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RESEARCH ARTICLE

Remote Cognitive Behavioral Therapy for Anxiety in Children with Autism Spectrum Disorders: A Systematic Review

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Abstract

This study aimed to elucidate the effects of remote cognitive-behavioral therapy on anxiety in children with autism spectrum disorder from an empirical study and to obtain suggestions for future support construction. Two cases met the eligibility criteria for primary and secondary screening and were reviewed by two investigators to evaluate the efficacy of remote cognitive behavioral therapy. Although cognitive-behavioral therapy skills differed between the two studies, anxiety was reduced after the intervention in both studies, suggesting that remote cognitive-behavioral therapy helps reduce anxiety in children with autism spectrum disorders. However, due to the paucity of previous studies, the effects of remote cognitive-behavioral therapy on anxiety reduction in children with autism spectrum disorder have not been fully verified, and the accumulation of studies using randomized controlled trials is an issue.

Keywords: Autism Spectrum Disorder, Children, Anxiety, Remote, Cognitive Behavioral Therapy, Systematic Review.

1. Introduction

Autism spectrum disorders are characterized by communication disorders as well as a preoccupation with interests and behaviors, which can be identified as early as the first year and a half of childhood. Children with autism spectrum disorder who have these characteristics have an anxiety comorbidity rate as high as 80%[1], with 40% of children meeting the criteria for an anxiety disorder[2]. A high percentage of them have anxiety disorders[3], with phobias, generalized anxiety, separation anxiety, and social anxiety being the most common[4]. It has been pointed out that anxiety in children with autism spectrum disorder increases the risk of depression and aggressive behavior[5] and interferes with adaptive functioning at home, school, and in the community[2]. This necessitates providing early intervention for anxiety in children with autism spectrum disorder.

Cognitive-behavioral therapy is helpful as an intervention method for children with autism spectrum disorders[6-9], and its effectiveness has been demonstrated in decreasing anxiety symptoms and in the loss of anxiety diagnosis, increased participation in school, family, and community activities, and increased psychological well-being[10-12]. However, cognitive-behavioral therapy, which helps reduce anxiety in children with autism spectrum disorders, has not been widely used as a support method. Reasons include, on the supporter side, the lack of specialized training programs does not lead to supporter development[13]. In contrast, on the subject side, there is resistance to attending intervention sessions at the clinic itself[11], and traveling to and from the clinic on school days is stressful, time-consuming, and expensive[14]. Lack of access to medical care for families living in rural areas or far from specialized clinics[15-17] has also been

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identified as a factor in the lack of support reaching children with autism spectrum disorders.

Against this background, teletype therapy, such as computer-based videoconferencing, has attracted attention. Distance-type therapy has reported the usefulness of psychosocial interventions for children and teenagers with anxiety, depression[18], attention deficit disorder[19], and mood disorders[20]. Experts in autism spectrum disorders have positioned online-based, distance-based cognitive behavioral therapy programs as a recommended methodology because of their visual, animated, entertaining, and structured attributes[21-23]. Furthermore, because computer-based approaches can be accessed at any time, the relative convenience and efficiency of receiving specialized clinical care without having to leave home for subjects living in rural areas or far from a clinic are expected to expand support in the future. However, the usefulness of remote cognitive-behavioral therapy for anxiety in children with autism spectrum disorders has not been fully verified. There are also a few literature reviews on its usefulness.

Therefore, this study targets intervention studies using remote cognitive-behavioral therapy for anxiety in children with autism spectrum disorders, and by verifying its effectiveness, we decided to create materials to examine support measures that lead to the reduction of anxiety in children with autism spectrum disorders.

2. Research Methods

A systematic review was conducted based on the Minds Clinical Practice Guidelines Development Manual 2020 ver. 3.0[24].

Clinical Question Formation and Literature Selection Criteria

The clinical question was, "Is remote cognitive-behavioral valuable therapy for anxiety in children with autism spectrum disorder?

A comprehensive literature search was conducted using Ichushi-Web, PubMed, MEDLINE/CHINHL, Cochrane Library, and PsycINFO. The search terms were "autism spectrum disorders," "anxiety," and "cognitive-behavioral therapy. The search terms were those that had been tested for the effects of remote cognitive-behavioral therapy on anxiety in children with autism spectrum disorders (last examination date: 2024/7/23). The following literature was excluded from the search: (1) literature that did not focus on children with autism spectrum disorder, (2) literature that did not focus on anxiety, (3) literature that did not use cognitive-behavioral therapy, (4) literature that was not conducted remotely, and (5) review literature.

The primary screening was conducted independently by two researchers. Further, articles that did not meet the clinical questions of the study from the title and abstract, including those with similar themes and researchers' names, were considered duplicates and excluded from the included literature. In the secondary screening, two researchers independently read the complete text. Furthermore, they selected articles that met the selection criteria and compared the results of the two researchers. Additionally, if the two researchers' opinions differed, a third opinion was incorporated to determine the article to be selected.

3. Ethical Considerations

The copyrights of the literature covered by this study were protected, and two researchers extracted the results to ensure that the content of each literature was not compromised. There were no conflicts of interest in this study.

4. Results

4.1. Literature Search Results

Figure 1 shows the results of the literature search.

A total of 1,797 references (257 in Ichushi-Web, 443 in PubMed, 496 in MEDLINE/CHINHL, and 601 in PsycInfo) were retrieved. Duplicate references and references that met the exclusion criteria established in this study were deleted. Finally, two references confirmed to meet the eligibility criteria among researchers were included in the analysis.

4.2. Remote Cognitive Behavioral Therapy for Anxiety in Children with Autism Spectrum Disorder

4.2.1 Participant Selection, Assignment, and Dropout Rates

Table 1 shows each reference's participant selection, allocation, and dropout rate method.

Randomization was described in only one case (N0.2) regarding the recruitment of subjects. Only one mention of allocating participants to each county (N0.2) also mentioned allocating subjects to each county and blinding. For participant selection, all included a diagnosis of autism spectrum disorder as an eligibility criterion, and only one included eligibility and exclusion criteria for parents as well as children (No. 1). The dropout rate was low in one case (No. 1), and high in one case (No. 2).

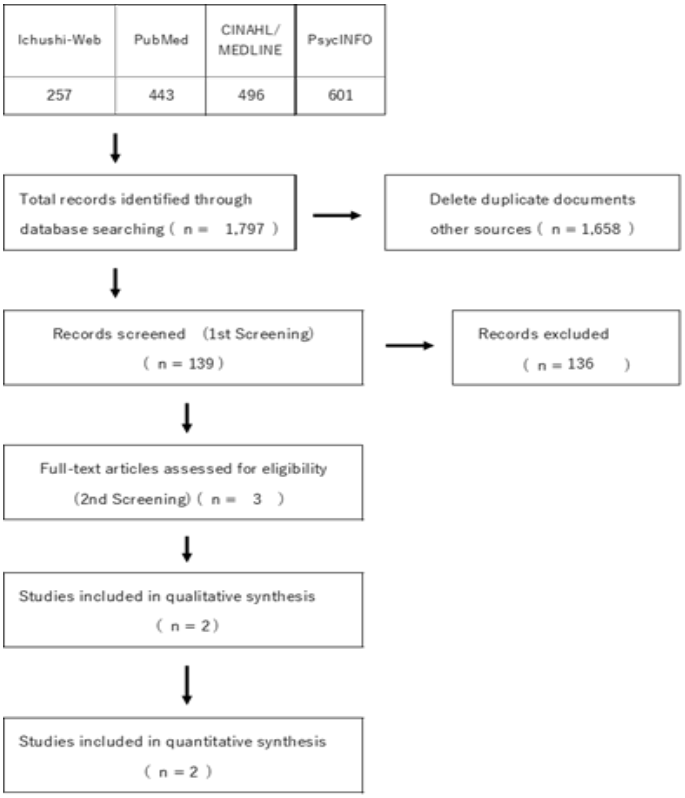

Figure 1. *Literature Search Flowchart*

Table 1. *Subject selection, allocation, and dropout rates*

No	Author, Year of publication	Recruitment Method number of subjects	allocation Allocator, Binding (execution detection)	Group	types of Anxiety Disorders	Eligbility Criteria. Exclusion Criteria		Subject/ Dropout/ Dropout rate
						youth	parents	
1	Susan LH.. 1 et al... 2016	community workshops, webinars, focus groups, and regional conference presentations in rural parts of the state rural and frontier communities in a western state	NA /NA/NA	①experimental; 17 control: 16 The "control group" is secondary data from a companion project	NA	[Eligibility Criteria] (1) males and females between the ages of 7 and 19 years (2) current clinical diagnosis of ASD, as documented in an evaluation report that included the Autism Diagnostic Observation Schedule, administered within the past 5 years by a reliable administrator, or confirmed in a live evaluation by one of the study psychologists on an outreach visit (3) current scores on the Social Responsiveness Scale that are indicative of moderate risk of autism or greater (4) indication of clinically significant symptoms of anxiety, as operationalized as obtaining a score of 25 or higher by parent report on the Screening for Childhood Anxiety and Related Emotional Disorders (5) currently residing more than a 45-min drive from a specialty medical center where intervention was available clinically, and also within state lines (due to licensing requirements) [Exclusion Criteria] (1) primary mental health diagnosis of a mood disorder, thought disorder, or other psychiatric condition that a study psychologist determined was a more critical target for intervention than anxiety symptoms (2) severity of mental health conditions that warranted more intensive or more individualized treatment than provided by the experimental intervention	[Eligibility Criteria] (1) parent or primary caregiver of a youth with ASD and anxiety (2) willingness to participate actively in a 10-week, 1-h per week, interactive, multifamily therapy group facilitated by a licensed clinical psychologist or postdoctoral fellow and delivered via videoconferencing (3) the access to a personal computer and internet services with consent to allow project to supplement hardware, memory, internet connection, and/or processing speed in order to support videoconferencing, or willingness to borrow a project computer equipped to support the project (4) willingness to refrain from simultaneously participating in psychological treatment specifically focused [Exclusion Criteria] (1) inability to speak and understand English fluently (2) parent did not reside with the youth with ASD at least 50% of the time (3) parent and youth did not reside in Colomdo	①experimental 17/1/5.9 ②control NA

2	Rebecca J.. et al... 2017	●Snowball sampring (general practitioners, mental health professionals, school guidance officers, teachers. parents and media publicity) ●self-referrals	randomly (computer program)/ Conducted/ Conducted	①experimental: 21 ②2control: 21	●Social Anxiety Disorder: 29 (60%) ●Generalised Anxiety Disorder 12 (28.6%) ●Specific Phobia: 1(24%)	[Eligibility Criteria] (1) to hold a diagnosis of Asperger's Syndrome (AS) made by a health professional (paediatrician, psychologist, psychiatrist) (2) to have a clinical diagnosis of either Separation Anxiety Disorder (SAD), SP, SAND or GAD with a clinical severity rating (CSR) of 4 or greater according to the Anxiety Disorders Interview Scale for Children (3) to be aged between 8 and 12 years, able to read and write English at a minimum age 8 years level, and have access to a computer equipped with internet access from home *comorbidity with other anxiety disorders and externalising disorders was permissible [Exclusion Criteria] (1) Children, who were identified as meeting clinical levels of depression, dysthymia an externalising disorder above a CSR of 5 as measured by the (2) receiving psychosocial treatment for anxiety elsewhere (3) had a diagnosed learning disorder (4) possessed significant intellectual or physical impairment	NA	①experimental child post 21/4/190 3-month 21/838.0 *completed all 10 sessions parent post 21/9/429 3-month 21/942.9 *completed all six sessions ②control NA

Table 2. *Cognitive Behavioral Therapy in anxiety in children with autism spectrum disorder*

No	Author, No Year of publication	Program	Therapist	Session Structure	Session Content	Role of Parents	Assessment Items Assessment Scale	Results
1	Susan LH.. et al... 2016	Facing Your Fears (Group Therapy for Managing Anxiety in Children with High-Functioning Autism	NA	Sessions ●number of intervention: 10 ●time of intervention: 60 one booster sessions after completion of the program	Visual schedule, Weekly "check-in", Mini lesson w/activity, Homework	Encouraged to serve as coaches for the youth as they practice managing and facing fears in "reallife" subsequently share their progress with the group	●Anxiety Screen for Anxiety and Related Emotional Disorders in Children ●Parent's perception of efficacy in the parenting role	●SCARED Experiment pre: 30.94+9.35, post: 26.76±8.50 Control pre 28.25±11.95, post: 32.13±12.99 ●PSOC Experiment pre: 70.44±10.45, post 66.44+10.44 Control pre: NA, post: NA
2	Rebecca J.. et al...2017	BRAVE-ONLINE program	Registered psychologists] *a minimum of eight hours training in the schedule and who were blind to treatment condition. All interviewers received ongoing supervision by a psychologist throughout the study	Sessions Child ●Number of intervention : 10 ●time of intervention: 60 Parent ●number of intervention :6 ●time of intervention: 60 two booster sessions undertaken one and three months after completion of the	NA one short phone call midway through the program to assist with exposure hierarchy construction	NA	●Severity rating Each diagnosis is given a clinician severity rating (CSR) ●Child's overall level of functioning Children's Global Assessment Scale (CGAS) ●Anxiety Spence Children's Anxiety Scale child and parent ●Internalising behaviours Child Behavior Checklist Revised (CBCL)	●CSR Experiment pre: 6.62.45, post: 4.11+.46, 3-month: 3.37+.48 Control pre: 6.76.31, post: 6.29+.33 ●CGAS Experiment pre 48.52±1.89, post: 62.10±1.92, 3-month: 67.12±2.78 Control pre: 6.76.31, post: 6.29+.33 S●CAS-C Experiment pre: 39.10±2.01, post: 23.40±2.94, 3-month: 22.10±3.01 Control pre: 38.48+2.98, post: 29.29+3.06 ●SCAS-P Experiment pre: 36.95±3.29, post: 23.89±3.39, 3-month: 21.07±3.49 Control pre 36.62+3.21, post: 30.55±3.32 ●CBCL-INT Experiment pre: 22.62+2.19, post: 12.91+2.27, 3-month: 11.86+2.20 Control pre: 25.91+2.19, post: 22.22+2.27

4.2.2 Usefulness of Remote Cognitive Behavior Therapy

Table 2 shows the effectiveness of remote cognitive-behavioral therapy for anxiety in children with autism spectrum disorder. The cognitive-behavioral therapy programs used were Facing Your Fears (No. 1). Moreover, the BRAVE-ONLINE program (No. 2). Existing cognitive-behavioral therapy programs are based on 16 sessions. Nonetheless, the number of sessions in the literature for this study was 10 for both programs, one with one booster session (No. 1) and one with two booster sessions (No. 2). One (No. 2) required parents to have six sessions as well. Each session was 60 min in both pieces of literature,

slightly longer than the existing cognitive-behavioral therapies. Only one (No. 1) described the details of the session. The structure of the cognitive-behavioral therapy differed between the included articles. However, in all articles, remote cognitive-behavioral therapy led to a reduction in anxiety in children with an autism spectrum disorder.

Table 3 shows the challenges and solutions for using the remote type. Only one case (No. 1) described challenges and coping. Although most of the challenges were correctable, there were some cases where the session was forced to be interrupted, suggesting the need to provide clear guidelines to families on what to do when the connection is lost.

Table 3. *Challenges in using remote types and how to deal with them*

No	Author, Year of publication	Issue	Coping Methods
1	Susan LH.. et al...2016	Of the 138 videoconferencing sessions conducted to consent 8 (5.8%) were significantly impacted by technical glitches. Fixable issues: limited bandwidth, poor sound quality, and audio feedback issues due to equipment settings across users, use of laptops with wireless connec- tions instead of hardwired connections, and background software (including virus protection programs) inhibiting use of the videoconferencing features Moderate technical glitches (defined as a brief disconnection with successful re-joining within a few minutes): an average occurrence rate of .87/ session. Of 17 families, 7 (41%) were disconnected at least one time during the 10-session intervention; 2 families experienced recurrent connection problems during the first five sessions.	Providing families with clear guidelines on how to handle lost connections
2	Rebecca J.. et al...2017	NA	NA

5. Discussions

5.1. Usefulness of Remote Cognitive-Behavioral Therapy for Anxiety in Children with Autism Spectrum Disorder

5.1.1 Dropout Rate of Participants

Two studies clearly stated the dropout rate: one (No. 1) had a low dropout rate, and the other (No. 2) had a high one. The one case with a low dropout rate (No. 1) set inclusion and exclusion criteria for parents participating in the program. Nevertheless, parents were encouraged to coach their children as they practiced managing and facing their fears in "real" situations and to share their progress with the group. The characteristics of autism spectrum disorder include repetition and fixation on certain things and behaviors. Further, sessions are essential for the child to show interest in the program with existing cognitive-behavioral therapy. However, how the child spends time outside of the sessions is also essential for the effectiveness of cognitive-behavioral therapy. The one case with a low dropout rate (No. 1) may have had a lower dropout rate than the one with a low dropout rate (No. 2) because the parental intervention kept the child interested in the sessions. However, since this point is related to the quality of the therapist conducting the session and the program content, it cannot be said that the degree of parental intervention alone affected the dropout rate, and more research is needed, considering the paucity of previous studies.

5.1.2 Effects and Challenges of Remote Cognitive Behavioral Therapy Programs

The results of the target literature indicate that, although there are differences in the intervention methods and contents of each session between the literature, intervention programs using remote cognitive behavioral therapy help reduce anxiety in children with an autism spectrum disorder.

The reasons why remote cognitive behavioral therapy helped reduce anxiety in children with autism spectrum disorder cannot be generalized. Nonetheless, two factors may have influenced the results: cognitive behavioral therapy helps reduce anxiety in children with autism spectrum disorder[6-8], and it has been pointed out that a characteristic of autism spectrum disorder is that children are interested in specific things. Among these, they show a high interest in technology[21,25]. Additionally, by providing remote support rather than face-to-face, it is possible to provide a program that can be flexibly implemented at home or within a schedule. This can eliminate the stress and difficulties associated with visiting a clinic[26], which is thought to be useful for young individuals who are averse to leaving their familiar environment[27]. Consequently, it is thought

that continued participation in the program led to a reduction in anxiety.

However, some participants were forced to discontinue treatment owing to communication problems, which do not occur in face-to-face treatment (No. 1). As described in the target literature as a countermeasure if there was a manual that described how to respond to communication problems, it would not develop into a significant confusion. Further, if there was support from parents, it may be possible to avoid increasing the anxiety of children with autism spectrum disorder when the treatment is interrupted. Both studies in this review showed a certain level of satisfaction with remote cognitive behavioral therapy. Nonetheless, in remote therapy, which is more likely to be discontinued than face-to-face therapy[26], a sudden communication problem may cause the child to lose interest. It is necessary to create a manual for remote treatment and to connect it to the construction of support that allows children with autism spectrum disorder to receive treatment with peace of mind. One study in this review (No. 1) was a simple before-and-after comparison. A control group is necessary to verify the effectiveness of the intervention. Moreover, further accumulation of research using randomized comparisons is necessary to develop a remote cognitive behavioral therapy program. In particular, those aimed at reducing anxiety in children with an autism spectrum disorder.

5. 2 Study Limitations and Future Prospects

This study only included intervention studies using remote cognitive behavioral therapy. However, considering the differences in eligibility and exclusion criteria for participant selection, intervention methods, and the limited number of studies, it is not clear whether the programs in these studies fully maximized their effectiveness. Additionally, variations in the interventionists' skill levels raise further uncertainty about the impact of reducing anxiety in children with autism spectrum disorder. It is necessary to accumulate randomized controlled trials to develop a remote methodology that leads to anxiety reduction in children with autism spectrum disorder. Ensuring the quality of the therapist's intervention skills is also essential. In the previous studies included in this study, the number of interventions and the duration of interventions were shorter than those of existing cognitive behavioral therapy. In the future, in order to reduce the anxiety of children with autism spectrum disorder, it is necessary to verify the usefulness of the remote type, but it is also necessary to construct support programs that are tailored to the target population, such as hybrid support programs that use both remote and face-to-face methods.

6. Conclusion

The effectiveness of remote cognitive behavioral therapy on anxiety in children with autism spectrum disorder was clarified from intervention studies using a systematic review method, and its usefulness was suggested. However, due to the lack of previous research, it cannot be said that this methodology has been established, and the accumulation of randomized controlled trials remains a challenge.

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