitlist group. Specifically, 12 (13.8%) participants dropped out from the waitlist condition, 29 participants (32.2%) from the bibliotherapy condition, and 14 participants (15.6%) from the group treatment. This is an important point, as bibliotherapy is not suitable for every family. It requires a degree of independence and may not be effective for those expecting and requiring active guidance and advice from an expert.

Computerised treatments pose a number of disadvantages as well. First, there is need for a computer and fast Internet connectivity. Although a large percentage of households have computer and Internet access, there remain a proportion of individuals who do not, or for whom Internet speed is below acceptable levels, particularly in rural areas. For example in Australia, a country with vast rural and remote areas, 21% of households located outside the major cities do not have Internet access. Thus, it may well be that those most in need of computer-based therapies (i.e., those in rural and remote areas who have less access to traditional face-to-face therapy), may not be able to access them.

As is evident from the above discussion, although bibliotherapy and computer-based therapies have many benefits, they are not without their limitations and there remains a need for additional alternative treatment delivery methods to provide efficacious CBT programs for youth anxiety disorders (Calear & Christensen, 2010). This study sought to explore the efficacy of one such alternative, an audio-based program developed for the treatment of child anxiety disorders. It would seem that there has been little if any prior research conducted on audio programs for any type of disorder with any age population. Indeed, the authors were only able to find two papers in which an audio mode of treatment delivery was employed. Both studies were published prior to 1975 and involved systematic desensitisation for adult phobias (Baker, Cohen & Saunders, 1973; Kahn & Baker, 1968). Indeed, more current audio-based approaches, delivered through either CDs or mobile applications (Apps) tend to be adjuncts to therapy rather than complete CBT programs. For example, the BRAVE program (March et al.,

2009; Spence et al., 2006, 2011) provides youth with an audio BRAVE relaxation CD. Similarly, auditory Apps such as Smiling Mind (Smiling Mind, 2015) are frequently prescribed to youth by therapists as an adjunct to therapy to enable clients to practice particular strategies such as mindfulness-based exercises. Thus, there is a significant gap in the literature with respect to the empirical investigation of programs delivered in an auditory manner, in which the entire CBT program is embedded.

This study aimed to evaluate the 'Turnaround' program, an audio-based program where the entire content of the CBT program is embedded within the audio program itself. Although available for purchase in the United States, the 'Turnaround' program has not previously undergone any empirical investigation. Thus, this pilot study provides the first test of the first audio-based treatment program targeting child anxiety disorders.

It is not suggested here that auditory programs provide a 'better' alternative to traditional therapy, bibliotherapy or computer-based therapy. Rather, audio programs may provide another viable alternative that may be more attractive or useful to certain individuals. For example, those who are visually impaired or who simply prefer an audio rather than visual (such as bibliotherapy) mode of learning may prefer an audio program. Similarly, those without a computer or internet access, or who feel uncomfortable using that medium may prefer an audio program. Audio programs also offer the same benefits as bibliotherapy and computer-based therapies in that they are more flexible and less time intensive than other approaches, which further reduces barriers to treatment and increases accessibility to meet the demands of busy family lifestyles (Donovan & March, 2014a, 2014b; March et al., 2009; Spence et al., 2006, 2011). Thus, audio programs might offer youth another option in treatment service delivery.

The primary aim of this study therefore, was to investigate the efficacy of an audio-based treatment program for child anxiety through a small pilot randomised controlled trial (RCT) that compared children receiving the program to those in a waitlist condition. It was hypothesized that, from pre-assessment to post-assessment, compared to the waitlist children, children in the treatment condition would demonstrate significantly greater improvements in primary diagnostic status, clinical severity rating, global assessment of functioning, and number of diagnoses as well as significantly greater improvements in child- and parent-reported levels of anxiety and internalising problems. It was further hypothesised that these treatment gains would be maintained at 3-month follow-up.

1. Method

1.1. Participants

Tables 1 and 2 provide the sociodemographic and diagnostic information for participants respectively. Participants were 24 children aged 5–11 years ($M = 7.46$, $SD = 1.67$) and one of their parents. The ratio of male (11) to female (13) participants was relatively even (46% male, 54% female). The majority of children lived with one or both of their biological parents (70.8%) and were born in Australia. As is evident from Table 1, the majority of parents had attended university, were well educated and had relatively high incomes (Australian Bureau of Statistics, 2009a, 2009b). Children were referred to the study by parents, teachers, guidance officers, and other mental health professionals in response to advertising through school newspapers and schools throughout Brisbane, Australia.

To be included in the study, children were required to hold a primary diagnosis of separation anxiety disorder, obsessive-compulsive disorder, generalized anxiety disorder, social phobia, or specific phobia, as these are the disorders the program was designed to treat. Furthermore, a clinical severity rating (CSR) of at least 4 according to the Anxiety Disorder Interview Schedule for children (ADIS; Silverman & Albano, 1996) (see below) was required as a rating of 4 indicates a clinical level of anxiety. Table 2 outlines the baseline diagnostic information for the audio treatment group (Audio) and the waitlist group (WL).

Children were excluded from the study if they: (a) met DSM-IV criteria for a primary diagnosis of major depression, dysthymia, or any externalizing disorder at a severity rating greater than their primary anxiety disorder; (b) had a CSR greater than 5 for major depression or dysthymia anywhere in their profile, (c) met DSM-IV criteria for a pervasive developmental disorder; (d) demonstrated

Table 1
Baseline sociodemographic information (N = 24).

Demographic	Audio (n = 12)	WL (n = 12)
Age in years		
Child	7.25/.49	7.67/49
Mother	40.17/1.18	40.92/1.18
Father	43.42/1.67	41.42/1.67
Gender		
Female/male	6/6	7/5
Combined family income		
AU $41,000–AU $60,000	0	1
AU $61,000–AU $80,000	2	1
AU $81,000–AU $100,000	2	2
> AU $100,000	8	8
Highest level of education		
Mother		
Postgraduate university degree	5	3
Undergraduate university degree	3	6
TAFE	1	2
Completed year 12	2	1
Completed year 10	1	–
Father		
Postgraduate university degree	5	1
Undergraduate university degree	3	7
TAFE	–	2
Completed year 12	4	–
Completed year 10	–	1
Child's country of birth		
Australia	10	12
Canada	1	–
United Kingdom	1	–
Child's living situation		
Lives with both parents	8	9
Lives with both parents/separated	3	2
Mother	1	1

Table 2
Baseline diagnostic information (N = 24).

	Audio n = 12		WL n = 12	
	M	SD	M	SD
Severity of primary anxiety diagnosis	6.45	.29	6.33	.27
Number of anxiety diagnosis	2.91	.23	2.50	.22
CGAS rating	53.09	.91	54.92	.87
	N	%	N	%
Primary anxiety diagnosis				
Separation anxiety disorder	2	16.67	4	33.33
Social phobia	3	25.0	3	25.0%
Generalised anxiety disorder	4	33.33	4	33.33
Specific phobia	2	16.67	1	8.03
Obsessive-compulsive disorder	1	8.03	–	
Secondary anxiety diagnosis				
Generalised anxiety disorder	4	36.36	3	25.0%
Social phobia	4	36.36	2	16.67
Separation anxiety disorder	1	9.09	4	33.33
Specific phobia	2	18.18	3	25.0%

significant intellectual or physical impairment or (e) were currently receiving psychological treatment elsewhere. Families excluded from the study were provided with additional support information and potential referrals.

Fig. 1 presents the flow of participants through the study. As is evident from Fig. 1, after screening, 24 families completed the diagnostic assessment and were randomly assigned to one of two conditions; the audio program (Audio; $n = 12$) or the waitlist control (WL; $n = 12$). There were no dropouts in this study and no missing data.

1.2. Measures

Assessments were conducted at baseline, 12-weeks following

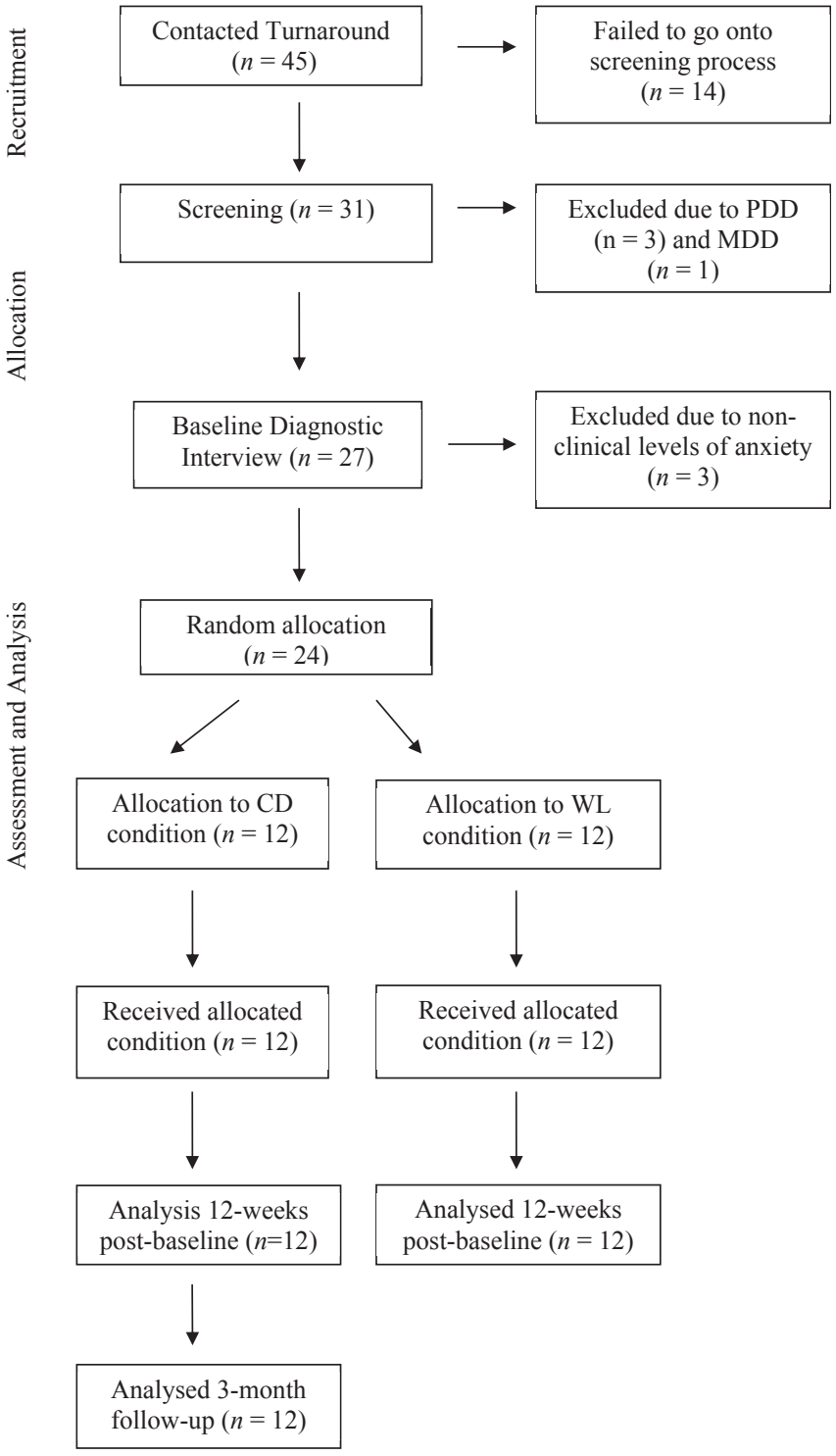

Fig. 1. Flow diagram of participants through stages of the study.

baseline (post-assessment) and 3-months after treatment completion (3-months) for those in the Audio condition, and at time points corresponding to baseline and post-assessment for the WL group. Expectancy and credibility ratings were assessed at baseline, and satisfaction with the treatment program was assessed at 3-month follow-up.

1.3. Primary outcome measures

1.3.1. Anxiety disorders interview schedule for DSM-IV: parent and child version

The Anxiety Disorders Interview Schedule for DSM-IV: Parent Version (ADIS-P; Silverman & Albano, 1996) and the corresponding Child Version (ADIS-C) were used to determine child diagnostic status. The ADIS C/P allows the assessor to assign a clinician severity rating (CSR), ranging from 0 (no interference) to 8 (extreme interference) for each diagnosis the child meets. Diagnoses that receive a severity rating of 4 (moderate interference) indicate clinical significance. For the purpose of the present study, the method for combining child and parent reports outlined in the ADIS-C Clinician Manual (Albano & Silverman, 1994) was used. The ADIS-C/P has demonstrated sound psychometric properties across numerous studies for both symptom scales and diagnoses (Lyneham, Abbott, & Rapee, 2007; Silverman, Saavedra, & Pina, 2001). Trained psychology postgraduate students who were blind to the child's condition and independent of the study, conducted the interviews. Assessors received a minimum of eight hours training in the interview schedule, completed a minimum of eight hours of diagnostic interviews that were monitored by a supervising registered clinical psychologist, and received ongoing supervision by a registered clinical psychologist. All ADISs were audiotaped and a random sample of 10% were listened to by a second assessor blind to diagnostic category, severity and condition. A correlation of .97 was found between assessors for the CSR ratings and a kappa of one was found for primary diagnosis type.

1.3.2. The Children's Global Assessment Scale

The Children's Global Assessment Scale (CGAS: Shaffer et al., 1983) was used to provide an assessment of global level of functioning based on information gathered during the diagnostic interviews from both children and parents. The CGAS is a clinician rating of functioning for children aged 4–16 years, ranging from 0 to 100, where higher scores indicate a higher level of functioning. Scores on the CGAS between 81 and 100 indicate a normal level of functioning, scores of 61–80 represent a slight disability, scores of 41–60 indicate moderate disability, and scores of 1–40 represent serious disability (Shaffer et al., 1983). The CGAS has demonstrated good inter-rater reliability estimates ranging from .53 to .84 (Dyrborg et al., 2000; Hanssen-Bauer, Aalen, Rudd, & Heyerdahl, 2007; Rey, Starling, Wever, Dossetor, & Plapp, 1995; Shaffer et al., 1983) and a strong test-retest reliability of .85 (Shaffer et al., 1983).

1.4. Secondary outcome measures (child- and parent-report questionnaires)

1.4.1. Spence Children's Anxiety Scale – child and parent version

The Spence Children's Anxiety Scale child (SCAS-C; Spence, 1998) and parent (SCAS-P; Nauta et al., 2004) versions were used to assess child anxiety symptoms. The SCAS-C and SCAS-P contain 44 (of which 6 are filler items) and 38 items respectively. Children and parents are required to respond to each item on a 4-point scale from 0 (never) to 3 (always). Total scores may range from 0 to 114 for both the SCAS-C and SCAS-P, with higher scores indicating greater child anxiety. The SCAS-C and SCAS-P have demonstrated sound psychometric properties across many studies (Essau, Anastassiou-Hadjicharalambous, & Munoz, 2011; Muris, Schmidt, & Merckelbach, 2000; Nauta et al., 2004; Spence, 1998; Spence, Barrett, & Turner, 2003; Whiteside & Brown, 2008). The Cronbach's coefficient alphas for the SCAS-C and SCAS-P were .84 and .91 respectively in the present study.

1.4.2. The internalizing subscale of child behavioural checklist (CBCL-Int)

The 32-item Internalising subscale of the Child Behaviour Checklist (CBCL-Int; Achenbach & Rescorla, 2001) was used to assess child-internalizing behaviour. Parents were required to respond on a 3-point scale from 0 (never) through 1 (sometimes) to 2 (often), the frequency with which each item occurred for their child. For the purposes of this study, the raw scores were converted to T-scores. The psychometric properties of the CBCL are well established (Achenbach & Rescorla, 2001). The Cronbach's coefficient alpha of the CBCL-Int in the present study was .91.

1.5. Measures relating to treatment acceptability

1.5.1. Expectancy and credibility ratings

Expectancy and credibility ratings for both child and parent were measured prior to treatment. A brief, 5-item measure assessing participants' expectations about various treatment aspects was used (e.g. 'To what extent do you think this program will help you and your child feel happier and less worried?'). This measure was originally developed by Spence et al. (2006) and later modified for assessing the BRAVE-ONLINE child program by March et al., (2009). In the present study, participants were asked to rate their level of agreement with each item on a 10-point scale from 0 (*not at all*) through 2 (a little bit), 5 (somewhat), 7 (quite a lot), to 9 (*completely*). A mean item expectancy and credibility score was derived, and therefore scores on this measure could range from 0 to 9, with higher scores reflecting higher treatment expectancy and perceived credibility of the program.

1.5.2. Treatment satisfaction ratings

Satisfaction with the treatment program was assessed at 3-month follow-up with a measure developed by March et al. (2009). The 8-item scale required parents and children to rate their satisfaction with the program from 1 *(not at all true)* to 5 *(very true)*. A mean item satisfaction score was derived, and scores on this measure could therefore range from 1 to 5, with higher scores reflecting greater treatment satisfaction.

1.6. Procedure

Ethical approval was sought and obtained from the Griffith University Human Research Ethics Committee. An initial screening telephone interview to assess broad inclusion and exclusion criteria was first conducted with the child's parent. The child and parent (s) were then asked to attend an appointment at the Griffith University Clinic for the diagnostic interview. At the initial meeting, children and parents were asked to complete a consent form, were provided with an information sheet, and completed the questionnaire package. The ADIS was then conducted and the CGAS rating assigned. Families who met inclusion criteria following the interviews were randomly allocated to either the treatment (Audio) condition or the waitlist (WL) condition through use of an allocation list that was computer-generated prior to the study.

The child and parent(s) in the Audio condition were required to attend the clinic twice-weekly to complete the 10 treatment sessions. Thus, therapy was conducted over a 5-week period. There was no therapist contact during any of the sessions. Upon arrival, children and their parent(s) were brought into a clinic room where

they listened to each "lesson" (or session) via a CD-player. Families were given the option of either listening to the lessons together as a family or listening to them independently. Children were provided with writing and colouring utensils to complete the program workbook, and were given each lesson to take home and listen to at least once again before the following session. Parents were asked to review the content of each lesson so that they were familiar with the material and could assist their child if required. At post-assessment and again at 3-month follow-up, families were required to attend the Griffith University Psychology Clinic in order to complete the diagnostic interviews and questionnaire packages again.

Families assigned to the WL group were required to attend assessment meetings at the Griffith University Psychology Clinic at baseline and 12-weeks later (post-assessment). After the post-assessment time point, those in the WL group received the treatment program and ceased to be part of the study.

1.7. Content of the intervention

The audio intervention tested, "Turnaround", was developed by Russ and McCarthy (2010). The program is recommended for children aged 6–12 years who experience symptoms of Generalized Anxiety Disorder, Separation Anxiety Disorder, Specific Phobia, Social Phobia, Obsessive-Compulsive Disorder, and Panic Disorder. While the program was originally designed for 6–12 year old children, the authors suggested it would be beneficial for younger children as well. Turnaround comprises 10 lessons, daily journal exercises, a relaxation CD, two parent CDs, and an interview with a Neuropsychiatrist discussing the use of medication and strategies for families to successfully obtain help. The instructions for use suggest that families listen to a series of "lessons" (or sessions) at a pace that is suitable for them, with the recommendation that each lesson is listened to at least twice before moving onto the next lesson, and that no more than one lesson is listened to per day. Table 3 outlines the content of each lesson.

The Turnaround program includes: psychoeducation; relaxation strategies; cognitive strategies such as self-talk, the restructuring of negative thoughts, and problem solving techniques; exposure; and contingency management. Children begin by joining six fictitious anxious children in the Turnaround adventure and are educated on anxiety in an entertaining manner by these characters. Each lesson is of approximately 20–30 min duration and is represented as "another day on the adventure". Each lesson utilises a variety of scenarios and provides a step-by-step guide to anxiety management in a child-friendly manner.

Two parent CDs instruct parents on ways to assist their child to overcome anxiety and include information on psychoeducation, praise, and problem-solving strategies. Parents are encouraged to listen to each lesson so they are not only aware of the information their child is provided with, but also so that they can assist their child to use the strategies they have learned to combat their anxiety.

For the purposes of this study, it was decided that families would come to the clinic and listen to each lesson in order to ensure they were completing the program. Although a more "real-life" test of the program would allow families to simply take the program and work through it at their own pace, it was decided that a useful first step in the testing of Turnaround would be to investigate whether the program was indeed efficacious if delivered as the authors intended.

2. Results

2.1. Data analytic plan

First, preliminary analyses were conducted to ensure there were no pre-existing differences between the Audio and WL groups on demographic or outcome variables at baseline. Chi-square analyses and Multivariate Analysis of Variance (MANOVA) were used to compare groups on socio-demographic variables, diagnostic status, and self-report measures.

With respect to the analyses assessing treatment efficacy, results are presented separately in terms of primary and secondary outcome measures. In order to evaluate changes from baseline to post-assessment, a series of chi-square analyses and repeated measures Analyses of Variance (ANOVAs) were performed. Specifically, for the continuous outcome measures of CSR, CGAS, SCAS-P/C, and CBCL-Int., a series of 2 (Condition: Audio, WL) × 2 (Time: pre-treatment, post-treatment) repeated measures between groups ANOVAs were conducted. Chi-square analyses were conducted to compare the percentages of children who were free of a) their *primary* and b) *any* diagnosis across both Audio and WL conditions.

Only those in the Audio condition were present at 3-month follow-up. Thus, in order to evaluate treatment effects at the 3-month follow-up point, a series of one-way repeated measures ANOVAs were conducted to investigate treatment effects across all three-time points (baseline, post-assessment, 3-month follow-up) with the Audio participants. Where significant time effects were found, simple contrasts were subsequently performed to determine the points between which the significant effects lay. Table 4 outlines the baseline, post-assessment and 3-month follow-up data for both Audio and WL groups with respect to their CSR, CGAS, number of anxiety diagnoses, and percentage free of primary and any anxiety diagnosis. Table 5 provides the means for the SCAS-C, SCAS-P, and CBCL-int. scales at baseline, post-assessment and 3-month follow-up.

2.2. Preliminary analyses

With regard to socio-demographic variables, no significant differences were found across conditions for gender χ^2 (1) = .17, p = .68, ethnicity χ^2 (2) = 1.53, p = .47, parent gender χ^2 (1) = 1.04, p = .31, country of birth χ^2 (1) = 2.18, p = .14, or combined household income χ^2 (6) = 7.17, p = .31. Additionally, there were no significant differences found between groups at pre-assessment for child age, mother age, father age, or number of siblings, Pillai's F(1, 22) = 1.52, p = .24, η^2 = .24.

With respect to primary and secondary outcome measures, there were no significant differences between groups at pre-assessment on type of primary anxiety diagnosis, χ^2 (4) = 2.00, p = .74, or secondary anxiety diagnosis χ^2 (3) = 2.77, p = .43. Similarly, there were no significant differences between conditions on diagnostic severity ratings (CSR), global assessment of functioning on the CGAS, or number of anxiety diagnoses, Pillai's F(1, 21) = 1.10, p = .39. Finally, there were no significant differences at baseline between groups on self-report measures completed by children and parents (i.e. SCAS-P/C, CBCL-Int) Pillai's F(1, 22) = .43, p = .78.

2.3. Treatment expectancy and credibility ratings

The mean expectancy and credibility item scores were 6.63 (SD = .94) for parents and 6.78 (SD = 1.57) for children. The scores therefore fall closest to the anchor point of 7 (quite a lot), suggesting that treatment and credibility rating for children and

Table 3
Description of lessons.

Lesson	Description
1	Picture Your Fear: General introduction to Turnaround program. Normalisation of anxiety, rationale for treatment, & motivational interviewing. Identify type of anxiety and begin to externalise the problem by picturing the fear. Journal: Day 1 entry
2	Three Headed Beast: Continue to normalise & externalising the fear. Psychoeducation on the cognitive behavioural components of anxiety: wacky thoughts, yucky feelings, and zany response. SUDs levels for children. Examples to assist in identifying own symptoms, including puzzles and exercises Journal: Day 2 entry
3	Crank's Wild Ride: Introduce characters that represent the sympathetic & parasympathetic systems to explain and reframe pathological interpretation of physical symptoms. Identify own anxious body signs & relaxation techniques. The Chill Kit instructions: listen every night to practice progressive muscle relaxation & deep breathing exercises Journal: Day 3 entry & Chill Kit at night
4	Focus on 'Wacky' thoughts. Introduction to unhelpful thoughts. Focus on rigid & inflexible thinking patterns (e.g. "all or nothing thinking" & "rule maker"). Cognitive restructuring. Practice thought challenging for anxiety-provoking situations & self-talk. Journal: Day 4 entry & Chill Kit at night
5	Focus on 'Wacky' thoughts (cont.): Unhelpful thoughts with negative bias underneath (e.g. "mind reader", "the prophet", "dark shades"). Cognitive restructuring based on finding the facts to challenge thoughts. OCD focus with examples. Journal: Day 5 entry & Chill Kit at night
6	Focus on 'Wacky' thoughts (cont.): Unhelpful thoughts that decrease self-esteem (e.g. "inner bully" & believing thoughts based on intensity). False alarms. Responding to the anxious feeling & fearing fear. Cognitive restructuring with accepting body feelings/reactions to anxiety. Using humour and assertiveness training. Journal: Day 6 entry & Chill Kit at night
7	Willingness to change: Transition lesson discussing secondary gains with anxiety. Motivational interviewing. Four stages of hope (i.e. Blind hope, Crushed hope, Encouraged hope, Confident hope). Examples & encouraged to identify own stage. Journal: Day 7 entry & Chill Kit at night
8	Flooding Exposure: Explain exposure & rationale. Function of avoidance. Examples provided of avoidance techniques. Various techniques for facing fears with a focus on flooding. Journal: Day 8 entry & Chill Kit at night
9	Gradual Exposure: Description of exposure hierarchy & SUDS. Habituation on each step, using imaginative & actual exposure. Advised to practice step twice a day until fear is tolerated before moving to next step. Journal: Day 9 entry & Chill Kit at night
10	Final Day: Brief review of strategies. Encourage children to continue practicing, need repetition and listen to series again. Modelling how important being calm is, reinforce power of hope & choice, & neuroplasticity. Journal: Day 10 & Chill Kit at night

Table 4
Values for primary outcome measures (N = 24).

	Pre-treatment		Post-assessment		3-Month
	CD	WL	CD	WL	CD
	N = 12	N = 12	N = 12	N = 12	N = 12
Free of primary diagnosis					
n	0	0	7	2	8
%			58.3	16.7	66.67
Free of any diagnosis					
n	0	0	3	0	5
%			25.0	.0	41.67
CSR					
M	6.50	6.33	3.58	5.58	2.67
SD	.79	1.07	2.35	1.08	2.42
CGAS					
M	53.67	54.92	66.08	56.08	75.00
SD	3.37	3.15	8.85	3.23	10.21
Number of diagnoses					
M	2.75	2.5	1.50	2.33	.83
SD	.97	.67	1.17	.65	.94

Note. CSR = Clinician Severity Ratings. Clinician severity ratings range from 0 (low) to 8 (high), 4 is considered clinical; CGAS = Children's Global Assessment Scale. CGAS ratings range from 0 (lowest functioning) to 100 (highest level of functioning).

parents were relatively high. March et al. (2009) found similar expectancy and credibility ratings when using the same measure, with mean item scores of 6.9 (*SD* = 1.21) for children and 7.29 (SD = .74) for parents.

2.4. Baseline to post-assessment

2.4.1. Primary outcome measures

As is evident from Table 4, at post-assessment 58.3% of children in the Audio condition no longer met clinical criteria for their *primary* anxiety diagnosis, compared to 16.7% of the WL children. This difference was significant χ^2 (1) = 4.44, p = .04. Furthermore, 25% of Audio children no longer met clinical criteria for *any* anxiety diagnosis, compared to 0% of children in the WL condition at post assessment. This difference approached statistical significance, χ^2 (1) = 3.43, p = .06.

Significant time effects were found for the CSR, $F(1, 22) = 29.99$, $p < .001$, $\eta^2 = .57$, the CGAS, $F(1, 22) = 27.91$, $p < .001$, $\eta^2 = .56$, and number of anxiety diagnoses, $F(1, 22) = 19.04$, $p < .001$, $\eta^2 = .46$. In addition, significant condition × time effects were found for the

Table 5
Values for secondary outcome measures (N = 24).

	Pre-treatment		Post-assessment		3-Month
	CD	WL	CD	WL	CD
	N = 12	N = 12	N = 12	N = 12	N = 12
SCAS-C					
M	34.67	34.33	16.33	30.41	17.67
SD	8.34	16.74	7.82	16.85	12.26
SCAS-P					
M	30.17	34.59	18.17	33.75	19.25
SD	14.28	13.92	12.88	11.83	12.40
CBCL-Int. (T-scores)					
M	63.33	62.83	52.92	63.67	50.83
SD	11.19	11.25	13.22	8.04	16.04

Note. CSR = Clinician Severity Ratings. Clinician severity ratings range from 0 (low) to 8 (high), 4 is considered clinical; CGAS = Children's Global Assessment Scale. CGAS ratings range from 0 (lowest functioning) to 100 (highest level of functioning).

CSR, $F(1, 22) = 10.47$, $p < .001$, $\eta^2 = .32$, the CGAS, $F(1, 22) = 19.15$, $p < .001$, $\eta^2 = .47$, and number of anxiety diagnoses, $F(1, 22) = 11.13$, $p < .001$, $\eta^2 = .34$. The results suggest that compared to WL children, children in the Audio condition demonstrated a greater reduction in clinical severity and number of anxiety diagnoses, and a greater increase in overall functioning, from baseline to post-assessment.

2.4.2. Secondary outcome measures

Significant time effects were found for the SCAS-C, $F(1, 22) = 33.35$, $p < .001$, $\eta^2 = .60$, the SCAS-P, $F(1, 22) = 9.73$, $p = .01$, $\eta^2 = .31$, and the CBCL-Int, $F(1, 22) = 8.91$, $p = .01$, $\eta^2 = .28$. Furthermore, significant condition × time effects were found for the SCAS-C, $F(1, 22) = 14.00$, $p < .001$, $\eta^2 = .39$, the SCAS-P, $F(1, 22) = 7.37$, $p = .01$, $\eta^2 = .25$, and the CBCL-Int $F(1, 22) = 12.28$, $p < .001$, $\eta^2 = .36$. The results suggest that children in the Audio condition demonstrated a greater reduction in anxiety symptoms and internalizing issues from baseline to post-assessment, compared to children in the WL condition. Furthermore, the mean CBCL-Int T-score indicated that although both Audio and WL children were in the borderline range at baseline, only the Audio children had moved to within the normal range by post-assessment.

2.5. 3-Month follow-up

2.5.1. Primary outcome measures

As is evident from Table 4, 66.67% of children in the Audio condition were free from their *primary* diagnosis at 3-month follow-up and 41.67% were free of *any* anxiety diagnosis. Significant effects for time were found for the CSR, $F(1, 11) = 26.33$, $p < .001$, $\eta^2 = .84$, the CGAS, $F(1, 11) = 27.35$, $p < .001$, $\eta^2 = .85$, and number of anxiety diagnoses, $F(1, 11) = 28.36$, $p < .001$, $\eta^2 = .85$. Simple contrasts indicated significant improvement from baseline to 3-month follow-up for the CSR, $F(1, 11) = 49.71$, $p < .001$, $\eta^2 = .91$, the CGAS, $F(1, 11) = 59.92$, $p < .001$, $\eta^2 = .85$ and number of anxiety diagnoses, $F(1, 11) = 54.38$, $p < .001$, $\eta^2 = .83$, and from post-assessment to 3-month follow-up for the CGAS, $F(1, 11) = 18.45$, $p < .001$, $\eta^2 = .63$. Further significant improvements were not evident from post-assessment to 3-month follow-up for the CSR, $F(1, 11) = .29$, $p = .61$, $\eta^2 = .06$, or number of anxiety diagnoses, $F(1, 11) = 4.00$, $p = .07$, $\eta^2 = .27$. Thus, it would seem that the significant reductions in CSR ratings and number of anxiety diagnoses evident at post-assessment were maintained at 3-month follow-up, and that the improvements made at post-assessment in terms of the CGAS were further enhanced at the 3-month follow-up point.

2.5.2. Secondary outcome measures

Significant effects for time were found for the SCAS-C, $F(1, 11) = 18.36$, $p < .001$, $\eta^2 = .79$, the SCAS-P, $F(1, 11) = 16.90$, $p < .001$, $\eta^2 = .77$, and the CBCL-Int, $F(1, 11) = 22.01$, $p < .001$, $\eta^2 = .82$. Simple contrasts indicated significant differences between pre-assessment and 3-month follow-up for the SCAS-C, $F(1, 11) = 15.69$, $p < .001$, $\eta^2 = .59$, the SCAS-P, $F(1, 11) = 32.71$, $p < .001$, $\eta^2 = .75$, and the CBCL-Int, $F(1, 11) = 29.51$, $p < .001$, $\eta^2 = .73$. Significant differences were not found from post-assessment to 3-month follow-up for the SCAS-C, $F(1, 11) = .16$, $p = .70$, $\eta^2 = .01$, the SCAS-P, $F(1, 11) = .49$, $p = .50$, $\eta^2 = .04$, or the CBCL-Int, $F(1, 11) = .36$, $p = .56$, $\eta^2 = .03$. Thus, it would seem that the improvements made from baseline to post-assessment in terms of anxiety and internalizing symptoms, were maintained but not improved upon at 3-month follow-up.

2.5.3. Satisfaction ratings

The mean scores for child ($M = 3.49$, $SD = .95$) and parent ($M = 3.59$, $SD = .74$) satisfaction with the program were considered moderate to high and comparable with previous research using the same measure with an online intervention (March et al., 2009; Spence et al., 2006) for both children ($M = 3.60$, $SD = .75$) and parents ($M = 3.88$, $SD = .83$).

3. Discussion

This study investigated the efficacy of an audio program, “Turnaround” in reducing the impact of child anxiety disorders. The results of the pilot RCT were promising, and suggested that the Turnaround program was effective in reducing the clinical severity of the primary diagnosis, decreasing the number of diagnoses held, improving overall level of functioning, reducing child and parent report of anxiety symptoms, and reducing internalizing behaviours. At post-assessment, 58.3% of children receiving treatment compared to 16.7% of waitlist children were free of their *primary* diagnosis, with this figure rising to 66.67% at the 3-month follow-up time point. Additionally, at post-assessment, 25.0% of children in the treatment condition compared to .0% of the waitlist condition were free of *any* anxiety diagnosis, with this figure rising to 41.67% for the treatment group at 3-month follow-up.

The percentage of children free from their primary diagnosis (58.3%) is comparable to that found in traditional face-to-face CBT for child anxiety. Trials involving group and individual face-to-face CBT interventions have found that 60%–80% of children no longer meet criteria for their primary anxiety diagnosis after treatment (Beidel, Turner, & Morris, 2000; Flannery-Schroeder & Kendall, 2000; Kendall, 1994; Kendall et al., 1997; Silverman et al., 1999; Wood, Piacentini, Southam-Gerow, Chu, & Sigman, 2006).

Similarly, in comparison to other alternative treatment programs, the audio treatment program appears to be a comparable and viable treatment option. For instance, the results of the audio program appear similar at post-assessment and superior at 3-month follow-up, to the Rapee et al. (2006) study where a bibliotherapy program for youth anxiety disorders with no therapist contact was assessed. At post-assessment, the percentage of children free from *any* anxiety diagnosis was 17.8% in the Rapee et al.'s (2006) study and 25.0% in the current study. At 3-month follow-up, this figure remained fairly similar at 18.9% in the Rapee study, however, improved to 41.67% in the current study. It should be noted that investigations of therapist-supported bibliotherapy have reported much higher rates of children free from any anxiety diagnosis, with findings such as 79% (Lyneham & Rapee, 2006) and 95% (Cobham, 2012). It would be interesting to assess the effectiveness of the audio program with therapist support of some kind, to determine whether greater reductions in primary and additional diagnoses could be attained.

Comparing the audio program to computerised interventions, it would appear that it produced similar improvements in terms of percentages of children free of their primary diagnosis following treatment. As noted above, the present study found that 66.7% of children had lost their primary diagnosis at 3-month follow-up. This rate is comparable if not superior to those found in the RCT on the Cool Teens program (22.5% at 3-month follow-up; Wuthrich et al., 2012), and the RCT conducted on the BRAVE-ONLINE adolescent program (54.5% at 6 month follow-up; Spence et al., 2011). However, it was slightly lower than the rate of 75% found in the March et al. (2009) study on BRAVE-ONLINE child program. It should also be noted that Cool Teens and the BRAVE-ONLINE programs include therapist support, while the audio program tested in this study does not, making the results of the audio program particularly promising.

With respect to expectancy and credibility ratings, parents and children reported ratings closest to the anchor point of 7 (quite a lot), suggesting that they were confident prior to treatment that the program would be successful in reducing child anxiety symptoms. Parents and children also positively evaluated the program after completing it, reporting moderate to high levels of treatment satisfaction. Taken together, the audio program appears to be comparable to traditional face-to-face therapy, computerized interventions, and bibliotherapy interventions, and is also seen as credible and satisfactory by consumers.

3.1. Strengths, limitations, and suggestions for future research

The present study had several strengths. Importantly, to the best of the authors' knowledge, it was the very first test of an audio-based program in the treatment of child anxiety disorders. As such, it provides preliminary support for the effectiveness of an audio-based approach that circumvents many of the known barriers to treatment, provides an alternative for those unable or unwilling to engage in face-to-face, bibliotherapy or computerised programs, and thus provides a platform for future research into this area. Second, the study employed multiple, sound psychometric measures, all of which are commonly used in the child anxiety research area. Third, although the sample size was small, the study included a range of diagnoses, comorbid disorders, and child age. A fourth strength of the study is the zero-level attrition rate that may be due to many factors. The sample may have simply been particularly highly motivated, or the audio program may have offered a particularly captivating approach that kept children engaged and offered greater flexibility and convenience compared to other approaches, thus leading to greater compliance. Alternatively, perhaps bi-weekly sessions, requiring families to engage in therapy for a total of only 5 weeks, led to less disruption to busy family schedules, and hence greater compliance with treatment and assessment.

Despite the many strengths of this research, it was not without its limitations. First, although the study was pilot in nature, the sample size was particularly small and the follow-up period was relatively short. Future research should attempt to obtain larger sample sizes and include longer-term follow-ups not only so that the program can be better tested in terms of its efficacy, but also so that other research questions, such as the determination of predictors of treatment outcome, can be answered. Also, given the wide range for which the program was designed, a larger sample size would allow determination of its efficacy for younger versus older children. It may be that tailoring of the program is required for younger or older children if differences in efficacy and satisfaction are found for younger and older children.

Second, the results of this research may be limited in terms of generalizability due to the high socio-economic background, high level of parental education, and primarily Caucasian status of the participants. Because there is no 'therapist' in the audio-based program, thus rendering it a 'self-help' program, high SES and parental education may be particularly problematic in terms of generalizability. Parents of higher SES and education levels may be better equipped to 'act as therapists' for their child, therefore inflating the results of the study. Furthermore, high SES might account for the low attrition rates and high satisfaction ratings found in this study. Future research must ensure a greater spread of SES and parental education in their sample, to examine the effects of these variables on the efficacy of the Turnaround program.

Third, the absence of a waitlist condition at 3-month follow-up makes it impossible to determine whether the demonstrated further improvements at 3-month follow-up were the result of natural recovery or the effects of treatment. Although difficult for ethical reasons, it would be useful for future research to include a longer waitlist period so that this potential confound could be ruled out. It would also be beneficial for future studies to employ an active control and clinic/Internet/bibliotherapy comparison groups to provide a stronger test of the audio program. A final limitation of the study was that it was not a "true" test of the intervention. Families were required to come into the clinic twice per week to listen to the audio sessions, rather than take the CDs home and listen to them at their own pace as the program was designed. Given that the audio program had never been tested in terms of efficacy, it was decided that it was first important to demonstrate whether the program itself was effective when completed in its entirety. However, compliance may not be as strong when families are left to their own devices. Future research should test the efficacy of the audio program when conducted as it was intended: as a self-help program.

A final limitation of the study was that it was not a "true" test of the intervention. Families were required to come into the clinic twice per week to listen to the audio sessions, rather than take the CDs home and listen to them at their own pace as the program was designed. Given that the audio program had never been tested in terms of efficacy, it was decided that it was first important to demonstrate whether the program itself was effective when completed in its entirety. However, compliance may not be as strong when families are left to their own devices. Future research should test the efficacy of the audio program when conducted as it was intended: as a self-help program. Furthermore, it would be useful to test the program with participants for whom the intervention may be particularly beneficial i.e., those who are visually impaired, without computer or Internet connection, or who are living in rural areas. Given that all participants in this study were volunteers, it would also be useful to test this program with a

referred population.

In addition to the suggestions for future research described above, there are a number of other avenues worthy of investigation. With parents essentially acting as therapists in self-help interventions, it is important for future research to determine potential predictors of treatment success such as family communication, consistency, and collaboration in the successful implementation of the audio program when families are allowed to progress at their own pace. Also of note, is the indication that children demonstrated significant improvements despite the exposure sessions being placed relatively late in the Turnaround program. Exposure challenges avoidance behaviours and is considered the key element of CBT for anxiety disorders (Muris, 2007). The audio program tested in this study introduces exposure in Sessions 8 and 9, much later than most anxiety programs where exposure is presented earlier and is continued throughout therapy. Indeed, there is evidence to suggest that exposure should come first in anxiety treatments (Taboas, McKay, Whiteside, & Storch, 2015; Whiteside et al., 2015). Perhaps without the availability of a therapist in the audio program, it is important for the child and parent to have a clear understanding of the child's anxiety disorder and to successfully master and implement other anxiety management techniques before exposure begins. Future research should examine whether the results of the Turnaround program could be enhanced further with earlier placement of the exposure sessions. Also worthy of future investigation is to trial the audio program supplemented with either telephone or email contact by a therapist. Indeed, supplementing self-help interventions with therapist contact has been found to be an effective way to treat child anxiety when bibliotherapy or computer-based approaches have been used (Cunningham et al., 2006; Khanna & Kendall, 2010; Lyneham & Rapee, 2006; March et al., 2009).

4. Conclusions

The present study sought to provide an initial investigation of the efficacy of an audio-based CBT program for child anxiety disorders. Although future trials need to be conducted before firm conclusions can be drawn regarding the efficacy of the audio program tested here, this preliminary study suggests not only significant treatment outcomes, but also low rates of attrition and high levels of consumer satisfaction. The audio program is not intended to replace traditional face-to-face CBT interventions. However, it holds promise in terms of multi-platform dissemination of evidence-based CBT treatment for child anxiety. Overall, the audio program is a creative and innovative approach to the treatment of child anxiety, with the potential to reach many children currently suffering with anxiety disorders who are not accessing help.

Conflict of interest

No conflict of interest.

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