

“Less stress”: a pilot study on a cognitive behavioral treatment program for anxiety in children with autism spectrum disorders

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Abstract

Background: Comorbid anxiety disorders are prevalent in children with autism spectrum disorders (ASD), but only a minority receives adequate treatment for anxiety. Cognitive behavioral therapy (CBT) has been shown to be effective in treating anxiety disorders. The objectives of the present pilot study were to test the feasibility of the CBT program “Less stress” for comorbid anxiety disorders in children with ASD and explore whether an improvement in diagnostic outcomes for anxiety disorders and symptoms of anxiety was found after treatment.

Method: Participants were ten children diagnosed with ASD and anxiety disorders (eight boys, mean age = 9.5 years, range 8 - 12 years). The “Less Stress” program includes three months of weekly treatment sessions followed by three monthly booster sessions. Five therapists participated. A standardized semi-structured diagnostic interview with the mothers was used to assess comorbid disorders. Child anxiety symptoms were measured with the Revised Child Anxiety and Depression Scale (RCADS).

Results: The therapists found the manual easy to use but adaptations were necessary, particularly shorter sessions due to frequent ($n = 7$) comorbid Attention-Deficit/Hyperactivity Disorder. The participants found the program useful and the parents noted that they had learned methods they could continue using after the end of the program.

Eight of ten children completed the treatment. Seven of the eight completers benefited from the program. Five of those seven children were free from all anxiety disorders, while two had fewer anxiety disorders. On a group level, a significant mean reduction of anxiety symptoms (RCADS) was found after treatment.

Conclusions: The therapists found the “Less stress” program to be a feasible intervention in a sample of children with ASD and comorbid anxiety. The significant reduction of anxiety after treatment is promising, but a replication in a larger and more rigorous study is needed to investigate the effectiveness of the intervention.

Keywords; autism spectrum disorders; treatment; anxiety; CBT

Introduction

Autism spectrum disorders (ASD) are characterized by early-onset core difficulties in social- and communication skills and unusually restricted, repetitive behavior and interests with an estimated worldwide population prevalence of about 1%, affecting more males than females (1). Most children with ASD have one or more comorbid conditions like attention-deficit/hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), anxiety- and mood disorders, implying a further reduced level of child functioning and an additional burden for the family (1-4). Although more than 50% of children with ASD also fulfill criteria for an anxiety disorder (2, 4, 5), only a minority receive adequate treatment for anxiety (6). The importance

of offering children with ASD help for their additional disorders beyond the core ASD difficulties has been emphasized by users, clinicians and researchers alike (7, 8). For instance, one study found that school performance was the life domain most impacted by anxiety symptoms (9) and the need to explore the potential impact of anxiety on school performance in children with ASD has recently been underlined (10).

In general, we know that anxiety can be effectively treated with cognitive behavioral therapy (CBT) (11, 12). Also, when intellectual abilities (IQ) are below average but in the (lower) normal range, children with ASD can complete and benefit from CBT (13). However, an early study found that children with ASD seem to respond less well to standard CBT for

anxiety (14). Therefore, in order to succeed in the treatment of anxiety in children with ASD, it may be important to adapt the treatment to the child's abilities and disorders (6, 15). Central to the treatment of children with ASD, is the involvement of parents, the use of concrete visual aids, and to work on learning to recognize emotions - as this is often particularly difficult for them (16, 17). Exposure is one of the main components of general anxiety treatment (18), and exposure-based programs in English have been found to be effective in treating anxiety disorders in children with ASD (19-21). Although no consistent outcome differences according to delivery formats were reported in a review (11), a recent study comparing three forms of treatment for anxiety in children with ASD found that CBT adapted for ASD outperformed standard CBT and treatment as usual (20).

A group-based CBT program for anxiety disorders adapted for children with ASD ("Cool Kids ASD") (22, 23) has been translated to Danish, and in a feasibility study from a general hospital setting, eight out of nine families found the program useful (24). The Danish version of the "Cool Kids ASD" (25) was then used in a waitlist-controlled study (49 children aged 8-14 years), and after treatment, 30% of the children were free of their primary anxiety disorders (5% were free of all anxiety disorders) (26). While the study found no statistically significant difference between the two trial conditions on primary outcomes (anxiety disorders), significant differences were reported on secondary outcomes (anxiety questionnaires) indicating clinically meaningful treatment responses.

Currently, we lack a Norwegian individually based CBT program for children with ASD and anxiety disorders. "Less stress" is a new CBT program in Norwegian (27) based on the previously developed "Exploring feelings" program (28) which has been evaluated in a controlled study (29). The "Less stress" sessions are designed to be conducted with child and parent(s) together, in line with a meta-analysis reporting larger effects for studies with parental involvement compared with child-only treatments (30).

The objectives of the present study were:

1. To test the feasibility of the "Less stress" program for children with ASD and comorbid anxiety disorders aged 7-12 years.
2. To explore whether an improvement in diagnostic outcomes for anxiety disorders and symptoms of anxiety was found after treatment.

We hypothesized that the program would be feasible in a Norwegian setting, as the program was based on a CBT protocol that has been tested in other western countries. Furthermore, based on previous positive CBT research findings in other

countries, we hypothesized that a reduction of anxiety disorders and symptoms would be found.

Methods

Participants, background and recruitment

Participants were ten children (eight boys and two girls), mean age 9.5 years (range 8-12). They were diagnosed with ASD at their local Child and Adolescent Mental Health Clinic (CAMHS) in different parts of Norway, according to the International Classification of Diseases and related health problems; ICD-10 (31) using a diagnostic interview for ASD (32) (Childhood autism $n = 3$, Asperger syndrome $n = 6$, Pervasive developmental disorder, unspecified $n = 1$).

Mean IQ reported from CAMHS was in the lower normal variation area: 90 (SD 17), range 68 - 115. The parents were well-educated, with a mean 16 years of education for both parents.

Eight of the ten children lived with both biological parents. All children had siblings, and in three families, ASD was present also among siblings.

The Norwegian user organization "*Autismeforeningen*" had made the study known on their website and all participating children were referred to "Less stress" due to what was understood as impairing anxiety by parents and at CAMHS. The inclusion criteria were: 1) a verified ASD diagnosis in children between 7 and 12 years of age, and 2) parent ratings of anxiety symptoms equivalent to a t-score ≥ 65 on a standardized anxiety questionnaire (the Revised Child Anxiety and Depression Scale; RCADS) (33). The first ten referred children were included, none were excluded.

Therapists, training and supervision

At baseline, all children were registered at a local CAMHS and were treated by five therapists who had previous experience working clinically with children with ASD. The therapists had some ($n = 3$) or extensive ($n = 2$) experience with CBT treatment for children. The therapists were given an introductory day-long course on "Less Stress" by the developer. In addition, a user-representative from the Norwegian user organization "*Autismeforeningen*" contributed with suggestions for adaptations in delivering the intervention based on his experience with anxiety in children with ASD, e.g., how to cope with severe hyperactivity, and to increase motivation by using videos of the child's successful exposure tasks.

Supervision during the study was available from the last author by telephone if needed, but regular supervision sessions were not scheduled. In total, five supervision telephone calls were carried out during the study period to discuss treatment issues

(e.g., how to increase client motivation, client issues, etc.).

Treatment

Children were treated with the “Less Stress” program, which is a manual-based CBT program (27). The program is specifically developed for children with ASD and comorbid anxiety disorders, and addresses cognitive, behavioral and physiological factors involved in the maintenance of anxiety. Treatment was delivered individually with both child and at least one parent present in all the treatment sessions at the clinic (n = 8) and at the child’s home (n = 2).

In “Less Stress”, a total of 13 weekly sessions and three-monthly follow-up sessions are administered. There are also two separate parent-sessions: one before the start of the program with information about anxiety in ASD and the aim of the “Less Stress” treatment, and the second in the middle of the program. This session is an update on aims and

progress, but the main focus is on how to assist their children in the coming exposure tasks. “Less stress” consists of two main parts. The first part (sessions 1-7) is skills-based, in which the child and parent learn about anxiety and strategies that can be used to cope with it (e.g., relaxation/mindfulness, identifying helpful and unhelpful thinking and challenging their own thinking, using social support, problem-solving skills, and conducting in-session exposure exercises). In this first part of the program, there is an emphasis on building rapport with the child and develop a “tool-box” of strategies the child can use when facing anxiety.

The second part (sessions 8-13) is mainly focused on conducting exposure exercises for situations that are anxiety provoking for the individual child. Please see Table 1 for an overview of the sessions. There is also an opportunity to do social skills training in the second part of the program to practice social skills, if this is needed in relation to the exposure exercises.

TABLE 1. Overview of the “Less Stress” sessions

Session	Content
Parent session 1	Conducted before session 1. Parents receive information regarding the program and the role of the parent during the treatment
Session 1	“Getting to know each other” exercise. Introduction to the program, assessment of the child’s interests and what makes the child happy. Assessment of potential rewards that could be used
Session 2	Psychoeducation on feelings, relaxation and anxiety. Setting goals for the program
Session 3	Creating a toolbox for emotion regulation (“Relaxation tools” and “Special interest tools” based on sessions 1 and 2, and introduction to “Physical tools”, “Social tools”, “Other tools” and “Unhelpful tools”)
Session 4	“Thinking tools” (cognitive restructuring) and “Doing-tools” (exposure)
Session 5	“Thinking tools” and “Doing-tools”
Session 6	“Problemsolving tools” + Exposure
Session 7	“Completing the toolbox” + Exposure
Parent session 2	Conducted before session 8: Update on progress/goal setting. Information regarding exposure work and role of the parents in the next treatment phase
Session 8-13	Exposure-based targeting of the main anxiety problem(s)
Follow-up sessions 1-3	Three follow-up sessions with a monthly interval (starting 1 month after session 13)

Note. Sessions 1-7 are focused on skills-training, psychoeducation and in-session exposures, whereas sessions 8-13 are mainly exposure-based

There are many similarities between traditional CBT and the “Less Stress” program, as the main foundation of the program is CBT for anxiety disorders including psychoeducation about anxiety, identification of thoughts, feelings and behaviors linked to anxiety and how these are linked together, and with an emphasis on cognitive restructuring and conducting exposures. The program differs from traditional CBT in that it is more “visually focused” and less based on having the children write in a workbook (which is central to other CBT for anxiety programs such as Cool Kids, Friends and Coping

Cat). “Less stress” includes adaptations to traditional CBT that are considered helpful for children with ASD: With the use of a PowerPoint presentation, participants are introduced to a young “professor” that will assist the child during treatment. This professor is also anxious and uses a thermometer (0-10) to measure his anxiety and a microscope to “check facts”. Thus, he is a “role model” for investigating and working with anxiety by conducting experiments (exposures) and uses a richly equipped toolbox to fix anxiety arising in these experiments. The children work on how to cope with their

anxieties through this visually oriented program, which is considered more helpful than using the traditional "workbook" programs where participants must do considerable reading and writing. Furthermore, the PowerPoint program aids in having participant and therapist focused on an external object (the computer), thus reducing the face-to-face contact often found difficult for children with ASD. Finally, the program is concrete (avoiding abstract terms) and activity based (with role-playing, games and to exposing themselves for the things they fear (exposure tasks) both within sessions and as home assignment tasks).

Measures

Feasibility

Feasibility was measured by collecting feedback from therapists and users after the treatment was completed. The therapists completed questionnaires adapted for "Less stress" after every session. They evaluated to what extent the child had carried out the assigned home assignment (rated from 0 = not at all to 6 = to a very large extent), and a self-rated adherence (3 items) / competence (1 item) evaluation (rated from 0 = not at all to 4 = to a very large extent, see Table 2 for the questions/ratings).

The participating children and parents also completed questionnaires adapted for "Less Stress" after the end of treatment, including both ratings of user satisfaction and open-ended questions like "What I liked the most/the least with "Less Stress", (see Table 3 for the questionnaire ratings).

Child diagnostic- and symptom evaluation

As previously noted, the children were diagnosed with ASD at their local CAMHS.

The Social Responsiveness Scale; SRS (34) was used as a measure of ASD severity. SRS is a validated questionnaire that assesses behavioral and social-communicative traits (35) with a total score that has been justified in factor analyses (36). The SRS scores are reported to be continuously distributed in the general population, but it is advised to consider a diagnostic interview for ASD with a t-score > 70 (34).

To assess comorbidity and school refusal, mothers were interviewed with the revised version of the semi-structured Schedule for Affective Disorders and Schizophrenia for School-Aged Children: Present and Lifetime Version (K-SADS-PL DSM-5) (37) at baseline and after treatment. One K-SADS item measures school refusal and is scored as present if the child: "Protests intensely about going to school, or sent home or refusal to go at least one day per week and/or persistent reluctance or refusal to go to school".

Satisfactory convergent and discriminative validity and acceptable values for inter-rater reliability have been reported for the former US and Nordic versions of K-SADS-PL (38-40). For the DSM-5 version of K-SADS-PL, a recent Icelandic study found inter-rater reliability estimates ranging from fair to excellent ($\kappa = 0.57-0.90$), with most diagnoses in the excellent (> 0.75) range (41).

The second author, an experienced child and adolescent psychiatrist, conducted the parental interviews at baseline. She knew that the children had been diagnosed with ASD but was blind to questionnaire ratings of anxiety symptoms. The interviews were completed by telephone due to large geographical distances, an administration method previously found to be valid in differentiating children with and without anxiety disorders (42). The same child and adolescent psychiatrist conducted interviews after treatment. As such, the diagnostic procedure was not blind, but baseline interviews were not available when the after-treatment interviews were conducted.

Children's Global Assessment Scale; CGAS, is a clinician-rated tool which was used to indicate the lowest overall level of the child's psychosocial functioning (at home, at school, with peers) (43). Scores range from 0 to 100 with high scores indicating better functioning. CGAS is divided into 10-point intervals with a description of the child's level of functioning for each interval. Moderate to excellent inter-rater reliability has been found when used with untrained- [.73] and expert [.92] raters, respectively (44). The child and adolescent psychiatrist rated CGAS after conducting the K-SADS interviews.

Child anxiety symptoms were measured with the Revised Child Anxiety and Depression Scale (RCADS) (33), using the approved Norwegian translation (available at <https://www.childfirst.ucla.edu/resources/>). Symptoms were rated at baseline and after treatment by both parents and children. The RCADS has been developed to correspond more closely to selected DSM-IV anxiety disorders and includes a scale for major depression. Good test-retest reliability has been established (33) and convergent and discriminant validity as well as good internal consistency has been demonstrated for the RCADS in a clinical sample (45). The developer established 'clinical thresholds' for the overall RCADS-score using the anxiety disorders interview schedule for DSM-IV, child and parent versions (46) as a comparison, and normative data for the subscale thresholds. A t-score of 65 and 70 means that the score is roughly in the top 7% and 2%, respectively, of scores of un-referred young people of the same age (described as borderline clinical- and clinical

threshold by the developer) (45). A review found the RCADS to show robust internal consistency reliability in different assessment settings, countries, and languages (47).

The Child Anxiety Life Interference Scale (CALIS) (48) was rated by both parents. CALIS is a measure of life interference due to anxiety experienced by the child (9 items) and parents (16 items, including items on the interference experienced by the parents in their own life). In children with ASD, anxiety has been found to impact upon the child's engagement in activities both in and outside of home and upon parent life, as rated by CALIS (10). CALIS is scored from 0 (not at all) to 4 (a great deal). CALIS was found to have good internal consistency, moderate-to-high test re-test reliability, significant inter-rater reliability, good convergent and divergent validity and was sensitive to treatment change in the initial psychometric study (48). Satisfactory psychometric findings have been reported from Nordic studies (49, 50).

Quality of life was rated by the children using the Inventory of Life Quality in Children and Adolescents (ILC) (51, 52). A review of Norwegian ILC studies found satisfactory norms and measures of validity and reliability (53). The ILC Life Quality total score (LQ₀₋₂₈) yield scores ranging from 0-28, where higher values indicate better life quality. The ILC problem score (PR) is computed by dichotomizing each of seven subscales to indicate whether a problem is present (1) or not (0) on the subscale. A mean ILC problem score can then be calculated, with a 0-7 range. A mean LQ₀₋₂₈ score of 22.6 (SD 3.9) and a mean PR score of 1.3 (SD = 1.6) has been reported by typically developing Norwegian youth aged 8–16 years (n = 1987) (51).

Ethics

Written informed consent was obtained from participants. The study was approved by the Regional Committee for Medical Research Ethics in Norway (2016/860).

Data analysis

Descriptive statistics using means and standard deviations (SD) or number of patients are presented for the diagnoses and questionnaires.

Paired *t*-tests were used to investigate mean score differences between the two time points (baseline – after treatment). The level of significance was defined as $p < 0.05$.

Results

Feasibility

The therapists found the manual easy to use but adaptations were considered necessary in some instances. The introductory course in the "Less

Stress" program and the written treatment manual encourage adaptations where this is needed. The clinicians reported making the following adaptations: For children with severe language problems, verbal explanations were replaced with drawings to illustrate exposures and goals. When a lack of understanding numbers made the use of the 0-10 thermometer difficult, the grading of exposures was illustrated with drawings of size (i.e., a small mountain and a big mountain etc.). Due to frequent comorbid ADHD (seven of ten children), shortening the length of sessions was often necessary. The therapists also suggested using breaks with games and motor activities chosen by the children. The use of a personalized substitute for the professor was also helpful (i.e., replacing the professor in the PowerPoint program with another figure (such as a special interest). Several children needed small rewards also for attending sessions, not only for doing the exposures and for goal achievements. For some children who were reluctant to come, it was important that they could bring toys and even a pet to the sessions. Also, to strengthen child motivation during difficult home assignments, some parents repeated the PowerPoint sessions at home and made videos of their exposure tasks for the children to watch themselves and to show the therapist. Two children were treated at home, not at the clinic, due to previous problems related to clinic visits.

When the therapists rated to what extent the child had carried out the home assignments, the mean scores were considered satisfactory. The mean rating of all sessions among all participants was 3.5 (SD = 1.6) (6 indicates to a very large extent) and increased in the second half of the program (mean > 4) compared to the first half (mean > 3). The mean among the eight completers was higher (4.2, SD 0.5) than the general mean and very low in the two non-completers (0.8, SD 1.2). The therapist-rated adherence to "Less stress" and their perceived competence was considered satisfactory (see Table 2 for details).

Both parents and children expressed an overall contentment with "Less stress" (see Table 3). In the open-ended questions, most parents said "Less stress" was hard work but that they had learned principles and tools to continue to use in helping their children to master anxiety. Many children expressed that they liked the program because they had become less anxious, had mastered assignments and got nice rewards. Not much was indicated as disliked, but one child noted there was too much talking, and one was not satisfied with the professor in the PowerPoint presentation. The parents in general put weight on the systematic work over time, and the concrete goals to work on from session to session. However, one child said he disliked having

to do “what he didn’t want to do” and his parents pointed out that although they were given many home assignments, they were not concrete enough

and/or they lost control of what to work with at home.

TABLE 2. Therapist rated adherence and competence

Items rated by the therapist after every session	Mean (SD) range
1. To what extent did you follow the specified structure for the session?	3.5 (0.5) 2-4
2. To what extent did you demonstrate your therapeutic process and relationship skills?	3.5 (0.4) 2-4
3. To what extent did you think you focused on the goals set for the session?	3.5 (0.3) 2-4
4. Based on an overall assessment, how competently did you experience yourself as a therapist this session?	3.4 (0.5) 2-4

Note. Adherence (items 1-3) and competence (item 4). The items are rated from 0 (not at all) to 4 (very large extent).

TABLE 3. User satisfaction rated by parents and children

Items	Mother	Father	Child
	Mean (SD)	Mean (SD)	Mean (SD)
I found the “Less Stress” program useful	7.0 (0.0)	6.6 (0.5)	6.1 (0.8)
I have used some of what I learned during the program	6.9 (0.4)	5.4 (0.9)	5.8 (0.9)
I liked the “Less Stress” program	6.8 (0.5)	6.4 (0.5)	5.8 (2.1)
I will continue to use what I learned in the program	6.8 (0.5)	6.0 (0.7)	5.9 (0.8)
I remember what I learned in the program	6.4 (0.7)	5.3 (0.5)	5.5 (0.8)
Did you talk to your child/parent about “Less Stress”? (yes = 1 / no = 0)	1.0 (0.0)	0.6 (0.5)	0.9 (0.4)
Were you content with the therapist?	8.8 (0.5)	8.4 (0.5)	7.9 (1.8)

Note. The first six items were rated from 1 (very much disagree) to 7 (very much agree); the last item was rated from 1 (not content) to 9 (very content)

TABLE 4. Comparing baseline values for completers and non-completers

	Age years	IQ	CGAS	SRS	RCADS	Number of anxiety diagnoses	Comorbid ADHD
Non-completers (n = 2)	9.5	99	51	t = 71	t = 83	n = 1 in both	1 of 2
Completers (n = 8)	9.5	88	40	t = 96	t = 97	Range 1-5, mean 2	6 of 8

Note. IQ: Intelligence quotient; CGAS: Children’s Global Assessment Scale; SRS: Social Responsiveness Scale; RCADS: The Revised Child Anxiety and Depression Scale

TABLE 5. Questionnaire ratings at baseline and after treatment

Questionnaires, raters	Baseline ratings	After treatment	Statistics	
	N=10	N=8	t-value	p-value
	Mean (SD) range	Mean (SD) range		
CGAS, clinician-rated	42.4 (6.9) 32-52	48.3 (3.8) 41-55	-3.85	< .01
SRS t-score, mother	91.1 (12.6) 62-109	85.9 (11.0) 64-103	3.03	.02
RCADS t-score, mother	94.6 (11.0) 74-118	73.2 (20.1) 50-110	4.25	< .01
RCADS t-score, father	96.2 (16.3) 76-115	75.6 (17.9) 53-112	2.73	.04
RCADS t-score, child	67.0 (16.0) 38-82	60.0 (12.7) 43-76	4.06	.01
ILC total score, child	16.6 (4.4) 9-21	18.9 (3.6) 13-24	-2.24	.07
ILC PR score, child	3.6 (1.5) 2-6	3.0 (1.7) 0-5	1.66	.16
CALIS raw score, mother	50.1 (6.0) 39-59	41.8 (10.3) 20-53	2.16	.07
CALIS raw score, father	45.4 (6.7) 37-55	37.6 (12.8) 20-59	1.65	.16

Note. CGAS: Children’s Global Assessment Scale; SRS: Social Responsiveness Scale; RCADS: The Revised Child Anxiety and Depression Scale; ILC: Inventory of Life Quality in Children and Adolescents, ILC total score is the LQ₀₋₂₈ and PR is the problem score; CALIS: Child Anxiety Life Interference Scale

Eight of the ten participating children completed the "Less stress" program. Baseline values showed better functioning on important measures for the non-completers at baseline (see Table 4 for details).

Treatment results

Comorbid disorders to ASD:

At baseline, the assessment with K-SADS revealed the number of comorbid disorders to be mean 3.2 per patient (range 2-6): ADHD (7 of 10 children, Enuresis nocturna in one child, and moderate ($n = 2$) and severe ($n = 1$) Depressive episodes in three children).

There were a mean number of 2.2 anxiety disorders diagnosed per child (range 1 - 5): Specific Phobia ($n = 7$), Separation Anxiety Disorder ($n = 6$), Social Phobia ($n = 2$), Generalized Anxiety Disorder ($n = 2$), Agoraphobia ($n = 2$), Panic Disorder ($n = 1$), Selective Mutism ($n = 1$) and Unspecified Anxiety Disorder ($n = 1$). (The specific phobias were: Darkness, heights, tunnels, flying, toilets, skin wounds, animals, crowds, car queues and closed rooms. Two children had one phobia, three children had two, and two children more than five phobias). Furthermore, school refusal was present in four of the ten children.

After treatment, seven of the eight completers benefited from the program. Five of the seven children did not meet criteria for any anxiety disorders and two had fewer anxiety disorders (both had one remaining Specific Phobia and one had only a partly remission of the Selective Mutism). One child met criteria for the same anxiety disorders found at baseline. Furthermore, the three diagnosed Depressive episodes and school refusal were no longer present, with no change in the diagnoses of ADHD and Enuresis nocturna. When comparing questionnaire ratings on baseline and after treatment, the mean scores from all informants had improved, and most differences reached statistical significance (see Table 5).

Discussion

The first objective was to test the feasibility of the "Less stress" program for children with ASD. Therapist feedback and user satisfaction indicated that the intervention is feasible with children who have ASD and comorbid anxiety disorders, and suggestions for modifications with comorbid ADHD and/or intellectual disabilities were suggested. The second objective was to investigate whether reduction of anxiety-disorders and symptoms were found after treatment. Results indicated that both anxiety disorders and anxiety symptoms were reduced after treatment in treatment completers.

Feasibility

The therapists found the "Less stress" program feasible in a sample of children with ASD and comorbid anxiety. However, the therapists generally perceived that administering the program for those with comorbid ADHD could pose an extra challenge. Adaptations were needed to cope with the short attention span and hyperactive-impulsivity, which affected their ability to sit quietly and be attentive over time. It is plausible that the visually oriented "Less stress" was particularly important for those with ADHD, along with repetition of concepts, and frequent practice of strategies across contexts, as these adaptations have been found to aid children with this condition (17). Feedback from therapists suggested that the children generally worked well with their home assignments, with an increase over time, indicating that these were perceived as meaningful/useful by the participants. Non-completers did not carry out their home assignments (exposures). In addition, one child did not do his home assignment exposures but enjoyed coming to the sessions. All participants had a high user satisfaction, and the parents generally expressed confidence in their ability to apply the "Less stress" toolbox after the program.

Two children did not complete the program. Our baseline measures show that they had few anxiety disorders relative to the other participants (one each) and were better functioning on other measures than the completers were. This could suggest that the "Less stress" program is well-suited for those severely affected by anxiety. The non-completers might have had a lack of motivation due to a lower level of anxiety, but as child motivation was not measured separately, we cannot say whether that was the reason. However, it is worth noticing that the therapists informed that all but one of the participating children came somewhat reluctantly to the sessions and only because their parents wanted them to come. Thus, motivation as such could be generally low when judged by child behavior alone.

Although a review did not report unambiguous effect of parental involvement in CBT for anxiety (54), the therapists experienced that parental involvement was crucial in our study. They considered it highly unlikely that progress had been made without the continuous parental prompting of both attendance to sessions and the completion of the required home assignments (exposures).

Treatment results

According to the diagnostic interview with the mothers, seven of eight completers improved after treatment with substantially fewer anxiety disorders

than before treatment, suggesting that the "Less stress" program gave improvement as intended.

The diagnostic findings were corroborated on the anxiety questionnaires, as a significant mean reduction of anxiety symptoms was found after treatment from all three informants (about two SD's for the parents and one SD for the children on the RCADS total t-score). The mean ratings of anxiety and impairment from both parents are in line with the diagnostic interview and this is worth noticing, as the scores from the fathers can be considered more independent of the interview. All informants have scores in the same direction, although not all reach statistical significance, and in line with previous literature (55), the children report lower levels of anxiety compared to the parents. These patterns of parent and child ratings could result from children with ASD and comorbid anxiety having difficulty in reporting their anxiety while the parents are more aware of them. Such an interpretation is consistent with previous research suggesting that children with ASD underreport their anxiety symptoms (56, 57) also when anxiety is present as determined by clinician consensus (58, 59). Perhaps also the questions did not convey meaning to them, in line with difficulties in identifying and communicating ones' own emotions, known to affect children with ASD to a relative high extent (60-62).

Beyond improvement in diagnostic status/anxiety symptoms, we found a positive mean change in two broader measures: the clinician-rated CGAS and the child-rated life quality. However, the children were still impaired by ASD and other comorbid disorders after treatment, as the CGAS score (mean 48) still indicated a moderately affected functioning (43), and the scores on life quality were lower than those reported for the general child population (51).

Our sample included one child with mild mental retardation and some with somewhat reduced IQ and/or severe language problems, suggesting that the program may be suitable also in this subgroup, given relevant adaptations. Not withholding our small sample size, this is encouraging as there is little research investigating the effects of CBT for this population (11).

Most children in our sample had more than one anxiety disorder (mean 2.2, range 1-5), in line with previous findings on children with ASD (2, 63). The "Less stress" program was equally effective for the different anxiety disorders in the present study, with the exception of selective mutism, where only partial remission was found. Partial remission is a tentative definition of the increased occasional use of language sometimes found in children treated for selective mutism also when using defocused communication and graded exposure in an especially designed home- and school based intervention for this condition (64).

Furthermore, a majority had comorbid ADHD, and three of the ten children had a depressive episode, in line with a study showing that children with ASD and comorbid anxiety have more ADHD and other comorbid disorders compared to children with ASD and no anxiety disorder (55). The comorbidity did not seem to affect outcome in our study, as also shown in a recent study reporting no clear differential impact of co-occurring psychiatric disorders on response to anxiety treatment (65). However, as previously noted, implementing the program for children with comorbid ADHD were perceived as posing some extra challenges for the therapists.

Our study with "Less stress" did not include specific work on depression or school refusal. Still the children with depressive episodes did not meet diagnostic criteria for depression after treatment, and school refusal was also no longer present. Anxiety and depression often coexist and is then reported to represent greater symptom severity (66), and school performance has been found to be the life domain most impacted by anxiety in children with ASD (9, 10). It is thus encouraging that working with their anxiety problems and mastering difficult exposure tasks in "Less stress" might have counteracted depression and school refusal among the participating children.

Contrary to a study, reporting that a notable portion of youth with externalizing disorders, such as ADHD comorbid to ASD and anxiety, did not meet criteria for these externalizing disorders after treatment for anxiety (65), we found no change in the presence of ADHD after "Less stress".

We have no definite explanation for this difference, but while ADHD was not described as an area of concern in that study, this was in contrast to the children participating in "Less stress" where the participating children had a high rate of severe ADHD. This might suggest that this outcome difference is related to difference in baseline severity of ADHD symptoms.

Strengths and limitations

A strength of the study was that it was carried out in an ordinary clinical setting including local therapists with some ($n = 3$) and extensive ($n = 2$) CBT experience.

Limitations include that it was a pilot study without a control group and with a small sample size. In addition, although we have no information about other ongoing treatment during "Less stress", we cannot rule out that improvement took place due to other factors in the everyday life of the children. Furthermore, there were not blinded diagnostic evaluation after treatment and no measures of objective treatment adherence by the therapists. As all therapists had clinical experience with children

with ASD, we are unable to infer how feasible the intervention would be with clinicians who have no experience working with children with ASD.

Although measures of therapist-, child- and parent-reported feasibility yielded positive results (i.e., high ratings of therapist rated adherence and competence and high user satisfaction from parents and children), such measures could be subject to bias.

Conclusion

The therapists found the “Less stress” program feasible in a sample of children with ASD and comorbid anxiety. The significant reduction of anxiety disorders and symptoms found after treatment is promising, but a replication in a larger and more rigorous study is needed to investigate its effectiveness. It is further advised that future studies examine “Less stress” relative to an active control.

Clinical Significance

Our findings suggest that the “Less stress” may be well suited for children severely affected by ASD and anxiety. Parental feedback underlined the importance of having concrete goals to work with from session to session. Furthermore, children with ASD and additional co-occurring externalizing disorders and/or reduced intellectual functioning may benefit from treatment of anxiety using this program. As such, clinicians could consider delivering anxiety-specific treatment also for these subgroups, given that necessary adaptations are provided.

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Disclosures

Authors BO and KRO have no known conflicts of interests.

Authors TA and JFB are the developers of the “Less Stress” program and disclose that they may receive royalties from the program in the future. No other conflicts of interests are known to the authors.

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