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One session treatment for pediatric blood-injection-injury phobia: A controlled multiple baseline trial

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ABSTRACT

The present study evaluated the effectiveness of a modified One Session Treatment (OST), which included an e-therapy homework maintenance program over 4 weeks for Blood-Injection-Injury (BII) phobia in children and adolescents. Using a single case, non-concurrent multiple-baseline design, 24 children and adolescents (8–18 years; 7 males, 17 females) with a primary diagnosis of BII phobia were randomly assigned to a one, two or three week baseline prior to receiving OST. Primary outcome measures included diagnostic severity, diagnostic status, and child and parent fear ratings. Secondary outcome measures included avoidance during behavioural avoidance tasks (BAT), global functioning and self and parent reported anxiety, fear and depression. Efficacy was assessed at post-treatment, 1-month, and 3-month follow-up. BII symptoms and diagnostic severity remained relatively stable during the baseline periods and then significantly improved following implementation of the intervention. Treatment response was supported by changes across multiple measures, including child, parent and independent clinician ratings. At post-treatment 8 of the 24 (33.33%) children were BII diagnosis free. Treatment gains improved at follow-ups with 14 (58.33%) children diagnosis free at 1-month follow-up and 15 (62.5%) diagnosis free at 3-month follow-up. Preliminary findings support the effectiveness of a modified OST approach for BII phobic youth with treatment outcomes improving over follow-up intervals.

Blood-Injection-Injury (BII) phobia is a severe and debilitating condition, characterized by fear and avoidance of seeing blood, receiving an injection or other invasive medical procedure, or being injured (American Psychiatric Association (APA), 2013). It occurs in as many as 0.8%–1.3% of children and adolescents and 3–4% of adults (Burstein et al., 2012; Curtis, Magee, Eaton, Wittchen, & Kessler, 1998; Depla, ten Have, van Balkom, & Graaf, 2008; Essau, Conradt, & Petermann, 2000; Kim et al., 2010) and is associated with serious health consequences. For example, adults with BII phobia report avoiding routine medical check-ups; seeing a physician; having operations; receiving medical treatment for diagnosed illnesses (e.g. asthma, diabetes and heart failure); and dental treatment (Öst & Hellström, 1997). Moreover, they may avoid certain career paths (e.g., nursing, medicine), travel for fear of receiving necessary vaccinations, and becoming pregnant (Öst, Hellström, & Kåver, 1992). BII is thought to be distinct from the other phobia types in that it is associated with a stronger genetic vulnerability (Van Houtem et al., 2013) and a unique physiological (e.g., fainting) and emotional response (e.g., disgust; Olatunji, Cisler, McKay, & Phillips, 2010).

In adults with BII, behavioural and cognitive-behavioural treatments have received empirical support with five-controlled treatment trials conducted to date (Hellström, Fellenius, & Öst, 1996; Öst, Fellenius, & Sterner, 1991; Öst et al., 1992; Öst, Lindahl, Sterner, & Jerremalm, 1984; Öst, Sterner, & Fellenius, 1989). As is evident, these trials were conducted solely by Öst and colleagues in Sweden and included the evaluation of a range of behavioural interventions including; massed or spaced exposure (e.g.,

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confrontation of feared object or situation in a controlled manner, for a prolonged period of time), applied tension (e.g., brief tension of arms, legs and torso muscles, followed by release, not relaxation, of the muscles and implemented during exposure to BII stimuli), tension only (e.g., tension technique the same as that used in applied tension; however, patients are not exposed to BII stimuli), applied relaxation (e.g., progressive muscle relaxation in the context of exposure to BII stimuli, and a combination of applied tension and relaxation) (Ayala, Meuret, & Ritz, 2009; Öst et al., 1984, 1989). In their systematic review of treatments for BII, Ayala et al. (2009) concluded that regardless of type of intervention (e.g., exposure, applied tension), treatment was equivalent, with 70–80% of patients responding. Despite expecations that applied tension might be associated with greater benefits given the unique physiological response associated with BII (Ayala et al., 2009), there was limited evidence for the additional effects of applied tension above and beyond exposure alone. In contrast, BII phobia has been neglected in the child and adolescent literature and no controlled studies have been conducted to date.

For youth with specific phobia, an intensive cognitive behavioural treatment (CBT) called One Session Treatment (OST) is considered a first line treatment (Milliner & Farrell, 2014; Ollendick & Davis, 2013). OST incorporates in vivo exposure, cognitive challenges, participant modelling, reinforced practice and psychoeducation in a single session maximised to 3 h. Empirical support for OST has been demonstrated in 10 studies, including three large randomised controlled trials (RCT; Ollendick et al., 2015, 2009; Öst, Svensson, Hellstrom, & Lindwall, 2001) and seven smaller clinical trials (Farrell et al., 2013; Flatt & King, 2010; Leutgeb, Schäfer, Köchel, & Schienle, 2012; Leutgeb & Schienle, 2012; Muris, Merckelbach, Holdrinet, & Sijsenaar, 1998; Muris, Merckelbach, Van Haaften, & Mayer, 1997; Waters et al., 2014) for a diverse range of specific phobia subtypes in youth, including animal (e.g., dog, cat, spider), natural environment (e.g., dark, water, heights), situational (e.g., lifts) and other (e.g., vomit, loud noises). In these studies, OST has been found to be superior to a waitlist control (Flatt & King, 2010; Ollendick et al., 2009; Öst et al., 2001), psychological placebo (Ollendick et al., 2009) and Eye Movement and Desensitization and Reprocessing (EMDR; Muris et al., 1998, 1997). Although OST is effective for most phobic youth (50–80% diagnosis free), there still remain a significant proportion of children who only partially respond or do not respond to this treatment (Ollendick & Davis, 2013). Moreover, BII has rarely been examined in these studies.

In their RCT ($n = 60$) for phobic youth, Öst et al. (2001) included 12 youth with injection phobias and 2 with blood phobias. Overall, these youth were found to respond significantly less well to treatment than youth with other types of phobia based on a post-assessment behavioural approach task. These children reportedly had difficulty differentiating the therapist from other health professionals (e.g., doctor, nurse) who they associated with previous anxiety provoking experiences, and as such, were less likely to engage in therapist assisted exposure tasks. Flatt and King (2010) also included a small number (6 participants) of youth with BII phobias; however, they did not examine differences in treatment outcome across the different types of phobia. Ollendick et al. (2015, 2009) specifically excluded youth with BII phobias for various reasons, including poorer treatment response in Öst et al. (2001); unique physiological response (e.g., fainting); and the complexity associated with delivering treatment to these youth (i.e., need for medical professionals).

In a recent paper, Oar, Farrell, and Ollendick (Submitted) described the development of a modified OST approach to enhance treatment outcome for BII phobia in children and adolescents and its use with two youth. The youth received individualised, case-formulation driven OST. The cases highlighted the unique challenges associated with treating BII in youth. Modifications included addressing the role of pain (e.g., psychoeducation, more graduated exposure steps), disgust (e.g., disgust eliciting exposure tasks), and fainting in the maintenance of children's phobia. Moreover, it was recommended that parents be more actively involved throughout treatment (e.g., education session prior to OST, contingency management training, guidance regarding planning exposure tasks following treatment) and for families to participate in a structured maintenance program post-treatment.

The aim of the current study was to examine the efficacy of this modified OST in a multiple baseline controlled trial in youth (8–18 years) with a primary diagnosis of BII, who were randomly assigned to a 1-week, 2-week or 3-week baseline. This design allows for the evaluation of the efficacy of novel interventions in a controlled manner (Jarrett & Ollendick, 2012). Single case designs are endorsed by the evidence based treatment movement (Task Force on Promotion and Dissemination, 1995) and are considered an important initial step in examining the efficacy of novel treatments. It was expected that BII symptoms and diagnostic status would remain stable during the baseline periods and then significantly improve following modified OST. Moreover, it was predicted that significant reductions would be observed from pre-to post-treatment on clinician ratings (CSR), diagnostic status, global functioning, behavioural avoidance during a behavioural avoidance tasks (BAT), self-reported anxiety, fearfulness and depression. Finally, it was expected that modified OST would be acceptable to families and that treatment gains would be maintained at 1- and 3-month follow-ups.

1. Method

1.1. Participants

Children and their parents were recruited through referrals from paediatricians, general health practitioners and other health professionals, and via advertising in school newsletters. Youth had to be between 8 and 18 years and meet criteria for a primary diagnosis of BII phobia according to the DSM-V. Comorbidity with other internalising and externalising disorders was permissible provided they were secondary diagnoses, or co-primary with BII. Children and adolescents were required to have at least one parent available to attend all assessment and treatment appointments. Children on psychotropic medications were required to be stabilised on their current dose for at least 6 weeks prior to entering the trial. There were no medication changes throughout the study. Eligible families agreed to be randomly assigned to a baseline period of up to 3 weeks prior to treatment and to cease any concurrent psychological therapy from the time of their enrolment into the trial until the 3-month follow-up assessment, unless clinically required. Youth were excluded if they had a diagnosis of an Autistic Spectrum Disorder or Intellectual Impairment, reported psychotic symptoms or reported serious suicidal ideation.

Forty-seven families contacted the research team and completed an initial telephone screen. Twenty-four children and adolescents (8–18 years; 29.20% males, $M = 10.86$, $SD = 2.41$; 70.80% females, $M = 12.12$, $SD = 3.41$) participated in the trial, which was approved by the Griffith University Human Research and Ethics Committee (refer Table 1). Of those youth, 54.17% ($n = 13$) presented with injection phobia only, and 45.83% ($n = 11$) presented with combined BII phobia. Five children (20.80%) reported a history of vomiting when confronted with their feared stimuli, while a further 4 (16.70%) children reported a history of fainting in the presence of their feared stimuli. Seven children (25%) experienced significant physical health problems including Type 1

Table 1
Participant characteristics.

Age	Range = 8–18 years	$M = 11.75$, $SD = 3.15$
Gender	Males	29.20% ($n = 7$)
	Females	70.80% ($n = 17$)
Ethnicity	Caucasian	95.83% ($n = 23$)
	Asian	4.17% ($n = 1$)
Type of BII phobia	Injection	54.17% ($n = 13$)
	Blood, injury and injection	45.83% ($n = 11$)
Physiological response BII stimuli	Vomiting	20.80% ($n = 5$)
	Fainting	16.70% ($n = 4$)
Physical health conditions	Asthma (n = 3), Diabetes (n = 1), Cerebrovascular disease (n = 1), Anaphylaxis (n = 2) & Other conditions (n = 2)	29.17% ($n = 7$) (N.B. Some children had multiple conditions)
Marital status	Two parent households	58.30% ($n = 14$)
Parent tertiary education	Mother	79.20% ($n = 17$)
	Father	70.80% ($n = 19$)
Family income	Above 80,000	62.50% ($n = 15$)
	Range = $30,000 to >$100,000	
Family history of fainting when confronted with BII stimuli (parent report)		41.67% ($n = 10$)
Family history of BII related fear/phobia (parent report)		33.33% ($n = 8$)

diabetes, chronic asthma, anaphylaxis, cerebrovascular disease and other conditions. Youth were primarily Caucasian ($n = 23$; 95.83%) and from two parent households ($n = 14$; 58.30%).

Most parents had a tertiary level education (mothers = 79.20% and fathers 70.80%) and combined income above $80,000 ($n = 15$, 62.50%; Range = $30 000 to >$100,000). On average children met criteria for 2.71 diagnoses including BII. Nineteen children (79.20%) had a secondary comorbid diagnosis, 15 children (62.50%) a tertiary diagnosis, and 6 children (25%) had four or more diagnoses. Comorbid diagnoses included generalised anxiety disorder (GAD), other types of specific phobia, social phobia (SoP), separation anxiety disorder (SAD), post traumatic stress disorder (PTSD), major depressive disorder (MDD), attention deficit hyperactivity disorder (ADHD) and oppositional defiant disorder (ODD). Ten of the 24 children (41.67%) were reported to have a family member (e.g., mother, father, sibling, grandfather) with a history of fainting when confronted with BII related stimuli. Parents of eight children (33.33%; 6 mothers and 2 fathers) reported currently being fearful of BII related stimuli.

1.2. Design

The present study evaluated the effectiveness of a modified OST for BII in youth using a single case, non-concurrent multiple baseline design (Hayes, Barlow, & Nelson-Gray, 1999; Kazdin, 1998). This involved a series of AB replications with participants randomly assigned to one of three baseline periods - 1 week ($n = 8$), 2 weeks ($n = 9$) or 3 weeks ($n = 7$), using a computer-generated list of randomly permuted blocks.

1.3. Measures

Anxiety Disorders Interview Schedule for DSM-IV, Child and Parent Versions (ADIS-IV-C/P; Silverman & Albano, 1996). The ADIS-IV is a semi structured diagnostic interview assessing DSM-IV anxiety, mood and other disorders in children and adolescents aged 6–17 years. Diagnoses assigned a CSR of four or above, on a 0 (*not present*) to 8 (*very severe*) scale, are considered clinically significant (Silverman & Albano, 1996). The ADIS-IV has well-established psychometric properties, with high levels of inter-rater and test-retest reliability (Silverman, Saavedra, & Pina, 2001). Telephone administration of the ADIS-C/P has been found to be as reliable as in person delivery (Lyneham & Rapee, 2005). ADIS-C/P interviews were conducted either face-to-face or via the telephone by registered clinical psychologists and postgraduate clinicians, who had received training in ADIS-IV administration. Assessments and diagnoses were reviewed in supervision with the first (ELO) and second authors (LJF). Child and parent-derived ADIS-IV diagnoses were compared and in discussion with supervising clinical psychologists a final combined diagnostic profile was determined. The diagnosis with the highest CSR was considered the youth's primary diagnosis. Independent assessors blind to the child's initial presentation were used at pre-treatment, post-treatment, 1-month and 3-month follow-up. Prior to treatment and at the 1-month and 3-month follow-ups the full ADIS-C/P was administered. However, at post-treatment only the ADIS modules that were endorsed at pre-treatment were administered. Moreover, the BII related questions on the ADIS-IV Specific Phobia Module were administered to children and their parents during the baseline period and e-therapy sessions (see below) by the family's assigned therapist to provide weekly phobia data. All ADIS-IV interviews were recorded (voice and videotaped). To assess for inter-rater reliability an independent trained assessor randomly reviewed 20% of the recordings across the time points and showed excellent agreement (primary diagnosis $\kappa = 0.89$; secondary diagnosis $\kappa = 0.81$; tertiary diagnosis $\kappa = 1.0$). Of note, the ADIS-IV version was utilized to diagnose youth, as at the time of conducting this study the ADIS-V child version was not available. From DSM-IV to DSM-V only small changes were made to the diagnostic criteria for specific phobia. Alterations included adjusting the requirement that people over 18 years must recognize that fear is excessive, and also that the duration requirement (e.g., typically lasting for 6 months or more) was extended from children to adults. Therefore, our diagnostic assessment is aligned with DSM-V criteria.

Children's Global Assessment Scale (*CGAS;*Shaffer et al., 1983). The Children's Global Assessment Scale (CGAS) is a clinician rated measure of youth's overall functioning and level of impairment. Scores on the CGAS range from 1(*Needs constant supervision*) to 100 (*Superior functioning*) with higher numbers indicative of higher levels of functioning. Scores 1 to 40 are indicative of serious disability, 41 to 60 moderate levels of impairment, 61 to 80 slight impairment, and 81 to 100 representing a normal and healthy level of functioning. The CGAS has favourable psychometric properties with intra-class correlations estimated at 0.84 for inter-rater reliability and 0.85 for test retest reliability over 6 months (Shaffer et al., 1983).

Idiographic Target Behaviours. Based on discussion of the youth's symptoms during the initial assessments, children and their parents worked with the therapist prior to commencing treatment to identify three primary target behaviours related to the child's BII symptoms. Children and their parents rated the child's level of fear associated with the target behaviour from 0 to 8 (0 = *none* to 8 = *very much*). Example target behaviours included watching someone having an injection, holding a test tube filled with blood, or having a finger prick. Fear ratings related to the youth's three target behaviours were averaged to provide mean child and parent fear ratings.

Spence Children's Anxiety Scale Child and Parent Versions (*SCAS-C/P*; Spence, 1998). The SCAS-C/P is a self- and parent-report measure assessing anxiety symptoms in 7–18 year old youth. The SCAS-C consists of 44 items and one open ended (non-scored) item. For each item the child is asked to indicate which response best describes them (e.g., I am scared of going to the doctor or dentist) on a 4-point likert scale ranging from 0 (*Never True*) to 3 (*Always True*). The SCAS-P consists of 38 items and one open ended (non-scored) item. For each item (e.g., My child is scared of the dark) parents indicate which response best describes their child on a 4-point scale ranging from 0 (*Never True*) to 3 (*Always True*). The SCAS-C/P yields a total score and six subscale scores, which are consist with DSM-IV-TR diagnostic criteria. The SCAS-C/P has well-established reliability (e.g., Cronbach's alpha coefficients for the total score of SCAS-C/P ranging from 0.89 to 0.92) and validity and has nationally representative norms (Nauta et al., 2004; Spence, 1998).

Short Mood and Feelings Questionnaire Child and Parent Version (*SMFQ-C/P*; Angold et al., 1995). The SMFQ-C/P is a 13-item self-report measure designed to assess depressive symptoms in children and adolescents aged 8–18 years. The SMFQ-C asks youth to rate a number of statements about how they have been feeling and behaving (e.g. I felt miserable and unhappy) over the past 2 weeks from 0 (*Not True*), 1 (*Sometimes True*) to 2 (*Always True*). Similarly, the SMFQ-P asks parents to rate how their child has been feeling and behaving (e.g. My child felt miserable and unhappy) over the past 2 weeks from 0 (*Not True*), 1 (*Sometimes True*) to 2 (*Always True*). The SMFQ-C/P yields a total score with a score of 8 or more considered clinically significant (Angold et al., 1995). The SMFQ-C/P has strong psychometric properties including good internal reliability (Cronbach's alpha = 0.85 for the SMFQ-C and 0.87 for the SMFQ-P) (Angold et al., 1995).

Fear Survey Schedule for Children Revised Child and Parent Version (*FSSC-R*; Ollendick, 1983). The FSSC-R is a self-report measure designed to assess fearfulness in children and adolescents aged 7–16 years. The measure requires youth to rate their fearfulness of 80 specific objects and situations on a 3-point likert scale (0 – *None*, 1 – *Some*, 2 - *A lot*). The parent version of the FSSC-R asks parents to rate their child's fearfulness of the same 80 specific objects and situations and uses an identical rating scale and scoring system (Weems, Silverman, Saavedra, Pina, & Lumpkin, 1999). The FSSC-R yields a total score and five factor scores including fear of the unknown, fear of failure and criticism, fear of minor injury and small animals, fear of danger and death, and medical fears. The FSSC-R has well-established reliability and validity and provides norms for youth of various ages and nationalities (Ollendick, 1983; Ollendick, King, & Frary, 1989). The FSSC-R has excellent internal consistency with Cronbach's alpha for the total fearfulness score consistently reported to be above 0.90 (Ollendick, 1983).

Behavioural Avoidance Tasks (BAT). Children and adolescents completed two BATs. One BAT examined response to video BII stimuli and the other to live BII stimuli. The BII video BAT required children to watch a 5-min video of people having blood tests and injections; the BII live BAT asked children to be prepared by a nurse for a blood test. Youth were instructed that the task was designed to elicit a moderate level of anxiety/discomfort. They were advised that the task would take 5-min and that they were not to perform any avoidance behaviours (e.g., covering their eyes or ears). The youth were encouraged to stay engaged in the task for as long as possible; however, they were also informed that if the task became too anxiety provoking they could terminate the task (e.g., video paused, the nurse to sit in the corner of the BAT room) whereby the child would remain seated in the BAT room for the remainder of the 5 min. The child's level of avoidance during the BAT was assessed. Avoidance was rated by the clinician from 0 to 4 (0 = *No avoidance* - Stayed engaged in task for the entire 5 min, 1 = *Minimal avoidance* - Stayed engaged in task for the entire 5 min with minimal avoidance, e.g., looking away < 20 s, 2 = *Moderate avoidance* - Stayed engaged in task for the entire 5 min with some avoidance, e.g., looking away > 20 s, 3 = *High avoidance* – Terminated that task before 3 min of time had elapsed, and 4 = *Complete avoidance* - Terminated the task less than 1 min after time commenced).

Homework compliance (Park et al., 2014). Homework compliance ratings were obtained at the beginning of each e-therapy maintenance session. Children and parents rated their compliance with assigned tasks on a 7-point likert scale ranging from 0 (Did not complete any assigned homework) to 6 (Completed all homework and made efforts above and beyond assignments). A mean homework compliance rating was calculated for each child and parent over the 4 weeks.

Child and Parent Treatment Satisfaction (CTS, PTS; Ollendick et al., 2015). At 1-month follow-up, children and their parents completed a questionnaire assessing their satisfaction with treatment. Both the CTS and PTS consist of 3 items rated on a 5-point likert scale. Child items included "Overall, my treatment was helpful", "My treatment helped me to cope better with my fear/phobia?" and "I would recommend this treatment to a friend who had similar fears/phobias". Parent items included "After completing their treatment my child is better able to cope with their fears/phobia", "Overall, my child's treatment helped and was effective" and "I would recommend this treatment to a friend whose child had a similar problem". The CTS and PTS each yield total scores ranging from 0 to 15, with higher scores indicating greater treatment satisfaction. The measures also had a small number of open-ended questions which asked children and parents to rate the elements of treatment they found the most or least helpful and the acceptability of the intensive format. This measure was previously used by Ollendick et al. (2015) and has sound internal consistency (Cronbach's alpha ranging from 0.65 to 0.94).

1.4. Procedure

1.4.1. Pre-treatment

Parents or caregivers completed an initial screen during a 15-min telephone interview to assess their child's eligibility (refer Fig. 1). If the child was suitable, the parent was emailed study information and consent forms and an appointment was scheduled to complete a diagnostic interview (e.g., ADIS-IV-P) over the telephone. Parents returned their signed consent forms via email.

Following the parent diagnostic interview, youth deemed appropriate completed the ADIS-IV-C and online self-report questionnaires at the Griffith University Psychology Clinic. Next, assessors reviewed diagnostic profiles with the supervising clinical psychologist in order to determine a final combined consensus diagnosis and CGAS score, and eligibility to proceed to the next stage of the study.

One week later, youth participated in a second assessment session during which they completed the two behavioural avoidance tasks (see above). Youth were randomised to the order

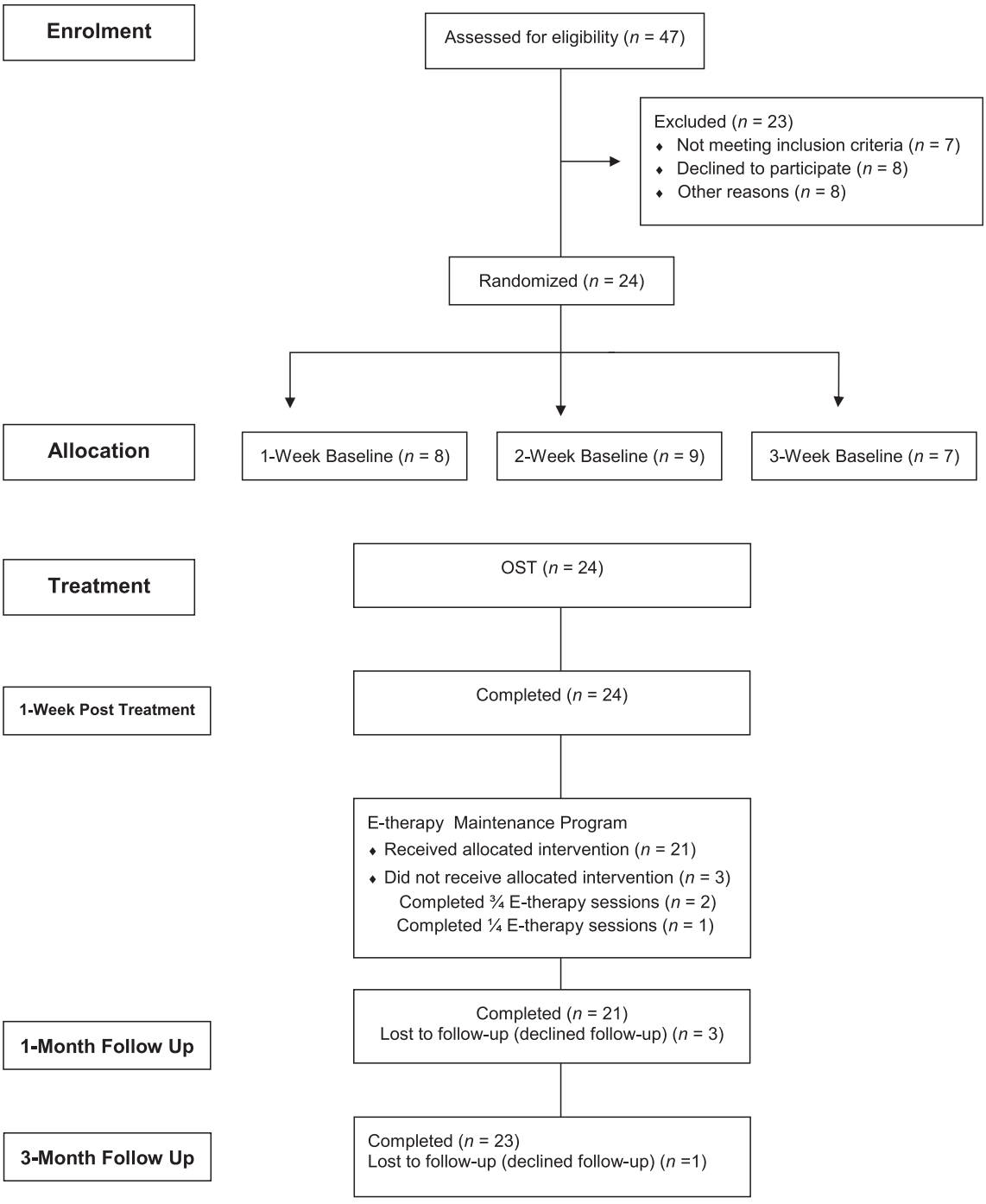

Fig. 1. Flow of participants through the study.

with which they completed the BATs. To minimize interference from one BAT to the next, youth completed an alternative task (e.g., read a picture book or magazine) in between each BAT for a minimum of 15 min. Following the BAT, the treatment rationale was explained to the family and the child was randomly assigned to one of three baseline conditions (e.g., 1 week, 2 weeks or 3 weeks).

1.4.2. Baseline

On a weekly basis during the baseline period, youth and parents completed telephone-administered BII related questions from the ADIS-IV Specific Phobia Module and rated the youths' target behaviours.

1.4.3. Parent and child education session

Children and parents attended a one-hour education session in the week following completion of their baseline period. They received psychoeducation about BII and the child's phobic response, and CBT-based OST for specific phobia with a focus on the principles of exposure therapy. With the assistance of the therapist the child and parent developed an example exposure hierarchy and discussed ideas for BII exposure tasks and how to prepare for these

tasks (e.g., purchase ingredients to make fake blood). Parents were also taught contingency management strategies in order to reward their child for their exposure practice.

1.4.4. One session treatment

One week after their education session, children and adolescents completed the modified OST for BII phobia (Oar, Farrell, & Ollendick, 2015). The treatment session involved 3 h of graduated exposure therapy along with cognitive challenges, participant modelling, reinforced practice and psychoeducation and skills training. Youth completed a range of exposure tasks to gradually confront BII stimuli. Example tasks included watching videos of blood tests, injections, or other medical procedures; making fake blood; dry needling (e.g., acupuncture); finger pricks and observing the therapist have a blood test (with the latter administered by registered physiotherapists and nurses). In order to standardise treatment, the goal for all OST treatments was for youth to have a finger prick and blood test either within their intensive session or by the conclusion of their e-therapy maintenance program (see below). To assist in generalization and to prevent relapse, exposure tasks were repeated multiple times and carried out across multiple contexts (e.g., psychology clinic, medical centre; Chelonis, Calton, Hart, & Schachtman, 1999; Gunther, Denniston, & Miller, 1998).

OST sessions varied from child to child as the therapist proceeded at the child's pace and adjusted the approach based on the child's response to various exposure tasks (e.g., fear level and behaviour). At least 3 phobic objects or situations were introduced over the course of the session (e.g., dry needling, finger pricks and blood test).

Given the ambiguous findings regarding the benefits of applied tension, above and beyond exposure therapy alone, the present study did not use applied tension (e.g., 10–20 s of tensing muscles, followed by 20–30 s of release). However, if a child's symptoms of fainting or nausea/vomiting were interfering with their ability to engage in exposure, the session was paused momentarily (i.e., 10 min) and the child was encouraged to use other adaptive strategies (e.g., wiggle toes, take some slow breaths, have a drink, splash water on their face, sit or lie with their feet up) to cope with these physical symptoms, in order for child to be able to progress with exposure. Once children recovered, they were encouraged to re-engage in a slightly easier exposure task (see Oar et al., Submitted for a full description of the treatment protocol). This occurred during the treatment of four children and adolescents all of whom continued and successfully completed their entire OST session.

1.4.5. Parent involvement in treatment

Given that anxiety disorders tend to run in families, and this may especially be the case for BII phobia (Van Houtem et al., 2013), parents were actively involved in the education session, at the end of their child's OST, and during all e-therapy maintenance sessions. At the conclusion of the OST, children and parents briefly reviewed progress made during the session and were reminded to schedule exposure tasks at home to continue progress and prevent relapse. Following this, the therapist and family determined four exposure tasks for the child to practice over the coming week. The education session provided an opportunity to teach parents contingency management strategies. Moreover, having parents involved at the conclusion of OST session and during the e-therapy maintenance program gave them the opportunity to observe the therapist model appropriate responses to their child's anxious behaviour.

1.4.6. E-therapy maintenance program

After their OST, families completed a 4-week e-therapy maintenance program. The child's therapist used Skype to video call the family once a week (approximately 45 min per call). At the commencement of each session, children and parents completed the BII related questions on the ADIS-IV Specific Phobia Module and rated the child's target behaviours. Next, the therapist, child and parents reviewed progress with exposure practice that week, rated their homework compliance, and then problem solved any difficulties. At the conclusion of each e-therapy session, the family and therapist collaboratively decided upon four exposure tasks the youth would practice the following week. Example tasks included, schedule an appointment with the family's general practitioner to discuss possible vaccinations, make fake blood and visit a physiotherapist for dry needling (e.g., acupuncture). Parents were encouraged to reward their child for completing the tasks. During the final e-therapy session relapse prevention was discussed with families and the importance of continued exposure practice to ensure long term treatment gains were maintained. A small number of youth ($n = 4$), who had not been engaging in exposure practice, were encouraged by their therapist to complete an exposure task (e.g., have a finger prick) during the e-therapy sessions in order to provide an opportunity for continued exposure.

1.4.7. Post treatment, 1-month and 3-month follow-up assessments

One week after OST (i.e., prior to e-therapy), parents and children completed a brief assessment via Skype. Parents and children were administered the Specific Phobia module of the ADIS-IV-P/C and rated their idiographic target behaviours. At 1-month follow-up (i.e., after e-therapy), parents and children returned to the GU Psychology clinic and completed a comprehensive assessment including diagnostic interviews (e.g., ADIS-IV-C/P), fear ratings associated with their idiographic target behaviours and BATs. At 1-month follow-up (i.e., after e-therapy), parents and children returned to the GU Psychology clinic and completed a comprehensive assessment including diagnostic interviews (e.g., ADIS-IV-C/P), fear ratings associated with their idiographic target behaviours and BATs. Online self-report questionnaires were completed by children and parents at home. At 3-month follow-up diagnostic interviews and idiographic target behaviours were readministered via Skype.

1.4.8. Treatment adherence

The majority of the treatments were carried out by the first author (ELO), a registered clinical psychologist, who completed 5 months of training in OST with the fifth author (THO). Two postgraduate clinicians assisted with five of the treatments under the supervision of the first and second authors (ELO &LJF). Postgraduate clinicians were provided with training in the treatment protocol by the first author (ELO). Postgraduate clinicians were required to observe at least two complete treatments conducted by the first author and to have the first author observe their first OST. To ensure standardisation all OST sessions were supervised by the second author (LJF). Two nurses and two physiotherapists assisted with treatment sessions and met with the first author and were provided with training regarding their role in the OST. Attempts were made to video record treatment sessions; however, as the majority of the sessions were conducted outside of the psychology clinic (e.g., physiotherapy clinic and medical centre) this was not always possible. Therapists kept a written record of all exposure tasks completed during the child's OST and home practice assigned during the e-therapy sessions. Following each OST therapist's rated their perceived adherence and competency in delivering the treatment on a 13-item scale, with each item rated 0 (*Not at all*) to 6 (*Excellent*). Example items included “Used modelling during the session”, “Elicited and worked with the child's catastrophic beliefs” and “Handled difficulties in the exposure procedure”. This measure was developed by Ollendick et al. (2009) and the scores here are

presented similarly to Ollendick et al. (2009), where a mean for each item is calculated and the mean range reported. Across the items in the current study, therapists rated their competence and adherence on average between 4.50 and 5.71, which is consistent with the Ollendick et al. (2009) trial.

2. Data analysis

A series of repeated measures ANOVAs were conducted followed by component pairwise comparisons, to examine participant changes over time on the primary (CSR, child and parent fear ratings of target behaviours) and secondary outcome measures (CGAS, SCAS, SMFQ, FSSC-R & BAT). A Reliable Change Index (RCI; Jacobson & Truax, 1991) was calculated to determine whether the magnitude of change in children's diagnostic severity (CSR) was statistically reliable. An RCI cut-off of 1.96 standard deviation units was used to meet criteria for reliable improvement. Test-retest reliability for the ADIS C/P was obtained from Silverman et al. (2001) for specific phobia. Clinically significant improvement, defined by Jacobson and Truax (1991) as a change of two standard deviations from the pre-treatment mean, was also assessed in relation to diagnostic severity (CSR). Furthermore, a child was considered 'recovered' if reliable improvement was obtained based on the RCI and if their diagnostic status on the ADIS was within the non-clinical range (ADIS, CSR < 4) (Silverman & Albano, 1996). Differences in homework compliance between youth who were recovered and those who were not recovered were also explored at 1-month and 3-month follow-up, in addition to changes to the number of comorbid diagnoses over time.

To further evaluate children's response to the modified OST approach, single case data were analysed using the robust improvement rate difference (RIRD) technique described by Parker, Vannest, and Davis (2011). This technique is used in single case research to describe the difference in improvement rate between the baseline period and treatment. If a lower score on an outcome measure such as the CSR or child and parent fear ratings of target behaviours indicates improvements, any data point in the treatment period, lower than all the data points in the baseline period, is considered improved. If all data points in the baseline period are higher than the data points in the treatment, so there is no overlap between scores across treatment periods, the improvement rate for the treatment is 100%. The improvement rate is reduced by the extent that data points in the baseline are equal to or lower than any score in the treatment period, so show evidence of improvement. These scores are overlapping data points. To remove the overlap between the two treatment periods, the minimum number of data points needed to remove all overlap between periods are removed. The overlapping data points are divided between the treatment and baseline. For example if two data points have been removed from the treatment period, one of these is assigned to the baseline as an improved data point and one is assigned to the treatment as a not improved data point. The RIRD is then obtained by subtracting the percentage of improved data points from the baseline from the percentage of improved data points from the treatment for each child (see Parker et al., 2011). Child and parent treatment satisfaction was also examined to determine the acceptability of the modified OST approach.

3. Results

3.1. Therapy retention

All 24 children completed the child and parent education session and OST. Twenty-one of the 24 children completed all e-therapy maintenance sessions. Of the three children who did not complete the maintenance sessions, one completed the first e-therapy session and was unavailable until the 3-month follow-up assessment. The other two non-completers undertook three of the four e-therapy maintenance sessions. All children completed the post-treatment assessment. Three children were unavailable for the 1-month follow-up and one child for the 3-month follow-up. Hence, on the primary outcome measures (CSR and child and parent fear of target behaviours), 1-month and 3-month data were analysed using an intent to treat approach with the last observation carried forward where missing data were present (Ollendick et al., 2015, 2009; Waters et al., 2014). Children and their parents completed self- and parent-report measures at pre-treatment and 1-month follow-up. A significant minority of youth ($n = 8$; 33.33%) and their parents ($n = 6$; 25%) failed to complete online questionnaires at home for their one-month follow-up despite numerous attempts by the authors to collect this data. Due to the small number of responders (e.g., $n = 16$; 66.67% youth and $n = 18$; 75% parents), completer analyses were conducted for all questionnaire measures.

3.2. Primary outcome measures

To establish the stability of the baseline period, ANOVAs were conducted separately for the 1-week ($n = 8$), 2-week ($n = 9$) and 3 week ($n = 7$) baseline groups. There were no significant differences between baseline groups between pre-treatment and each of the baseline scores (i.e., 1 week, 2 weeks, or 3 weeks) for CSR and child and parent fear ratings associated with children's ideographic target behaviours (see Fig. 2). Hence, the baseline groups were collapsed and repeated measures ANOVAs were conducted for the overall sample ($N = 24$) using pre and week one baseline data.

3.2.1. Diagnostic severity

Significant differences were observed in CSR scores over time $F(4,92) = 50.13$, $p < .001$, $\eta_p^2 = 0.69$ (refer Table 2). A significant reduction in CSR was found from pre to post-treatment, $t(23) = 7.31$, $p < .001$, pre-treatment to 1-month follow-up, $t(23) = 7.94$, $p < .001$, and pre-treatment to 3-month follow-up, $t(23) = 8.56$, $p < .001$. In addition, youth's CSR scores continued to significantly decline from post-treatment to 1-month follow-up, $t(23) = 2.75$, $p = .01$, and post-treatment to 3-month follow-up, $t(23) = 3.30$, $p < .001$.

3.2.2. Idiographic target behaviours

ANOVA for child fear ratings of target behaviours revealed significant effects across time $F(4,92) = 35.25$, $p < .001$, $\eta_p^2 = 0.61$ (refer Table 2). Significant reductions were observed in children's fear ratings from pre to post-treatment, $t(23) = 5.45$, $p < .001$, pre-treatment to 1-month follow-up, $t(23) = 6.55$, $p < .001$ and pre-treatment to 3-month follow-ups, $t(23) = 6.26$, $p < .001$. Post-treatment improvement was maintained at 1- and 3-month follow-up.

Analysis of the parent fear ratings of target behaviours also showed significant changes over time $F(4,92) = 43.59$, $p < .001$, $\eta_p^2 = 0.66$ (refer Table 2). A significant reduction in parent fear ratings was found from pre-to post-treatment, $t(23) = 6.87$, $p < .001$, pre-treatment to 1-month follow-up, $t(23) = 8.69$, $p < .001$, and pre-treatment to 3-month follow-up, $t(23) = 7.39$, $p < .001$. Treatment gains were maintained at 3-month follow-up.

3.3. Clinically significant improvement and reliable change

Post-treatment, 17 of 24 (70.83%) children showed reliable change on CSR ratings, while at 1-month follow-up, 20 of the 24 (83.33%) children evidenced reliable change and finally, at 3-month

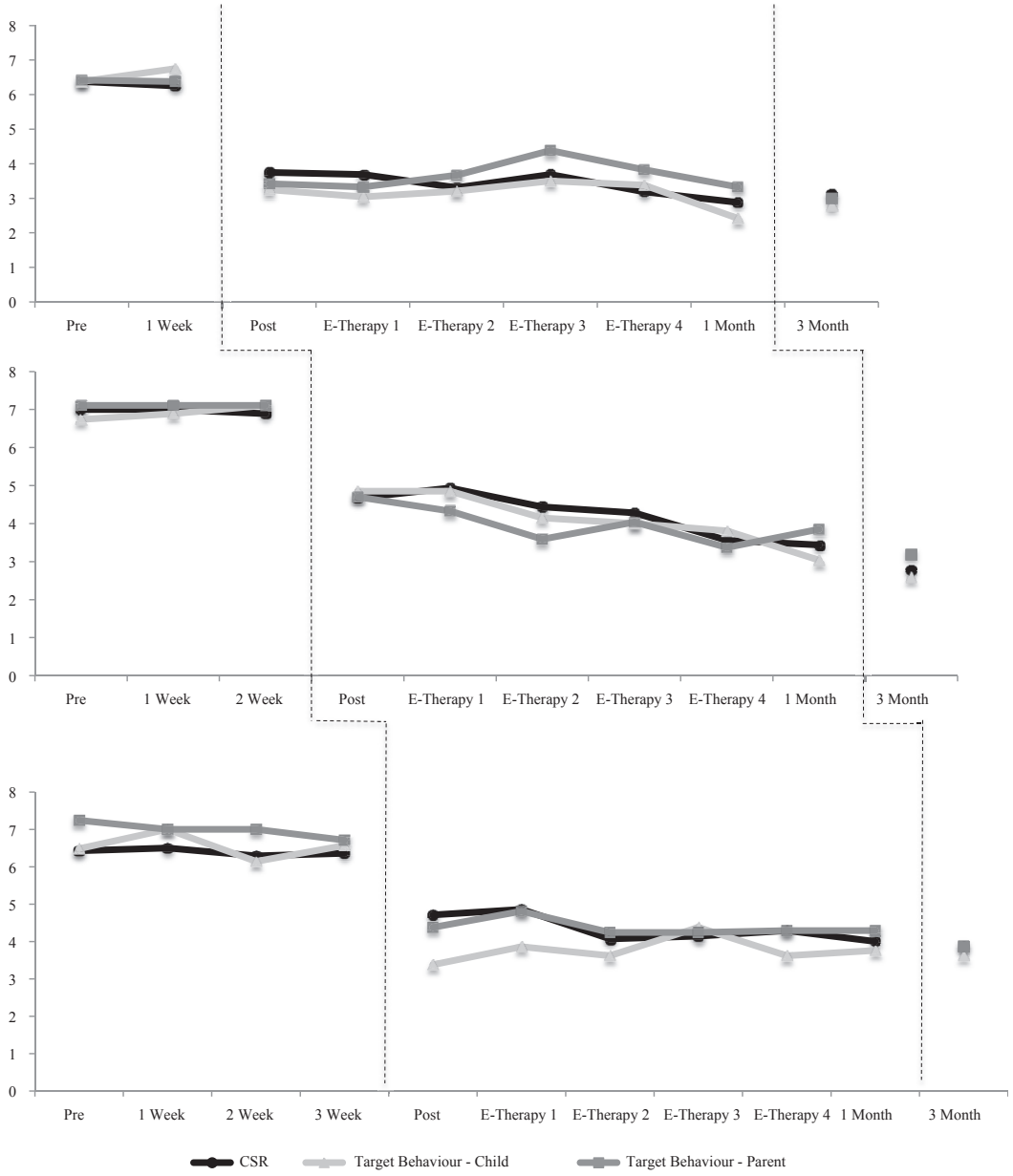

Fig. 2. Mean group scores for CSR, child and parent fear ratings of target behaviours across 1-week ($n = 8$), 2-week ($n = 9$) and 3-week ($n = 7$) baseline.

Table 2
Time main effects for treatment outcome measures.

Measure	Pre	Baseline	Post	1-month F/up	3-month F/up	Significance	Effect (ηp^2)
CSR	6.63 (1.06)	6.63 (1.06)	4.38 (1.47)	3.42 (1.82)	3.21 (1.69)	$p < .001$	0.69
Target behaviour – Child Fear rating	6.54 (0.91)	6.88 (0.68)	3.89 (2.36)	3.04 (2.21)	2.96 (2.33)	$p < .001$	0.61
Target behaviour – Parent Fear rating	6.92 (0.83)	6.83 (0.96)	4.18 (2.24)	3.81 (1.85)	3.33 (2.40)	$p < .001$	0.66
CGAS	60.00 (6.92)	–	71.67 (11.48)	77.08 (9.32)	79.17 (8.93)	$p < .001$	0.62
SCAS-C	22.37 (16.02)	–	–	10.94 (9.52)	–	$p < .01$	0.36
SCAS-P	20.89 (12.49)	–	–	10.78 (8.70)	–	$p < .001$	0.64
SMFQ-C	3.62 (4.33)	–	–	2.38 (2.96)	–	$p = .18$	0.11
SMFQ-P	2.39 (2.30)	–	–	1.11 (2.34)	–	$p < .01$	0.35
FSSC-R C	120.38 (29.22)	–	–	98.88 (20.64)	–	$p < .001$	0.58
FSSC-R P	123.50 (21.29)	–	–	99.61 (18.93)	–	$p < .001$	0.73
Number of Diagnoses	2.71 (1.27)	–	1.08 (0.97)	0.75 (0.90)	0.58 (0.88)	$p < .001$	0.64
Avoidance behaviour Live BAT	1.17 (1.34)	–	–	0.26 (0.69)	–	$p < .01$	0.34
Avoidance behaviour Video BAT	1.58 (1.64)	–	–	0.62 (1.25)	–	$p < .01$	0.32

Note. CSR = Combined ADIS-C/P clinical severity rating; Target behaviours = mean fear rating of 3 idiographic target behaviours rated 0 to 8.

follow-up, 21 of 24 (87.50%) children showed reliable change (refer Table 3). In relation to clinically significant improvement at post-treatment, 12 of 24 children (50%) children were considered "improved" on the basis diagnostic interviews. At 1-month follow-up 16 of 24 (66.70%) children were "improved", and finally at 3-month follow-up 18 of 24 (75%) were improved. Post-treatment, 8 of the 24 (33.33%) children were in the non-clinical range on the basis of diagnostic interviews (ADIS, CSR < 4), and showed evidence of significant reliable change. Additional treatment gains occurred at follow-ups, with 14 (58.33%) children non-clinical at 1-month follow-up and 15 (62.50%) at 3-month follow-up. Independent groups t-test revealed no differences between those who were 'recovered' and 'not recovered' on child rated, $t(21) = -0.09$, $p = .93$, Cohen's $d = -0.04$, and parent rated homework compliance $t(20) = 0.25$, $p = .80$, Cohen's $d = 0.12$, at 1-month follow-up. Similarly, significant differences were not found between those who were 'recovered' and 'not recovered' on child rated, $t(21) = -1.39$, $p = .18$, Cohen's $d = -0.62$, and parent rated homework compliance $t(20) = -1.12$, $p = .28$, Cohen's $d = -0.51$, at 3-month follow-up.

In relation to diagnostic comorbidity, significant differences were observed in the total number of children's diagnoses, over time, $F(3,69) = 40.83$, $p < .001$, $\eta_p^2 = 0.64$. A significant reduction was observed in the number of diagnoses from pre to post treatment, $t(23) = 6.06$, $p < .001$, pre-treatment to 1-month follow-up, $t(23) = 7.36$, $p < .001$, and pre-treatment to 3-month follow-up, $t(23) = 9.00$, $p < .001$. Post-treatment improvement was maintained at 1- and 3-month follow-up. Reductions were evidenced in not only in the frequency of BII phobia diagnosis but across all comorbid diagnoses.

Of further clinical interest at the conclusion of the OST, 58.30% ($n = 14$) children were able to have a finger prick and 45.80% ($n = 11$) were able to have a blood test or injection. Overall, 66.70% ($n = 16$) were able to have either a finger prick or blood test/injection during the OST session with 37.5% ($n = 9$) of youth able to have both. Following their e-therapy maintenance program at 1-month follow-up this increased to 87.05% ($n = 21$) who were able to have a finger prick and 66.70% ($n = 16$) who were able to have a blood test or injection. Overall, 91.70% ($n = 22$) were able to have a finger prick or blood test/injection by 1-month follow-up and 62.5% ($n = 15$) had both.

3.4. Robust improvement rate difference

The baseline phase was compared to the treatment phase using the robust improvement rate difference technique (RIRD; Parker, Vannest, & Brown, 2009; Parker et al., 2011). RIRD was obtained by subtracting the improvement rate for the baseline phase from the improvement rate from the treatment phase. On average, the RIRD for CSR was 85.76% (95% CIs 72.40%–96.18%). For child fear ratings of target behaviours, the RIRD average improvement rate was 78.34% (95% CIs 75.56–83.56%) and for parent fear ratings was 80.74% (95% CIs 68.63–91.41%). Consistency between clinician, child and parent ratings for the RIRD were high with significant positive correlations between clinician and child ratings, $r(22) = .77$, $p < .001$, clinician and parent ratings, $r(22) = .83$, $p < .001$ and parent and child ratings, $r(22) = .82$, $p < .001$.

3.5. Global functioning

An ANOVA showed significant changes to the CGAS over time $F(3,69) = 37.43$, $p < .001$, $\eta_p^2 = 0.62$ (refer Table 2). The analysis revealed a significant improvement in CGAS from pre-treatment to post-treatment, $t(23) = 5.29$, $p < .001$. Furthermore, significant increases in CGAS were also observed from post-treatment to 1-month follow-up, $t(23) = 3.09$, $p < .01$ with treatment gains maintained at 3-month follow-up.

3.6. Symptom measures

3.6.1. Anxiety symptoms

ANOVAs showed significant time effects for the SCAS-C, $F(1, 15) = 8.41$, $p < .01$, $\eta_p^2 = 0.36$ and SCAS-P, $F(1, 17) = 30.68$, $p < .001$, $\eta_p^2 = 0.64$ (refer Table 2), whereby there was a significant decline from pre-treatment to 1-month follow-up.

3.6.2. Fear symptoms

Analysis of the FSSC-R showed significant time effects for both the FSSC-R-C, $F(1, 15) = 20.45$, $p < .001$, $\eta_p^2 = 0.58$ and FSSC-R-P, $F(1, 17) = 46.03$, $p < .001$, $\eta_p^2 = 0.73$ (refer Table 2), with a significant decline from pre-treatment to 1-month follow-up.

3.6.3. Depression symptoms

ANOVAs were conducted to examine time effects on the SMFQ-C and SMFQ-P. Significant differences were not observed pre-treatment to 1-month follow-up on the SMFQ-C. In contrast, on the SMFQ-P time effects were found, $F(1,17) = 8.98$, $p < .01$, $\eta_p^2 = 0.35$ with a significant decline in SMFQ-P scores observed from pre-treatment to 1-month follow-up (refer Table 2).

3.7. Avoidance behaviour

ANOVAs showed significant time effects for the live BAT, $F(1, 22) = 11.15$, $p < .01$, $\eta_p^2 = 0.34$ and video BAT, $F(1, 23) = 10.80$, $p < .01$, $\eta_p^2 = 0.32$ (refer Table 2), with significant decreases in avoidance from pre-treatment to 1-month follow-up.

3.8. Treatment acceptability and satisfaction

At 1-month follow-up, treatment satisfaction was rated by children and parents across 3 items on a scale ranging from 0 to 15. Both children ($M = 13.75$; $SD = 1.84$) and parents ($M = 13$; $SD = 2.85$) reported high satisfaction. Of the 18 parents who responded to the questionnaire, 58.3% ($n = 14$) also indicated that the treatment was "just the right length"; however, 12.5% ($n = 3$) reported that one session was too short. Children rated the most

Table 3
Percentage of youth who were reliably changed, percentage of youth who were improved and percentage of youth recovered.

	Time		
	Post	1-month F/up	3-month F/up
Percentage reliably changed	70.83% ($n = 17$)	83.33% ($n = 20$)	87.50% ($n = 21$)
Percentage improved	50.00% ($n = 12$)	66.67% ($n = 16$)	75.00% ($n = 18$)
Percentage recovered	33.33% ($n = 8$)	58.33% ($n = 14$)	62.50% ($n = 15$)

Note: Percentage reliably changed = Reliable Change Index (RCI) > 1.96; RCI = $(CSR_{Post} - CSR_{Pre})/S_{diff}$; $S_{diff} = 0.65$, Cut off 1.27; Percentage Improved = < $M_{pre\text{-}treatment} - 2\ SD_{pre\text{-}treatment} = 4.52$; Percentage Recovered = Subclinical range on the ADIS-IV (CSR < 4) and showed evidence of reliable change.

helpful component of treatment as "being in the situation they feared", whereas parents rated "having the therapist show my child how to cope with the feared situation" as the most helpful.

4. Discussion

Currently there are no evidence-based treatments for youth with BII. The present study provides the first controlled trial of treatment outcome for BII in children and adolescents. Overall, results provide support for the effectiveness of a modified OST approach, which included an e-therapy maintenance program. Significant reductions in BII-related measures were observed at post-treatment and outcomes continued to improve at 3-month follow-up.

As expected, diagnostic severity (CSR) and child and parent fear ratings associated with target behaviours remained stable during the baseline phase and improved significantly following the modified OST. These changes were found across all three baseline periods (1, 2 and 3 weeks), indicating that change in BII symptoms was due to the modified OST not simply the passage of time or repeated assessments. Furthermore, single case analysis revealed greater improvement in the treatment phase relative to the baseline phase suggesting that changes were likely due to modified OST.

It was also predicted that significant reductions would be observed from pre-to post-treatment on CSR, diagnostic status, behavioural avoidance during a behavioural avoidance task (BAT), and child and parent reported anxiety, fear and depression. This hypothesis was partially supported. From pre-treatment to post-treatment significant reductions were observed in children's diagnostic severity on independent assessor ratings (CSR) with continued decline at 1-month follow-up and gains maintained to 3-month follow-up. BII diagnostic severity (CSR) showed reliable change at post treatment, 1-month follow-up and three-month follow-up. Post-treatment, 33.33% youth were diagnosis free (ADIS CSR $\leq$ 3), at 1-month follow-up at the completion of the e-therapy maintenance program 58.33% of youth were diagnosis free, and at 3-month follow-up 62.5% were diagnosis free. These outcomes are comparable to other treatment studies using OST for phobic youth which show that 50–60% of youth are diagnosis free at follow-up (Ollendick & Davis, 2013). Differences were not observed between youth who were 'recovered' versus 'not recovered' at 1-month and 3-month follow-up in relation to homework compliance suggesting that at home practice was not critical to responding or that the measure used to assess home practice was not sensitive. Moreover, consistent with previous research, the modified OST was associated with significant reductions in children and adolescents comorbid diagnoses (Ollendick, Öst, Reuterskiöld, & Costa, 2010). Ollendick et al. (2010) suggest that an increased sense of self-efficacy, following an intensive session, may generalize so that children are better able to cope with other phobias and anxiety as well.

Significant reductions were observed in youth's level of avoidance during the live and video BAT, from pre-treatment to 1-month follow-up. In regards to child and parent report measures of anxiety (SCAS) and fear (FSSC-R), significant reductions were observed from pre-treatment to 1-month follow-up. Significant declines were also observed in parent reports of their child's symptoms of depression from pre-treatment to 1-month follow-up. However, no differences were observed in children's self-reported depressive symptoms from pre-treatment to 1-month follow-up. Failure to find a difference on children's self-reported symptoms of depression may be due floor effects; at pre-treatment, the mean of children's self-reported depression was in normative ranges and hence there was limited room for change post-treatment. This finding is consistent with earlier studies of phobic youth conducted by Ollendick et al. (2009) and Öst et al. (2001).

Notably, at the conclusion of the OST, over half the children enrolled in the trial were able to have a finger prick, and almost half were able to have a blood test or injection. Following their e-therapy maintenance program at 1-month follow-up, this increased to just over 80% who were able to have a finger prick, and approximately 65% who were able to have a blood test or injection. In comparison, adult BII treatment trials produce far greater outcomes such that adults were achieving 10 finger pricks, 10 to 12 subcutaneous injections and 2 to 4 blood tests (Öst, 1997) in a single session. It is evident from the present study that children with BII progress through exposure at a significantly slower pace. Prior to treatment it is important that children, their parents, other health professionals working with the family, and therapists have realistic expectations as to what can be achieved during OST.

Children and parents reported high levels of treatment satisfaction and acceptability. They indicated that the program was helpful, and that it assisted them in coping with their phobia. They also endorsed that they would recommend the treatment to a friend who had a child with a similar fear. These satisfaction ratings are consistent with existing OST treatment studies (Ollendick et al., 2015). In general, the OST (3 h) and e-therapy maintenance program was perceived to be appropriate in regards to dose and length of treatment. Three families did however suggest that the treatment was too short. Notably, these were families of younger children ($M = 8.67$) and one child who had a history of chronic illness requiring multiple hospital admissions. Future studies could include a booster session for children with BII who are partial or non-responders at 1-month follow-up in order to enhance the dose of treatment.

A strength of the present study was collaboration between the health professionals involved in the OST. Engagement with other health professionals is an important adjunct to treatment for youth with BII phobia although it presents challenges from a feasibility perspective. In the current trial, the intensive treatment session was delivered in a university setting where all health professionals (e.g., physiotherapist and nurse) were available at the one site. The treatment in its current form would therefore be more amenable to delivery in either a hospital or outpatient medical setting. Further research is needed to determine whether this approach could be delivered as effectively in routine clinical practice. For example, treatment may be more feasibly delivered in another format, such as 1.5 h sessions over 2 days, whereby the clinician could meet with the family and a physiotherapist on the first day and then visit a nurse on the second. Moreover, a considerable amount of time was devoted to scheduling and coordinating appointments between families and the health professionals involved in the session. The practicalities in organising and delivering this treatment may therefore lend itself well to a group format. Ongoing collaborations following treatment were also important, whereby families were encouraged to book appointments with their general practitioner or physiotherapist to continue with exposure during their e-therapy maintenance program. Families were provided with a letter to give to health professionals outlining their involvement in an exposure based treatment program and the need for continued practice. Moreover, examples were provided for practitioners highlighting ways in which they could be of assistance.

Approximately one third of children and teenagers in the present study were reported to have a parent with the same fear. Despite this all parents were able to engage and participate in their child's OST treatment session and home tasks. Clinically it was noted that a lack of engagement in home tasks appeared to be more often the result of parent's busy schedules and hence parent fear did not appear to effect child progress during therapy sessions, although the degree to which this may have hindered at home

practice is unknown. Given that BII phobia has a strong family heritability it is suggested that future studies assess parent BII diagnostic status using structured clinical interviews and explore the effects of parent BII diagnosis on treatment outcome and continued exposure practice following treatment.

The present study is not without limitations. Due to challenges associated with video recording across different treatment settings (GU psychology clinic, physiotherapy centre and medical centre), the evaluation of treatment adherence relied on therapists' rating of their own competence and adherence to the treatment protocol. As in Ollendick et al. (2009, 2015) a more optimal approach would have been to have independent raters observe and evaluate treatment adherence. Another limitation of the present study was the BAT administration as clinicians who administered the task rated the child's level of avoidance and were not blind to the assessment time point or the fact that children had received an active treatment. It will be important in future research that BATs are set up to permit avoidance to be assessed by independent assessors. A significant proportion of youth and their parents did not complete questionnaires at 1-month follow-up despite numerous attempts by the authors to collect this data. Hence, the generalizability of the self-report findings is limited. The study is also limited by the predominantly Caucasian sample from middle to upper class socioeconomic backgrounds. Another limitation was the lack of follow-up beyond 3 months. During their final e-therapy session relapse prevention was discussed with families and the importance of regular continued exposure for 6–12 months following treatment to maintain gains. In comparison to other types of specific phobia (e.g., phobia of the dark or dogs) there are fewer chances for naturally occurring exposure opportunities to arise following treatment. If children are healthy, they may not require a vaccination or blood test for a year or more. Therefore the results are limited in terms of understanding the durability of this treatment approach beyond 3 months post-treatment. Long-term durability of this approach needs to be examined given that naturally occurring exposure opportunities may be more limited for children with this type of phobia; hence, these children may be more susceptible to a return of fear following successful treatment (Boschen, Neumann, & Waters, 2009). A booster session may be necessary to ensure treatment gains are maintained after 3 months. Moreover, future research studies need to examine and the duration and frequency of continued exposure practice required following OST to prevent a return of fear in BII phobic youth.

Despite these limitations, the present study makes a significant contribution to the literature as it is the first controlled treatment study for BII phobic youth. Preliminary findings provide support for the effectiveness of a modified OST approach for youth with BII and demonstrated that treatment outcomes were maintained up to 3-month follow-up. The multiple baseline controlled design demonstrated stability in BII symptoms across the baseline phase with significant reductions following the OST. Further research, including large randomized controlled trials is needed to provide additional support for this modified OST approach and to establish mechanisms of change and moderators of treatment response. Differences in treatment responding in terms of age and clinical presentation (e.g., children who respond with disgust, fainting or those youth with chronic health problems) needs to be further explored. The findings from this study encourage further research into time-limited, intensive treatments for BII phobia in youth.

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