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S.I. : ANXIETY IN AUTISM SPECTRUM DISORDERS

Feasibility, Acceptability and Preliminary Treatment Outcomes in a School-Based CBT Intervention Program for Adolescents with ASD and Anxiety in Singapore

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Abstract Adolescents with autism spectrum disorder (ASD) are at high risk for anxiety difficulties and disorders. Clinic-based cognitive behavioral therapy (CBT) is effective; however, few published school-based CBT programs for youth with ASD exist. In this study, the Facing Your Fears CBT protocol was adapted for delivery and piloted within a school setting by non-clinicians, with culturally appropriate adaptations. 44 13–15 aged youth with ASD from 22 mainstream schools in Singapore participated. Feasibility, acceptability and preliminary treatment outcomes were examined. Decreases in youth and parent reported anxiety symptoms were reported. Staff and parents found the program useful. Stakeholder support was important for implementation. Initial findings reflect the importance of carefully bridging research-to-practice for youth with ASD and anxiety.

Keywords Cognitive behavior therapy (CBT) · Autism spectrum disorder (ASD) · Adolescents · Anxiety · Facing your fears · Schools

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Introduction

Children and adolescents with autism spectrum disorder (ASD) are at particularly high risk for developing mental health conditions, and anxiety disorders are among the most commonly reported concurrent diagnoses in these youth (Leyfer et al. 2006; Simonoff et al. 2008). Estimates from a recent meta-analysis indicated that approximately 40% of youth with ASD met criteria for an anxiety disorder (van Steensel et al. 2011), many more than would be expected in the general population (3–8%) (McConachie et al. 2014).

Impact of Anxiety

For typically developing youth, anxiety can be debilitating, persist into adulthood, and markedly impact participation in home, school and community environments (Gosch et al. 2006; Russell and Sofronoff 2005). Anxious youth may experience marked difficulties in social interaction with family members and peers (Ezpeleta et al. 2001; Motoca et al. 2012; Settipani and Kendall 2013). Additionally, anxiety can interfere with a student's ability to access and participate in academic curricula, leading anxious youth to perform below their ability level (Rotheram-Fuller and MacMullen 2011; Wood 2006). Participation in after school activities may also be limited (Weissman et al. 2009).

For children and adolescents with ASD, excessive worry may prevent the establishment of healthy social relationships resulting in marked difficulties navigating social environments (Bellini 2004). Thus, anxiety may provide particular challenges for youth with ASD as the symptoms may negatively impact school functioning, family functioning and exacerbate the core deficits of ASD (Bellini 2004).

Further, caring for youth with both ASD and anxiety has been linked to higher societal costs compared to typically developing children. In fact, the total costs of caring for individuals with ASD and anxiety may be four times higher than for individuals with ASD alone (van Steensel et al. 2013). Thus, if co-morbid anxiety can be treated effectively among youth with ASD, then healthcare (and human) costs may be significantly reduced.

Intervention for Anxiety in ASD

Cognitive-behavioral treatments (CBT) are evidence-based treatments (EBP) for the management of anxiety, originally developed for the general pediatric population (Olatunji et al. 2010). Modified CBT interventions for youth with ASD and anxiety have emerged and have generally retained the core components of CBT for anxiety (e.g., psychoeducation, somatic management, attention to automatic negative thoughts, and graded exposure), while making modifications to the delivery of the core content to increase accessibility of the material for individuals with ASD (e.g., visual schedules and checklists, repetition and practice, role play, incorporation of special interests, use of video self-modeling, and regular parent participation; Moree and Davis 2010).

Research has yielded promising results for both individual (e.g., Storch et al. 2013; Wood et al. 2015) and group treatments (Chalfant et al. 2007; Reaven et al. 2012). To date, over ten randomized controlled trials have been conducted examining the impact of modified CBT for youth with high-functioning ASD and anxiety. Significant reductions in anxiety symptoms have occurred for school-aged and adolescent youth following participation in these modified CBT programs. The majority of these interventions have been developed and delivered in the United States, although two have been developed in Australia (e.g., Chalfant et al. 2007; Sofronoff et al. 2005), and one in Singapore (Sung et al. 2011).

To date, these interventions have primarily been delivered in clinic settings (e.g., Reaven et al. 2012; Ung et al. 2014), limiting access for high risk and underserved youth who cannot access therapeutic services from outpatient clinic venues. An exception to the university-based treatment programs for youth with ASD and anxiety is the McConachie et al. (2014) study that found that professionals who were not experts in CBT could effectively deliver the "Exploring Feelings" (Attwood 2004) program to youth with ASD and anxiety in community settings in the UK, yielding both high fidelity and good anxiety treatment outcomes. In addition, Luxford et al. (2016) found that the "Exploring Feelings" program could be delivered to 35 youth (aged 11–14 yrs) in secondary schools in the UK. The intervention was delivered by the researcher and supported by the teaching assistant in order to help support students outside of the CBT sessions. The intervention (compared to the wait-list control group) showed improvement in parent, teacher, and self-reported anxiety symptoms, and marginal improvement in teacher-reported social responsiveness.

Bridging the Research to Practice Gap

Implementing Evidence-Based Practice (EBP) in School Settings

It is critically important to improve access to care for youth with ASD and anxiety, given the difficulty that the majority of these youth have in obtaining evidence-based treatments. School settings may represent the ideal "location of choice" for the delivery of mental health services for many youth with ASD given the amount of time children spend in school, the proximity of a school building to a student's home, and in most cases no requirement for financial reimbursement. In addition, students with ASD and anxiety frequently display school based fears which can interfere with opportunities to be fully included in school activities (e.g., fear of making mistakes, talking in front of a group, fire alarms). Schools also have increased ecological validity compared with clinic settings which can enhance the generalizability of new skills through practice in the very settings that are often the most challenging (Kasari and Smith 2013; Mychailyszyn et al. 2011).

Unfortunately, translating research from controlled lab settings to natural environments is an exceptionally slow process. The prevailing view of intervention development includes rigorous testing of a new treatment in a tightly controlled environment with effectiveness trials beginning only after efficacy has been well established, (Kasari and Smith 2013). This lengthy process of intervention development may be particularly problematic for the delivery of EBPs in the context of schools, as a treatment created solely in clinic settings may not meet the needs of students with ASD or those of the educators facilitating the intervention (Kasari and Smith 2013). Thoughtful adaptations that are compatible with an organizations' values and beliefs and are perceived to be flexible in delivery, are more likely to be adopted than interventions that have not been carefully modified (Beidas et al. 2011; Dingfelder and Mandell 2011; Elkins et al. 2011; Volkmar et al. 2011).

Administrative and teacher support must be garnered, and enlisting a key administrator or "opinion" leader (individual who serves as an influential model for others in their social network by supporting the work of other professionals) at all stages of intervention development and implementation may be particularly important to enhance success (Forman et al. 2009). These collaborative efforts can

maximize contextual fit and create meaningful program outcomes, which in turn, may ultimately enhance the sustainability of the intervention (Chung et al. 2010; Forman et al. 2009). In addition, it is essential to provide high quality training and consultation to enhance facilitator self-efficacy as well as strong adherence to treatment. Manualized interventions may be particularly appealing in implementation efforts as they specify key components of the program, and offer strategies for delivering the treatment effectively, efficiently and credibly (Kasari and Smith 2013). Training cohorts or relatively large numbers of school teams to deliver EBPs may be particularly critical, as this effort has the potential to directly address in an a priori manner, common problems (i.e. staff turnover) that can negatively impact long-term sustainability (Locke et al. 2015).

Cultural Considerations

The adaptation process may be even more complex when interventions developed in the West are applied to children from other cultures across the world (Ravindran and Myers 2012). In these instances, it is important to attend to cultural influences and how these influences impact variables such as how a family identifies problems in their child and whether they seek help for these challenges. Understanding the nature of the relationship between parents and professionals is essential, as well as whether the content of a particular treatment program is consistent with a family's beliefs and priorities (Ravindran and Myers 2012). In western cultures, parents are often included in their children's treatment and a frequent goal of intervention (in addition to a focus on skill attainment) is the empowerment of parents (Ravindran and Myers 2012). The extent to which the same degree of collaboration is important or even possible in other cultures is unknown. Unfortunately, there are no known gold standard procedures for the cultural adaptations of interventions, other than to work closely with key stakeholders and to acknowledge cultural perspectives of disability from other cultural groups (Ravindran and Myers 2012).

CBT for Anxiety in School Settings

To our best knowledge, there are no known published school based CBT programs for managing anxiety in youth with ASD. There is, however, a growing body of literature examining the effects of CBT in school-based settings for typically developing children (Fisher et al. 2004; Mychailyszyn et al. 2011, 2012). Approaches have included universal intervention programs (prevention), as well as selected and indicated programs for students who are considered at-risk or who have been identified as having clinical anxiety symptoms (Barrett 2004; Miller et al. 2011). For example, the FRIENDS Program for Children (an evidence-based social and emotional skills program targeting resilience and the prevention of anxiety and depression in individuals across the lifespan) has demonstrated reductions in anxiety symptoms for youth when delivered in both clinical and school-based settings (Barrett 2004). Importantly, the CBT interventions provided by teachers and school nurses showed comparable reductions in anxiety to psychologist-led programs (Barrett and Turner 2001). However, the inclusion of students with ASD in these previous studies has been limited, even though these students are at higher risk for developing mental health symptoms relative to their typical peers.

Current Study

The primary purpose of the present study was to: (1) adapt the original Facing Your Fears: Group therapy for managing anxiety in children (ages 8–14) with high-functioning autism spectrum disorder (FYF; Reaven et al. 2011) program for a slightly older group of adolescents with ASD (ages 13–15) in school settings; (2) train and coach non-clinicians to implement the FYF-School based version (FYF-SB) in their schools for students with high-functioning ASD and anxiety; (3) assess initial feasibility and acceptability of the intervention; and (4) assess the initial effectiveness of FYF-SB. The initial implementation of FYF-SB occurred in Singapore, after psychologists from the Ministry of Education initiated a project to train Allied Educators (Learning and Behavioral Support—AEDs/LBS) to implement a school based intervention program for students with ASD and anxiety. Although there are other available treatment programs designed for youth with ASD and anxiety, the Ministry of Education in Singapore approached the developers of FYF because the treatment was designed to be delivered in a group format and because it was commercially available. FYF was also selected because three treatment trials have been conducted on this program to date, including a randomized controlled trial (Reaven et al. 2012). Results across all studies indicated that youth participants demonstrated significant reductions in parent-reported anxiety symptoms following participation in FYF (Reaven et al. 2009, 2012, 2014). Furthermore, results from the randomized trial indicated that youth who participated in FYF demonstrated significantly higher rates of clinically meaningful outcomes relative to youth who had been assigned to Treatment-As-Usual (TAU).

Singapore is a multi-ethnic and diverse Southeast Asian country (74% Chinese; 13% Malays; 9% Indians and 3% other nationalities) where numerous languages are spoken including English, Mandarin, Malay, and Tamil (2010 census). English is officially the main language of instruction in schools. The diagnosis of autism is typically done by developmental pediatricians and child psychologists in

hospital settings (Neik et al. 2014). Importantly, there is relatively strong community support for the diagnosis and treatment of ASD and subsidized services are often available to families (Neik et al. 2014). Early intervention in Singapore typically starts at preschool ages and include intensive behavior intervention as well as developmental models of intervention (Neik et al. 2014). There are approximately 20 special education schools for children with ASD in Singapore that are funded by the Ministry of Education (MOE) and National Council of Social Service (NCSS). Many students with ASD are also educated in mainstream settings.

This paper will detail the cross-cultural collaboration between investigators from the United States, Canada and Singapore, including the adaptation (i.e., including adaptations to fit within a school setting and cultural adaptions to fit within the Singaporean context) and implementation process, and interactive training designed for school personnel. Previous research has demonstrated that non-mental health professionals can be effectively trained to deliver CBT (e.g., Ginsburg et al. 2008; Westbrook et al. 2008); therefore, in this study non-clinicians were selected as group facilitators. Since educators and other non-mental health school-based personnel are often at the front lines in their interactions with students with ASD, but do not have sufficient training to assist their students in managing anxiety symptoms, it may be especially critical to develop school programs that can be delivered by non-clinician school teams. Finally, preliminary youth treatment outcomes from this initial effectiveness trial will be presented. It was hypothesized that students with ASD and anxiety in Singapore would exhibit significant reductions in anxiety symptoms following participation in FYF-SB, although the extent to which these reductions would be in line with results from previous treatment trials is unclear which is consistent with dissemination research (Weisz et al. 2013).

Methods

Participants

Two groups of participants entered the study: school staff and student participants. Participants were recruited through 22 mainstream secondary schools through the Singapore Ministry of Education.

School Staff

School staff consisted of Allied Educators (Learning and Behavioral Support) [AED (LBS)] who facilitated the FYF-SB program (i.e., Facilitators; n = 23) and Psychologists who served as coaches to the facilitators (i.e., Coaches; n = 19).

FYF-SB facilitators AED (LBS) are allied educators who work in the schools to provide support for students with special needs. They provide support by working directly with the students (e.g., in-class assistance, individually tailor supports), as well as providing consultation to teachers and parents on strategies to help students with special needs. To become an AED (LBS), individuals attend 1-year training and receive a Diploma in Special Education. Some of the AEDs (LBS) also obtained additional training at the Autism Resource Centre (ARC) in Singapore, receiving in-depth training on skills to support students with ASD. The role of the facilitators was to conduct each FYF-SB session, engage parents, teachers and school leaders, as well as provide updates and seek collaboration when needed. They also collected information related to the student's anxiety.

FYF-SB coaches The Psychologists work closely with schools by conducting psychological assessments and providing consultation to school personnel on how best to support students with learning difficulties and/or ASD. A coach was assigned to each facilitator to provide consultation and support in the planning and implementation of the FYF-SB program in school. The role of coaches included: (1) providing a minimum of two sessions of observations and on-site coaching; (2) discussing each session with facilitators to ensure adherence to the session objectives and activities, and to problem-solve where necessary (i.e., included face-to-face meetings, phone calls or emails); and (3) supporting facilitators during meetings with parents and school leaders.

Student Participants

A total of 44 13–15-year old Singaporean adolescents with ASD and anxiety from 22 mainstream secondary schools participated in the FYF-SB intervention program. The majority of the students were ethnically Chinese (70%), while the others were ethnically Indian and ethnically Malays. Each school had an average of 2 participating students. Of the 44 students, 38 were male (86%) and 6 were female (14%). Secondary school students were selected by the FYF-SB facilitators according to the following inclusion criteria: (a) chronological age of 13–15 years and living with someone who could give informed consent to participate; (b) known diagnosis of ASD;[1] and (c) significant anxiety-related behaviors and symptoms.

[1] In Singapore, diagnoses are mostly made during preschool years at government subsided public hospitals, or by school psychologists (for school-aged students). Diagnoses are made using the ADOS and ADI, consistent with Clinical Practice Guidelines on ASD published by Singapore's Academy of Medicine and Ministry of Health in 2010 https://www.moh.gov.sg/content/dam/moh_web/HPP/Doctors/cpg_medical/current/2010/ASD%20book%20Apr%2010.pdf.

Initially, students were identified as having concerning symptoms of anxiety by their teachers, AED (LBS), psychologists or parents. A brief set of screening questions were developed by the investigators and school teams for use within the school context. Prospective students were asked about the presence of specific worries (e.g., fear of the dark, spiders, loud noises, etc.), social fears, and/or whether they experience excessive worry about everyday events. Psychologists completed or supervised all screening for anxiety. Those students who endorsed the presence of anxiety symptoms were given a screening questionnaire, the Screen for Child Related Anxiety Disorders or SCARED (child and parent versions; Birmaher et al. 1999), prior to starting the group. Each student had to meet or exceed cut-off for the Total Anxiety Disorder score or for at least one subscale score (i.e., Panic Disorder, Generalized Anxiety Disorder, Separation Anxiety Disorder, Social Anxiety Disorder, or Significant School Avoidance) on the child or parent version. All students (n = 39 youth who completed treatment) met cut-off for the Total Anxiety Disorder score (62%; n = 24) or one subscale score (33%; n = 13) of the SCARED (child or parent), with the exception of two students (5%) who were just below cut-off for subscale scores. These students were included because staff felt their anxiety was interfering with school performance.

In Singapore, students gain entry into mainstream schools based on their academic attainments on a national examination conducted at the end of primary school (i.e., Primary School Leaving Examinations or PSLE) (For more information see https://www.moe.gov.sg/admissions/secondary-one-posting-exercise). Based on this criterion, only students with average to above average cognitive abilities gain entry into mainstream schools. Therefore, based on the criteria required to attend a secondary mainstream school, it was assumed that students would have the cognitive capacity to participate in FYF-SB. Formal IQ scores for the students were unavailable.

Procedure

This study was completed in compliance with the Singapore Ministry of Education Psychological Services Branch Professional Standards and with the Colorado Multiple Institutional Review Board (University of Colorado Anschutz Medical Campus). Informed assent and consent was obtained for all participants prior to collecting any data.

Setting

All intervention sessions occurred within a mainstream secondary school in Singapore. An invitation was sent to the principals of all secondary schools that had trained dedicated personnel for supporting students with special needs (n = 50). Principals were asked to indicate their interest in participating in the training for the FYF-SB intervention. Schools who responded positively to this invitation constituted the participating schools for the pilot project. A total of 22 out of 50 schools (44%) participated in implementing FYF-SB. Some schools were not able to participate due their AEDs (LBS) being away (i.e., medical or study leave).

FYF-SB Intervention

The FYF school-based program (FYF-SB) was adapted from the original FYF clinic-based program (see Reaven et al. 2011). To accommodate the school calendar, FYF-SB was comprised of 10 sessions, rather than 14 weeks as outlined in the clinic-based intervention. FYF-SB maintains the core objectives, concepts and strategies to reduce and manage anxiety symptoms in youth with ASD, and was designed to be achievable within the school setting with one facilitator (see Fig. 1). The FYF-SB program is delivered in the schools by facilitators in small groups (approximately 2–3 students) with each session lasting 1–1.5 h. The FYF-SB version maintains the core components of CBT for the treatment of anxiety disorders in youth, including psychoeducation, development of coping skills such as somatic management (e.g., deep breathing, relaxation), emotion regulation strategies, problem-solving, cognitive self-control (e.g., automatic thoughts), and graded exposure. The Singapore psychologists were very familiar with the principles of CBT and indicated that this approach would be consistent and appropriate for the culture.

Overall, FYF and FYF-SB are very similar group CBT programs with a few exceptions. Activities in the original FYF that were primarily designed to facilitate group cohesion for a younger cohort (e.g., "All About Me") were not included in FYF-SB. In addition, participants in FYF spent time creating and filming their own Facing Your Fears videos to generalize core concepts. For FYF-SB, the video project was eliminated; instead, students spent more time engaging in graded exposure practice in school and these practices were occasionally filmed. In FYF-SB, there was also increased emphasis on emotion regulation ("Plan to get to green activity"), as well as distinguishing between "real fears" and "false alarms". Three parent sessions were planned for FYF-SB: one prior to the start of the program, another before the practice components of the program, and a final session at the end of the program (Reaven et al. 2011). Although weekly parental involvement is part of the original FYF program, the Singapore team indicated that ongoing parent participation was not feasible given other demands on parent time.

Materials from the original FYF program were used; however, for the FYF-SB program, new written materials were created specifying which components from the original program should be utilized. Additional worksheets were created specifically for the school setting and for the slightly older participants. Examples of activities

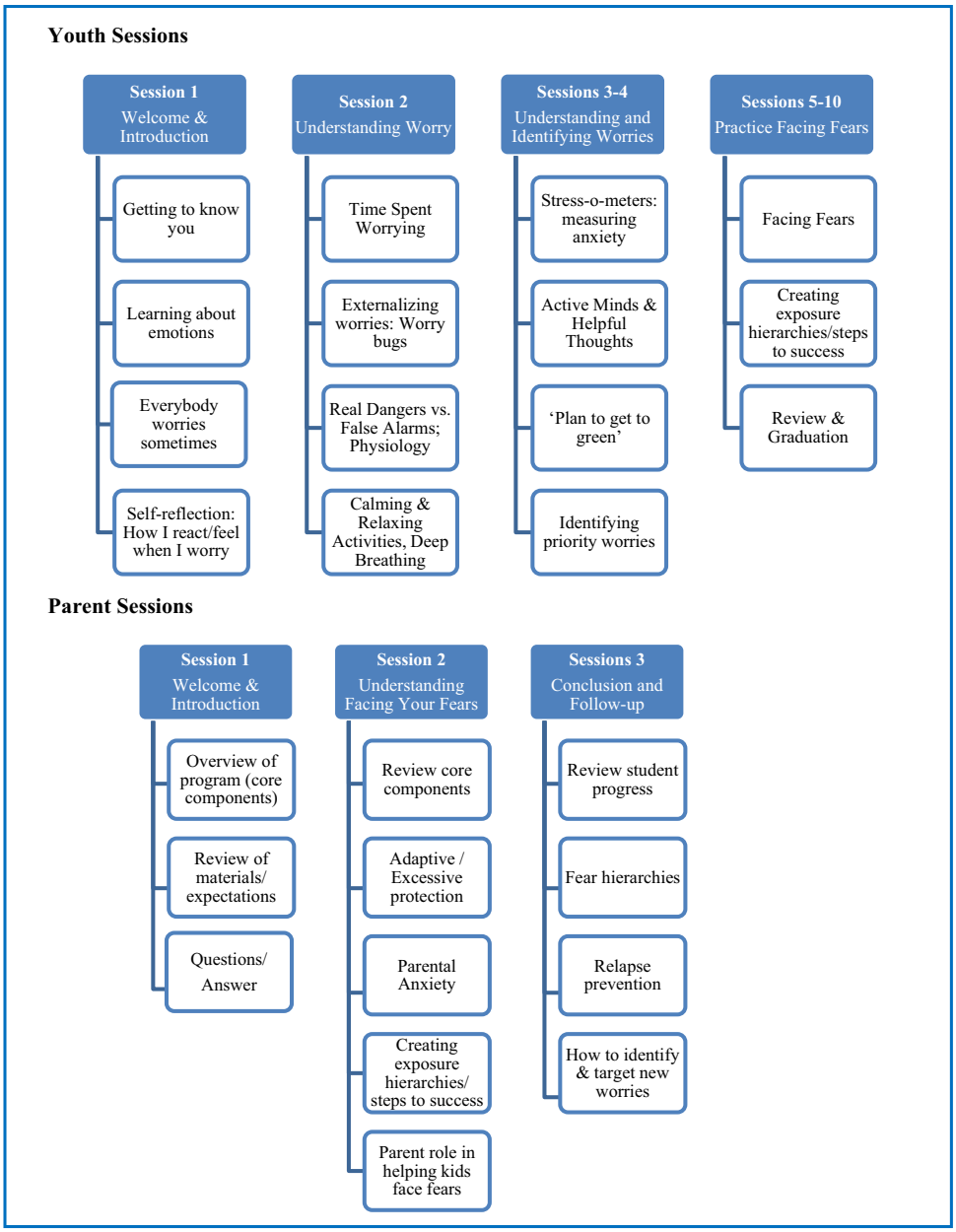

Fig. 1 Outline of key concepts and activities in FYF-SB

and worksheets created specifically for FYF-SB included: worksheets to document exposure practice in a school setting, an individualized worksheet detailing "plan to get to green", and addition of a "real danger versus false alarm" activity.

Aim 1—Adapting the Original FYF Program for Use in School Settings

Collaborative Process

Every phase of the project was thoroughly discussed and collaboratively determined beginning with the overall planning of the project, through determining the content and delivery of the training, to identifying the necessary adaptations to FYF for Singapore youth in school settings, and finally to making decisions regarding measurement strategies for pre/post outcomes.

Initial Planning

The initial planning phase consisted of multiple back and forth email communications that shaped the objectives of the project, the format and content of the training, and the development of FYF-SB. Details regarding the intended audience for the training (e.g., participant background, education and experience with youth with ASD and anxiety)

were critical to understand so that the training workshop could be tailored to best meet the needs of participants. Based on their preexisting roles in the schools and provisions of support for students with special needs, the school team indicated that AED (LBS) would facilitate FYF-SB, and school psychologists would serve as coaches to the facilitators.

Development of School-Based FYF

The development of FYF-SB for Singapore students involved a "shared decision-making approach" (Kasari and Smith 2013) where investigators and school personnel worked closely together to adapt FYF. Information regarding school structure and expectations, common anxiety symptoms, structure of support programs for students with ASD, anticipated parent participation, and issues related to language and culture were obtained. This material set the stage for shaping the school-based version of FYF that would best fit within a Singapore culture.

Adaptations of FYF for Singaporean Students

Adaptations are common and likely inevitable in an implementation process, and occur primarily to improve the fit of a new program to a setting or particular culture. Adaptations may be "deliberate" or "accidental" modifications of the treatment and can encompass deletions, additions or modifications of key components, as well as changes in the delivery of program components (Carvalho et al. 2013). Balancing fidelity and adaptation is critical and can be reflected in the balance between internal validity and external validity. In other words, is treatment outcome directly related to the intervention itself (internal validity), and can treatment implementation be replicated in another setting (external validity)?

When considering "deliberate" adaptations to maximize contextual fit for the current project, it was essential to preserve core components, while considering the need for model adaptation. A traffic light model for adaptation was used as a framework for modifying FYF (Centers for Disease Control and Prevention, Division of Reproductive Health, & ETR Associates). "Green" adaptations are modifications to a treatment that can "probably" be made without compromising core components. Examples here may include changes in vocabulary, pictures of people or places, differences in recruitment, timeline and incentives for participation. "Yellow" adaptations are modifications that "probably" can be made (although proceed with caution) and may include the substitution of activities, adding new activities and changing the order of the curriculum. Finally, "red" adaptations are modifications that should not be made and typically include deleting core elements or whole sections of the original program, reduction of the program (e.g., dosage), and adding strategies that may detract from the core elements (Centers for Disease Control and Prevention, Division of Reproductive Health, & ETR Associates).

A number of the adaptations that occurred in this study can be considered deliberate "green" light adaptations. For example, careful attention was paid to vocabulary and overall language level throughout the manualized intervention, and age appropriate school-based fears were used as examples. Exposure practice was conducted at school; thus, strategies for encouraging students to face fears and document practice within school environment were created. (see Fig. 2).

"Yellow" light adaptations were also made during the course of the FYF-SB development. For example, in the original clinic-based program, the concept of graded exposure is illustrated using a video of a child facing his fear of dogs. School personnel indicated that there may be cultural objections to the use of this video for some members of their community; therefore, the other videos from the original program were used instead. In addition, optional activities from the original FYF program were eliminated as they were intended for a younger participant group, and activities to enhance emotion regulation were included in FYF-SB. Because FYF-SB took place in schools, parents could not be included in every session. Thus, the parent content was condensed into three evening sessions.

Unfortunately, there were several "red" light adaptations that occurred, both deliberate as well as accidental. As noted above, the strong preference from the school administrators was that the 14 week program be converted to a 10 week treatment program. Each session was between 60 and 90 min in length, compared to the original program which was 90 min in length. Thus, the change in length of the treatment program may represent a change in treatment dosage. However, there is reason to believe that this change in dosage may not have been substantial. That is, since parents did not attend FYF-SB alongside their students, it did allow for more concentrated time with the students compared with the original FYF program. Finally, there was at least one major accidental adaptation during this project. Although it had been initially intended that adherence to treatment would be documented for each session via self-ratings from facilitators, students and parents, given the newness of this project and time demands on the facilitators and coaches, fidelity data was not collected.

Aim 2—Training and Coaching School Staff to Implement FYF-SB

Eligible school staff were identified and asked to participate in the FYF-SB project. All consenting school staff participated in the on-site training workshop delivered by two of

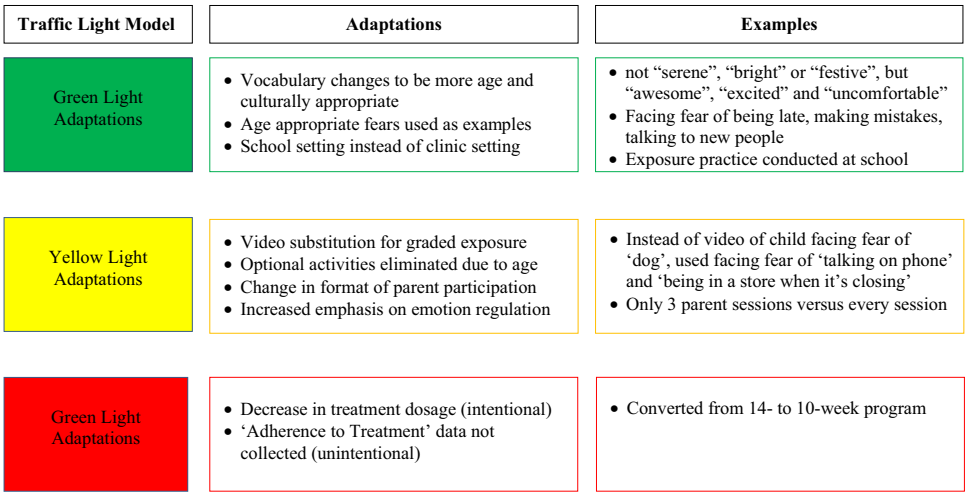

Fig. 2 Adaptations via traffic light guide (Centers for Disease Control and Prevention, Division of Reproductive Health, & ETR Associates)

the study authors. School staff completed an assessment of CBT knowledge pre- and post-workshop and then facilitated the 10-week FYF-SB program within 2 months of the workshop.

Training Workshop

The training program occurred over 4 days. All AEDs (LBS) and psychologists were required to attend for 3 full days, and psychologists only were required to attend a fourth day. The content of the first 3 days consisted of a review of topics related to ASD and the development of co-occurring psychiatric symptoms, with an emphasis on anxiety disorders; a description of the original FYF program; and a review of a draft of the school-based version of FYF. Similar to other FYF training workshops, content was delivered via didactic presentations, small group activities, videotaped examples, role-playing exercises and session by session review of proposed content (Reaven et al. 2014). Throughout the workshop, direct feedback was solicited from participants regarding appropriateness and fit of the content for the Singapore culture. Day 4 consisted of a data review of the FYF program and a work session between investigators, coaches and Singaporean counterparts which determined the design of the current study, identified barriers to implementation, created adaptations (both contextual and cultural) to FYF, and selected implementation outcomes.

Phone Consultation

After the conclusion of the training program, the AEDs (LBS) and psychologists implemented FYF-SB. One Skype consultation between one of the investigators and the school teams took place approximately half-way through the program. The purpose was for the school teams to provide brief updates on the implementation of FYF-SB, initial responses of students to the program, and to obtain specific support and suggestions for conducting exposure practice within the school context. School teams also maintained contact via e-mail communications.

Joint Planning Sessions

Two planning sessions occurred in Singapore prior to the start of the FYF-SB program and mid-way through the program. These sessions allowed facilitators and coaches to have in-depth discussions on student selection, session planning, student progress, customization of materials/activities, development of exposure hierarchies etc. Facilitators continued to receive coaching and support from the psychologists through the end of the intervention.

Aim 3—Assessing Initial Feasibility and Acceptability of the Intervention

Review Session

At the end of FYF-SB, a review session occurred to allow school teams to reflect on their experiences with the program and to identify facilitating factors, as well as challenges. A more formal measure of feasibility and acceptability had been created for all participants (i.e., students, parents, and school staff) but school teams were unable to complete the forms due to time constraints.

Aim 4—Assessing the Initial Effectiveness of FYF-SB

Students with ASD and anxiety-related behaviors were identified by teachers, allied educators, psychologists or parent and screened for the presence of anxiety symptoms

as referenced earlier. Facilitators contacted the families of eligible students to explain the goals and procedures of the FYF-SB program and to invite the student and parent(s) to participate in the program. As noted above, participants were deemed eligible if they met or exceeded cut-off scores on the SCARED (child or parent version). The SCARED and Developmental Behavioral Checklist-Teacher (DBC-T) were administered within 2 weeks prior to the start of group, and post measures were completed within 2 weeks after the end of group. Parents also participated in a feedback meeting, via a semi-structured parent interview, to obtain information about their views regarding the program and their child's progress.

Measures

Aim 2—Training and Coaching School Staff to Implement FYF-SB: School Team measures

Demographic Questionnaire

A brief questionnaire was administered to document years of experience in the psychology field, specific CBT training, and experience working with youth with ASD.

Evaluation of Training Workshop

School staff completed a training workshop evaluation form at the end of the training. School staff answered a series of questions on a 6-point scale (1 = strongly disagree to 6 = strongly agree). Participants were asked to rate: (1) the extent to which the workshop met training objectives (e.g., development of anxiety, core principles of CBT, modifications for ASD/adolescents); (2) how satisfied they were with training materials/activities (e.g., course content and length, didactic sessions, small/large group activities, videos, manual and addendum); and (3) knowledge and comfort regarding CBT for youth with ASD and anxiety (e.g., level of understanding of CBT principles, level of confidence to deliver program, etc.).

Assessment of CBT Knowledge

A 20-item multiple-choice CBT Knowledge Test was developed to evaluate school staff's knowledge of CBT, similar to assessments used in previous studies (Reaven et al. 2014; Rees and Gillam 2001). Two similar, but not identical, versions of the test were administered before and after the training workshop. Total correct scores were calculated.

Online Feedback Form (Post Completion of FYF-SB)

An online questionnaire was completed by school staff after the end of the program in order to determine the extent to which skills had been strengthened, as well as to gain insight about their experience implementing the FYF-SB program. School staff was asked to identify the new knowledge they obtained in the following domains: (a) knowledge and skills pertaining to CBT concepts; (b) rapport and relationship building with students; (c) management of challenging situations; and (d) communication with stakeholders (parents, school leaders, teachers).

Aim 3—Assessing Initial Feasibility and Acceptability of the Intervention

Review Session Process

Facilitators and coaches met as a group and engaged in reflective conversations and shared their experiences after completion of FYF-SB. They were asked to identify facilitating factors that were critical for the success of the program in their schools, as well as any challenges they experienced. Responses from the discussions at the review session were recorded and thematically analyzed by research assistants (see Analysis Plan section for more details).

Aim 4—Assessing the Initial Effectiveness of FYF-SB

Student Treatment Outcome Measures

Two measures were used to monitor changes in anxiety levels, and one measure was used to monitor changes in emotional and behavioral problems. These measures were administered pre- and post-intervention.

Screen for Child Related Anxiety Disorders (SCARED—Parent and Child Versions) The SCARED (Birmaher et al. 1999) is a 41-item inventory of statements each scored on 3 point Likert scale (0 = not true or hardly ever true, 1 = somewhat true or sometimes true, and 2 = very true or often true) was administered pre- and post-intervention. It consists of five anxiety subscales, including panic, generalized, separation, social, and school anxiety symptoms. A total score, as well as cutoffs for each subdomain score, is obtained. A total score of 25 or higher indicates risk of anxiety symptoms that interfere with teen functioning. The SCARED demonstrates excellent psychometric properties in typically developing youth (Birmaher et al. 1999; Hale et al. 2011). In youth with ASD, an extended 71-item version demonstrates strong internal consistency ($\alpha > 0.9$) and moderate convergent validity with the ADIS (van Steensel et al. 2013). Results from the 41-item measure demonstrate

good sensitivity (0.71) and specificity (0.67) among parents of youth with ASD (Stern et al. 2014). Cronbach alpha coefficients were above the acceptable coefficient threshold of 0.70 for the Total SCARED scores on the parent (pre = 0.90; post = 0.87) and child versions (pre = 0.91; post = 0.91). The majority of scores on the SCARED subscales were also above the threshold of 0.70 ranging from 0.72 to 0.89, with the exception of the School subscale on the parent and child version (ranging from 0.50 to 0.68) and Separation subscale on the child version only (pre = 0.66; post = 0.52).

Developmental Behavioral Checklist-Teacher (DBC-T). The DBC-T (Einfeld and Tonge 1992, 2002) is a 94 item checklist with each item scored on a 3 point Likert scale (0 = not true as far as you know, 1 = somewhat or sometimes true, and 2 = very true or often true) completed by teachers to assess behavioral and emotional problems in youth aged 4–18 years with a developmental disability. A Total Behavior Problem score is derived in addition to five subscale factor scores: Disruptive/Antisocial behavior, Self-Absorbed Behavior, Communications, Disturbance, Anxiety Problems and Social Relating problems. The DBC is considered to have good reliability and validity (Einfeld and Tonge 1995). Internal consistency, as measured by Cronbach alpha coefficients, were above the acceptable coefficient threshold of 0.70 on the DBC-T Total Scores (pre = 0.93; post = 0.95). The majority of Cronbach's alpha coefficients on the DBC-T subscales were also above the threshold of 0.70 ranging from 0.70 to 0.90, with the exception of the Anxiety subscale (pre = 0.39; post = 0.67) and Social Relating pre-intervention (0.64). A previous study by Poon and colleagues (2012) has used the DBC-T in Singapore and found that children with ASD exhibit elevated levels of challenging behavior in all areas, relative to children with multiple disabilities.

Semi-structured parent interview. After completion of the FYF-SB program, parent feedback was obtained during the final individual parent meeting, via a semi-structured interview conducted by facilitators. Parents were asked their opinion of the FYF-SB program, whether they observed any change in the anxiety level of their child, application of strategies for targeted fears or other fears, independent application of principles to face fears in the future, and about supports for parents. Responses from the interviews were recorded and thematically analyzed.

Analysis Plan

Implementation Outcomes: Quantitative Analyses

The effectiveness of the training for school staff (facilitators, coaches) and their subsequent perceptions about their knowledge and skills were assessed. Descriptive statistics were used to summarize demographic information about the participants who completed the training workshop, as well as to assess participant satisfaction with the training. To assess the participant's level of CBT knowledge prior to starting the training workshop compared to after the training workshop, a paired-samples t-test was conducted on total correct scores. Following completion of the implementation of FYF-SB, facilitators' perceptions about their abilities, knowledge and skills were assessed. Descriptive statistics were used to summarize the number of facilitators who endorsed particular skills. In addition, written comments were amalgamated and summarized to further illustrate each skill area.

Implementation Outcomes: Qualitative Analyses

After completion of the FYF-SB program, facilitators and coaches shared their experiences, and parents shared feedback via the semi-structured interview. The discussions during the review session and parent interview were thematically analyzed. To ensure that the data was reliable, coders (i.e., research assistants) initially analyzed the raw data independently and later came together to examine the extent of overlap with the codes and themes generated individually. To ensure a robust set of themes and consensus, further analysis and discussions were done. The set of themes was then presented to other members of the research team for further discussions and to establish greater credibility of the findings.

Preliminary Youth Treatment Outcomes

The students' anxiety level (parent and child SCARED) and emotional and behavioral problems (DBC-T) were assessed prior to treatment and after completion of FYF-SB, and these measurements were the basis for determining their outcomes. Wilcoxon signed-rank tests were calculated to compare baseline measures with posttreatment measures. The alpha for inflation of a Type 1 error was not adjusted because this was a preliminary outcome study and the sample size was small. However, effect sizes were calculated and they are used to interpret the strength and size of the differences found. To examine clinical significance, McNemar's analysis was conducted to determine whether students who met clinical criteria for anxiety pretreatment (according to Total SCARED scores, and Total DBC-T score) fell below clinical cutoffs at posttreatment.

Following completion of FYF-SB, parent feedback was also assessed using a semi-structured interview. Descriptive statistics were used to summarize the number of parents who endorsed benefits of the program in various areas (e.g., reductions in anxiety, independent application of

Table 1 Characteristics of school staff who participated in training workshop

School staff characteristics (N = 33)	*M* (*SD*) or % (*n*)	Range
Gender		
Female	82% (27)	
Age (years)	31 (6.9)	22–51
Education		
College degree (e.g., B.A., B.S.) and some graduate training	42.4% (14)	
Terminal masters (e.g., M.A., M.S.)	9.1% (3)	
Professional degree (e.g., Ph.D., Psy.D., MD)	9.1% (3)	
Other	39.4% (13)	
Year since completed highest level of education	6.3 (5.8)	1–33
Experience (years)		
Experience as an educator or other professional (including years in graduate school)	5.9 (4.3)	1–20
Experience with children with ASD	4.3 (2.9)	1–15
Experience with children with anxiety disorders	2.6 (2.3)	0–8
CBT experience in a professional capacity	0.64 (1.7)	0–7

skills, etc.). In addition, written comments were amalgamated and summarized to further illustrate each skill area.

Results

Aim 1—Adapting the Original FYF Program for Use in School Settings

The original clinic-based FYF program was adapted for students with ASD and anxiety and delivered in mainstream schools in Singapore, via a collaborative process between North American investigators and their Singapore counterparts. See Methods section for description of the collaboration as well as the FYF-SB program.

Aim 2—Training and Coaching School Staff to Implement FYF-SB

Demographic Questionnaire

A total of 33 school staff completed the demographic questionnaire. The majority of trainees were female (82%). Just over 40% of the school staff had a college degree, and 39% reported an "other" form of education, most commonly a professional diploma. On average, school staff had 4.3 years (range 1–15 years) working with children/youth with ASD and 2.6 years (range 0–8 years) working with children/youth with anxiety disorders. School staff was relatively inexperienced implementing CBT strategies, with less than 1 year of experience on average (range 0–7 years). (See Table 1).

Evaluation of Training Workshop

School staff answered a series of statements (e.g., "I would recommend this training to a colleague", "I understand the principles of CBT for treatment of anxiety") on a 6-point scale (1 = strongly disagree to 6 = strongly agree). School staff generally expressed high satisfaction with all aspects of the training with mean scores ranging from 4.57 to 5.28. Overall, school staff (n = 37) expressed high satisfaction with the training that was provided ($M = 5.05$, $SD = 0.34$, range = 4.4–6). (See Table 2).

Assessment of CBT Knowledge

School staffs' knowledge of CBT improved after attending the training sessions. A paired-samples t-test was conducted on total correct scores and indicated statistically significant improvements in CBT knowledge from pre-training ($M = 12.53$ or 63% correct, $SD = 14\%$, range 35–85%) to post-training ($M = 13.90$ or 70% correct, $SD = 12\%$, range 45–95%), $t(29) = -2.82$, $p = 0.009$, although effect size was small ($r = -0.26$). Compared to results from the US and Halifax (Reaven et al. 2014; pre-training: $M = 81\%$ correct, $SD = 7\%$, range = 70–90% to post-training: $M = 90\%$ correct, $SD = 7\%$, range = 75–95%; $t(9) = 2.41$, $p = 0.039$), these scores appear lower at both time points.

Online Feedback Form (Completed Post-Intervention)

The majority of school staff reported increased knowledge of CBT concepts and strategies (73%) and reported confidence in applying these skills following the delivery of FYF-SB (see Table 3). Even though school staff had prior experience with students with ASD, participation in

Table 2 Evaluation of training workshop

Workshop evaluation form	N	Range	*M (SD)*
Identify the factors that contribute to the development of anxiety symptoms in children with ASD	35	4–6	4.94 (0.59)
Identify the core principles of CBT for treatment of anxiety	36	4–6	5.28 (0.70)
Identify how CBT can be modified for children with ASD; identify core components FYF/FYF-SB	36	4–6	5.22 (0.59)
Identify components of the FYF-Adolescent program	36	4–6	5.17 (0.61)
Course content	37	4–6	5.22 (0.53)
Length of training workshop	37	3–6	4.86 (0.79)
Didactic sessions	37	3–6	4.86 (0.59)
Small group activities	37	4–6	5.11 (0.52)
Videos	37	4–6	5.16 (0.65)
Group discussions/questions and answer	37	4–6	5.11 (0.61)
Facing Your Fears manual and FYF-SB-addendum	37	3–6	5.03 (0.69)
I understand the principles of CBT for treatment of anxiety	37	4–6	5.0 3 (0.55)
I understand the Facing Your Fears Program for children with ASD and anxiety	37	4–6	5.16 (0.44)
I feel confident in facilitating the Facing Your Fears program	37	4–6	4.57 (0.60)
I would recommend this training to a colleague	37	4–6	5.05 (0.58)
The course met my expectations	37	4–6	5.00 (0.53)
Average overall score	37	4.4–6	5.05 (0.34)

the program provided the first opportunity to learn about anxiety and CBT concepts/strategies. Approximately 13% of school staff also reported that the concepts and skills they learned could be effectively applied to other contexts, such as *managing challenging situations and behaviors* (e.g., managing discomfort with facing fears, managing meltdowns). *Communication with stakeholders*, such as coaches, parents, teachers, was also an area in which 16% reported gaining experience. *Rapport and relationship building* with students were perceived to be important by 13.5% of school staff. School staff reported that participation in the program provided the opportunity to better understand their students.

Aim 3—Assessing Initial Feasibility and Acceptability of the Intervention

Review Session

A number of themes emerged from the review session about facilitating factors and barriers to the implementation of the FYF-SB program (see Table 4).

Facilitating factors: Six themes emerged relating to factors that facilitated the implementation of FYF-SB, which included: (1) *Strong and consistent support from stakeholders* was the most common facilitating factor (66.3% of all comments), and referred to support for the program from the coaches (i.e., provided encouragement, consultation, clarification, and help problem solving), school (i.e., allowed for sessions to be carried out comfortably), students (i.e., sessions were smoother and group dynamics better when good rapport established) and their parents (i.e., enthusiasm for the program fostered collaboration and use of strategies being taught); however, support from the coaches was identified as being most important; (2) *Joint planning sessions* provided continuous, 'just-in-time' training and support and served as timely "refreshers" and "opportunities to plan and practice" the concepts, and to review sessions before meeting with the students; (3) *Appropriate and meaningful resources* referred to the "appropriate adaptation" of the original manual into the school-based version; (4) *Identification of students who are motivated*, facilitated positive rapport and more enjoyable sessions.; (5) *Optimal structure of FYF-SB* was identified as a facilitating factor (e.g., small group format was manageable, encouraged socialization, mutual support, and good fit for students with ASD); and (6) *Skilled facilitators* carried out the program, and their prior experience, skills, and abilities were important for successful implementation.

Table 3 Themes and frequency of comments by school staff related to strengthening knowledge and skill via on an online survey after implementing FYF-SB

Themes (N = 37)	No. of comments (%)
Increased knowledge and application of CBT concepts and strategies	27 (72.9 %)
Improved communication with stakeholders	6 (16.2 %)
Management of challenging behaviors	5 (13.5 %)
Rapport and relationship building with students	5 (13.5 %)

Table 4 Themes and frequency of comments on facilitating factors and barriers to implementation of FYF-SB shared during the review session after implementing FYF-SB

Themes	No. of comments (%)
Facilitating factors	
Strong and consistent support from stakeholders	65 (66.32%)
Joint planning sessions	9 (9.18%)
Appropriate and meaningful resources	7 (7.14%)
Appropriate identification of students	6 (6.12%)
Optimal structure of FYF-SB	6 (6.12%)
Skilled facilitator	5 (5.10%)
Barriers	
Scheduling difficulties	11 (20.37%)
Lack of parental support	9 (16.66%)
Some students were not group ready	8 (14.81%)
Difficulty with selecting fears and designing exposure hierarchies	8 (14.81%)
Absence of locally-developed resources	8 (14.81%)
More knowledge and skills required	8 (14.81%)
Logistics and manpower problems	2 (3.70%)

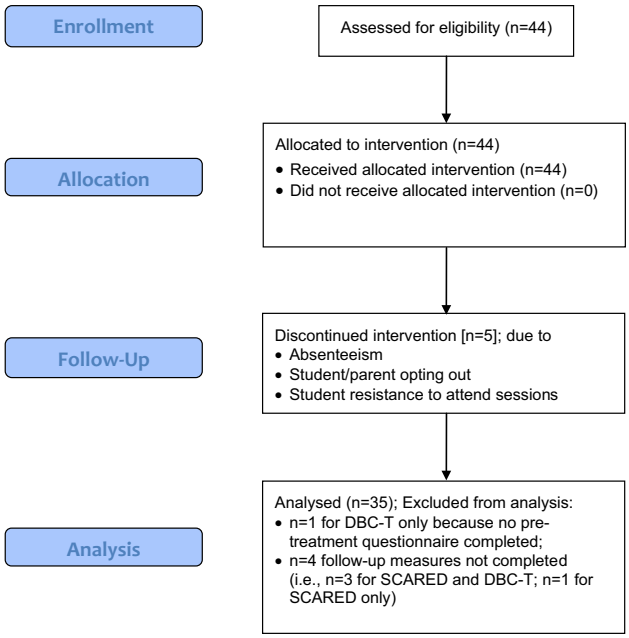

Fig. 3 CONSORT Flow Diagram

Barriers: Seven themes emerged relating to barriers or challenges to implementing FYF-SB in the schools, which included: (1) *Scheduling difficulties* as a significant challenge that contributed to delays in the program (e.g., sessions overlapped with school events or after-school remedial lessons, coordinating meetings with parents was challenging); however, some facilitators found ways to circumvent this issue (e.g., made use of common periods such as assembly periods); (2) *Lack of parental support* led to fewer students being available to participate in the program (i.e., due to parental reluctance to reveal child's fear) and low parental involvement in attending review meetings, raising concerns about how this might impact the student's ability to generalize skills; (3) *Some students were not group ready* making it difficult for facilitators to conduct sessions smoothly throughout the course of the program (e.g., students did not want to talk about their fears in front of peers; thus, requiring facilitators to manage this resistance while simultaneously ensuring that the program was still meaningful for the other group members); (4) *Difficulty with selecting fears and designing exposure hierarchies* for generalized fears (e.g. fear of death) or fears that did not lend themselves to intervention within the school setting (e.g. unpredictable or infrequent presence of feared events/objects, such as fear of thunderstorms or school-wide examinations); (5) *Absence of locally-developed resources* suggesting that the quality and appropriateness of the FYF-SB materials for the Singaporean students (e.g., manual not adequately localized to suit local audience, videos used depicted only North American students); (6) *More knowledge and skills required* in terms of group management skills and more in-depth knowledge of CBT concepts; and (7) *Logistics and person power problems* were reported as some settings were unable to complete specific school-based exposure practices without the support of additional facilitators.

Aim 4—Assessing the Initial Effectiveness of FYF-SB

A total of 44 students participated in the FYF-SB program, with 5 students withdrawing from the program for various reasons, including absenteeism from school, student/parent opting out, and student resistance to attend sessions. Thus, 89% (n = 39) of students completed the program. Of these 39 students who completed the program, data for 35 students was obtained. Four students were lost to follow-up because they did not complete the post-assessment measures. The analyzed sample included treatment completers only. See Fig. 3.

Child Ratings on the SCARED

A Wilcoxon signed-rank test revealed that Total SCARED scores were statistically significantly lower at posttreatment ($Mdn = 19.0$) than pretreatment ($Mdn = 24.0$), $z = -3.44$, $p = 0.001$, $r = 0.85$ (large effect size). Scores were also statistically significantly lower posttreatment for 4 out of the 5 subdomains: panic disorder/somatic symptoms, generalized anxiety, separation anxiety and

Table 5 Means and Standard Deviations of Measures Assessing Anxiety Level Pre- and Post-Treatment

	Pretreatment		Posttreatment		Wilcoxon	Significance	Effect size
	M	*SD*	*M*	*SD*	*z* value	*p* value	*r* value^
SCARED-Parent (n = 35)							
Total SCARED score	23.1	11.8	19.5	9.6	−2.20	0.03*	0.44
Panic/somatic	4.5	3.8	3.9	3.2	−0.74	ns	0.47
Generalized anxiety	8.1	4.7	6.9	3.6	−2.01	0.05*	0.15
Separation anxiety	3.9	3.0	2.9	2.7	−2.39	0.02*	0.13
Social anxiety	5.7	4.2	5.5	3.5	−0.26	ns	0.02
School avoidance	0.9	1.3	0.4	0.9	−2.13	0.03*	0.06
SCARED-child (n = 35)							
Total SCARED score	26.7	13.3	19.6	11.3	−3.44	0.001*	0.85
Panic/somatic	6.5	4.6	4.3	3.6	−3.39	0.001*	0.26
Generalized anxiety	6.9	4.2	5.6	4.0	−2.26	0.02*	0.15
Separation anxiety	5.4	3.2	3.0	2.2	−3.95	<0.001*	0.28
Social anxiety	6.0	3.3	5.3	3.4	−1.65	ns	0.08
School avoidance	1.9	1.5	1.3	1.5	−2.40	0.02*	0.08
DBC-teacher (n = 35)							
Total DBC-T	22.6	17.8	22.4	18.5	−1.30	ns	0.20
Disruptive/antisocial	6.4	7.0	6.7	7.3	−0.53	ns	0.01
Self-absorbed	4.1	4.6	4.4	4.6	−0.08	ns	0.02
Communication disturbance	3.3	4.4	3.3	3.8	−0.03	ns	0.01
Anxiety	2.0	2.1	1.9	2.1	−1.30	ns	0.06
Social relating	4.1	2.8	4.0	2.7	−0.55	ns	0.05

*Significant p-value

^Effect size r interpretation: small = 0.10; medium = 0.30; large = 0.50 (Cohen 1988)

school avoidance (small effect sizes; see Table 5). Overall, students with autism displayed statistically significant reductions in anxiety following participation in FYF-SB.

In this sample, 44% (8 of 18) of students who met clinical criteria for anxiety pretreatment (according to Total SCARED scores), fell below clinical cutoffs at posttreatment. McNemar's analysis was conducted to determine significance of the change from pre to post treatment. Results indicated that the proportion of students who met clinical criteria for an anxiety disorder was significantly lower post- than pre-intervention McNemar $\chi^2(1, N = 35) = 5.4$, $p = 0.02$, The corresponding Chi square was used to calculate effect size ($r = 0.53$; large effect size).

Parent Ratings on the SCARED

A Wilcoxon signed-rank test showed that Total SCARED scores were statistically significantly lower at posttreatment ($Mdn = 17.0$) than pretreatment ($Mdn = 20.0$), $z = -2.20$, $p = 0.03$, $r = 0.44$ (medium effect size). Scores were also statistically significantly lower at posttreatment for 3 out of the 5 subdomains: generalized anxiety, separation anxiety and school avoidance (all effect sizes were small). Thus, based on parent report, statistically significant reductions in overall anxiety symptoms occurred following student participation in FYF-SB.

Of the 13 of 33 students who had pre-treatment Total SCARED scores that exceeded clinical cutoffs, only 4 had Total SCARED scores that fell below clinical thresholds at posttreatment according to parent report. McNemar's analysis was conducted to examine significance of the change from pre- to post-treatment, and found that the proportion of students with Total SCARED scores that met clinical criteria for anxiety at pretreatment was not significantly different at post-treatment McNemar χ^2 (1, N = 35) = 0.67, $p = 0.41$. The corresponding Chi square was used to calculate effect size ($r = 0.63$; large effect size).

Teacher Ratings on the Developmental Behavioral Checklist (DBC-T)

A Wilcoxon signed-rank test showed that the total scores were not significantly lower at posttreatment ($M = 20.4$) than at pretreatment ($M = 20.9$), $z = -1.30$, $p = 0.20$, $r = -0.15$. Similarly, all subdomain scores were also not significantly different at pre- and post-treatment. McNemar's test revealed no significant differences in the proportion of students whose Total DBC-T scores met clinical criteria for the presence emotional/behavioral problems

Table 6 Parent feedback about the FYF-SB program

Item	No. of responses (%)				
	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
FYF-SB was useful	0	0	4 (12.1%)	14 (42.4%)	15 (45.5%)
FYF-SB was enjoyable	0	2 (6.1%)	4 (12.1%)	16 (48.5%)	11 (33.3%)
My child was able to apply concepts/carry out strategies	0	3 (9.1%)	4 (12.1%)	19 (57.6%)	7 (21.2%)

pre- and post-treatment (McNemar χ^2 (1, $N=38$) = 0.00, $p=1.00$, $r=0.43$). Thus, there were no differences pre-post in teacher reported anxiety using the DBC-T.

Semi-Structured Interview of Parent Impressions Regarding Treatment Outcome

The majority of parents agreed that FYF-SB was useful (87.9%) and enjoyable (81.8%), and felt that the concepts and strategies covered in the program could be easily applied independently (78.8%) (See Table 6). One parent highlighted, "*it is a structured program that breaks down an imminent fear into digestible steps. This makes it very easy for both parent and child to understand. There are also tangible steps to take which I really appreciate*". The majority of parents responded that there was some observable reduction in anxiety levels (93.3%) and an increased ability to manage their fears and/or an improvement in emotional wellbeing and behaviors (45.5%). Improvements were noted in worries and behaviors that were specifically targeted in the program, as well as other worries and behaviors that were not identified and targeted. Many parents (79.3%) also reported that their children independently applied some of the coping strategies learned in the program, such as deep breathing, and "*using the color coding to verbalize his stress/anxiety level*."

Discussion

The main purpose of the study was to adapt the original FYF program for use in school settings in Singapore, to train school staff to deliver the FYF-SB program, to assess initial feasibility and acceptability of the intervention, and to examine preliminary youth anxiety treatment outcomes following participation in FYF-SB.

Feasibility and Acceptability

Results indicated that school staff gained some knowledge of CBT concepts following a training workshop, reported maintaining this knowledge after conducting one course of FYF-SB, and expressed confidence in their ability to apply CBT concepts to target anxious symptoms in students with ASD. The mean CBT Knowledge Test scores obtained during this study were lower both pre and post training as compared with previous studies (Reaven et al. 2014). The lowered mean scores may be because the Knowledge Test was created prior to our face-to-face consultations with the Singaporean group and therefore was not appropriately adapted to match what had actually been presented in the workshop. Although statistically significant improvements in CBT knowledge occurred following participation in the workshop, the effect sizes were relatively small. The small effect sizes and lower averages at pre/post workshop may be due to several variables, such as facilitator differences across countries (e.g., mental health professionals versus educators) or limited fit between the questions on the test and workshop material.

School teams were able to deliver FYF-SB to a total of 44 students across 22 secondary schools with little attrition. School staff and parents indicated that the program was valuable and that they were able to apply the concepts and strategies they had learned to support youth to manage their fears. Overall, results of this study indicate that the original clinic-based FYF program could be successfully adapted and implemented in secondary schools in Singapore. It is important to highlight that that adaptations made in this study were inherently cultural, as the team worked extensively to accommodate the program for schools and adolescents in Singapore. Thus, the results of the intervention may not translate directly to adolescents in the US (or other countries/cultures) without additional appropriate adaptations for the new cultural context. However, this study is an important contribution as it is one of the first school based treatment program for youth with ASD and anxiety delivered by non-clinicians, in addition to a recent study evaluating the effectiveness of a school-based CBT intervention for anxiety in adolescents with ASD (Luxford et al. 2016).

Preliminary Treatment Outcomes

Another objective of this study was to examine youth anxiety treatment outcomes following participation in FYF-SB. Preliminary treatment outcome results indicated a statistically significant decrease in youth and parent reported

anxiety symptoms post-intervention for Total SCARED scores yielding large and medium effect sizes, respectively. Significant reductions were also noted in the subdomains of generalized anxiety, separation, and school avoidance, according to both youth self-report and parent report, although effect sizes were small. Significant reductions were also noted in the area of panic disorder/somatic symptoms according to youth self-report with a small effect size. Furthermore, 44% of youth with anxiety symptoms in the clinical range pretreatment, showed significant improvement posttreatment (i.e., Total SCARED score fell below clinical threshold). This is generally consistent with results of other studies examining the efficacy of FYF reporting medium to high effect sizes and a 50% improvement rate (Reaven et al. 2012). These results suggest that a school-based group CBT intervention specifically for youth with ASD may be effective for managing anxiety symptoms, which is consistent with other clinic-based CBT interventions (Chalfant et al. 2007; Reaven et al. 2009, 2012; White et al. 2009; Wood et al. 2009). It is important to note that unlike some previous studies with younger participants (youth aged 8–14; Reaven et al. 2009), significant reductions in anxiety symptoms were reported according to youth report. Although youth self-report may be somewhat inconsistent for individuals with ASD (Mazefsky et al. 2011), it may be that this older group of participants (ages 13–15) are better able to provide self-report information consistent with other research (youth aged 13–18; Reaven et al. 2012). Teachers did not report differences in the presence of emotional and behavioral problems post-intervention as measured on the DBC-T. It should be noted that the total scores at pretreatment were already at subclinical levels. Teachers had also provided feedback that items on the DBC-T were not applicable to their students. Thus, it is possible that this measure was not appropriate for this participant group, or that this sample of students did not present with significant emotional/behavioral problems as measured by the DBC-T.

Adaptations that Supported Implementation of FYF-SB

A careful and collaborative planning approach, comprised of shared decision making between key stakeholders and the investigators, was used to adapt the clinic based FYF program developed in the United States for youth with ASD in schools in Singapore. Indeed, support from stakeholders was the most commonly reported facilitating factor, underscoring the importance of engaging stakeholders in a collaborative community-partnered participatory process at all phases of research (Chung et al. 2010). Furthermore, appropriate adaptations are critical for implementation and long-term sustainability of evidence-based treatments in communities or schools (Owens et al. 2014). Therefore, thoughtful adaptations were made to address issues unique to the school setting, as well as adaptations that were culturally appropriate for the Singaporean context. In school settings, it is important to consider various contextual issues that can impact intervention implementation, including inherent limitations associated with the academic calendar, the diverse background and experience of professionals, and school organizational factors (e.g., leadership) (Owens et al. 2014). For instance, the clinic-based FYF program was modified to fit the school calendar (i.e., 10-week versus original 14-week program), the diversity and experience of the professionals was considered when designing the program (i.e., psychologists served as coaches to support the facilitators who delivered the program), the inclusion of parents was adapted to fit within a school-based treatment model (i.e., only three separate parent sessions versus inclusion of parents in every session). In this study, a key administrator served as an "opinion leader" who was intimately involved in all aspects of the implementation project. Perhaps as a result of her position, she was able to garner support/interest from key stakeholders and share initial outcomes and visible impact of the implementation project with others. Finally, adaptations were made to improve cultural fit within the Singaporean context, such as adaptation of resources (e.g., vocabulary changes, video substitution for graded exposure). Suggestions for even more culturally appropriate adaptations were made by school staff for future versions of FYF-SB (e.g., produce videos that include Singaporean students versus North American students).

Participation in meaningful professional development is another critical component for successful implementation by providing opportunities to learn about the rationale, core components, and skills necessary to implement a new intervention (Owens et al. 2014). Given this, a number of coaching strategies were used throughout the implementation of FYF-SB to train school staff. This included a 3-day interactive training workshop, as well as ongoing training for facilitators via a multi-faceted approach through the use of an internal coach (i.e., school psychologists) who provided on-going support, and an external expert (i.e., program developer) who provided consultation (i.e., phone consultation, e-mail communication). Previous research has shown the utility of on-going coaching and performance feedback from in house school staff (Olweus and Limber 2010; Schouten et al. 2008), as well as support from an external expert with deep knowledge (Schoenwald et al. 2004) to achieve and sustain program integrity. Indeed, in this study, coaches were identified as the most important stakeholders in the implementation process. Support from the program developers was intense at the beginning stages of program development and training, but was less intensive once the program was underway. Although more ongoing consultation was offered, the Singapore team felt that a single

Skype session in addition to ongoing email communication would be sufficient. Logistics play a critical role in collaboration across the world, and factors such as time differences and the difficulty scheduling a time during the school year when the members of the Singaporean school team were all available, particularly given competing demands on their time is exceptionally challenging.

Overall, it is encouraging that the FYF intervention could be successfully implemented within a new context (i.e., school), facilitated by non-clinicians (i.e., school staff), and yielded significant reductions in youth and parent reported anxiety symptoms post-intervention. These results may indicate the potential for implementing FYF-SB in school settings for youth with ASD and anxiety; however, future work is needed to determine whether these findings generalize to youth who receive FYF-SB, as is, in the other countries/cultures. In addition, many changes were made to the FYF intervention (groups were smaller, children were older, delivery was in a school setting by school professionals, and there was cultural adaptation). Because each of these components has not been examined in isolation, it is impossible to tease apart each modification and its effects on the outcomes of the intervention. Although this was a preliminary implementation study, there were a number of strengths including use of a mixed-methods design with both qualitative and quantitative methods (see Palinkas et al. 2011), clearly delineated adaptations to the original program (Owens et al. 2014) and a hybrid design that addresses both implementation and effectiveness within the same study (Curran et al. 2012). Perhaps what may be most useful about the present study is the extent to which the elements of the collaborative process with key stakeholders at all stages of program planning, adaptations and training may serve as a template for future studies that consider transporting clinic-based programs to real world settings.

Limitations

There are several limitations to this study. A major limitation is the lack of information regarding fidelity. Even though an acceptability and fidelity form had been created, school teams were not able to complete these forms, in large part, due to time constraints and that their initial efforts were directed towards other aspects of the project. Thus, we do not know the extent to which school staff adhered to the protocol and delivered the program as intended. However, coaches observed some sessions and discussed each session with facilitators in attempts to promote good adherence to session objectives and activities. Child acceptability ratings had been included as part of the initial form, so in addition to lack of fidelity measurement, we were also unable to obtain youth acceptability ratings. Future studies will need to determine the best way to measure acceptability and fidelity within the school context, taking into account the competing demands that school staff face and their ability to complete all tasks related to implementation of a new program.

The relatively small sample size and lack of a randomly assigned control group significantly limits the generalizability of the study findings. The initial goal of this research was to adapt the clinic-based program to fit within a new setting and to determine whether this new program could be delivered by school staff in Singapore. This initial implementation study provided preliminary effectiveness data and valuable lessons about working with schools to inform the next implementation phase that will include a more rigorous research design. The school setting posed various challenges to implementing a more rigorous research design at this early stage, including lack of resources (i.e., staff to screen and assess students, staff knowledge and comfort with the material) and the school calendar. Thus, the limited resources and newness of the program impacted measurement.

Only two outcome measures, the SCARED and DBC-T, were included in this study, and a gold-standard measure of anxiety (e.g., ADIS) was not included. The SCARED is a brief questionnaire that was not designed specifically for youth with ASD, although it has been found to be a potentially appropriate measure of anxiety symptoms in individuals with ASD (Lecavalier et al. 2014) and has been commonly used in other ASD/anxiety intervention studies (Reaven et al. 2009; Stern et al. 2014). Teachers in this study reported that the DBC-T was not applicable to their students and scores were at sub-clinical levels prior to the start of FYF-SB. Although the DBC-T was designed for youth with developmental disabilities, this tool was able to identify concerns in high-functioning individuals with ASD and anxiety in our previous clinic-based treatment studies (unpublished results) and the utility of this measure with children with ASD and a wide range of IQ's has recently been reported (Chandler et al. 2016). Future studies will need to consider additional outcome measures, as well as alternate measures, to capture more general emotional and behavioral concerns. For instance, the ASEBA Child Behavior Checklist (CBCL; Achenbach and Rescorla 2001) is a good alternative to the DBC when assessing progress in emotional and behavioral issues of children with ASD within mainstream school settings (Hoffmann et al. 2016; Pandolfi et al. 2012). It will also be important to carefully balance the need for strong measurement with demands on staff time. During this initial implementation of FYF-SB, the teacher-to-student ratio was approximanately 1:2, potentially raising concerns about the cost-effectiveness of such a program. The Singaporean team felt that starting with fewer students was beneficial given that this was the first time implementing this program, and allowed more

time to focus on learning the program and problem solving issues that arose. The Singaporean team reported that they felt they would be able to support increased numbers of students per group in the future.

Following the initial implementation of FYF-SB, feedback was sought from school staff and parents. With regard to feedback from school staff (via the Online Feedback Form), no form was given prior to the training (i.e. initial ratings of confidence in CBT concepts and strategies), so it is difficult to determine any potential change in confidence as a result of participating in the program. In addition, it is possible that the high acceptability ratings are influenced by a desirability effect as participants reported highly confident skills after training and implementation of FYF-SB. The same potential bias of parent acceptability comments may have occurred, as many parents reported favorable ratings of FYF-SB. Future work will need to include pre- and post-ratings, as well as separate clinical and research teams, which may help to eliminate bias.

Conclusions and Future Directions

The current research study represents an initial phase in the implementation of evidence based treatments for youth with ASD and co-occurring anxiety symptoms in school settings. It also underscores the importance of engaging in a collaborative process with key stakeholders at all phases of an implementation project, to develop a program that is contextually and culturally appropriate and meaningful. The quality of the collaboration is a critical component to supporting long-term sustainability of a new intervention. Indeed, a variety of factors are considered important to program sustainment in schools, such as: ongoing support from administrators, teachers and principals; a strong opinion leader; alignment of an intervention with school philosophy, goals, policies and programs; on-going high-quality professional development and consultation; methods to successfully address staff turnover; visible and relevant program outcomes; and adequate financial resources to deliver the program (Forman et al. 2009; Owens et al. 2014).

Future studies will need to include a more rigorous hybrid design including randomized assignment, to more adequately assess implementation and clinical effectiveness outcomes (Curran et al. 2012). To increase ecological validity, future research studies may also consider including ecological momentary assessments (EMA) to capture anxiety, stressful events and coping (Damiano et al. 2014), in addition to more rigorous treatment outcome measures. Even more culturally appropriate adaptations would be important to consider for future versions of FYF-SB, such as produce videos that include Singaporean students versus North American students. Language considerations are also important, such as ensuring that all materials and assessments are easily understood by non-native English speakers. In conclusion, the results of this study reflect an important first step in bridging the research to practice gap for youth with ASD and anxiety.

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Compliance with Ethical Standards

Conflict of interest Irene Drmic and Mariam Aljunied declares that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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