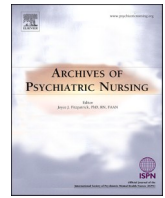


Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Archives of Psychiatric Nursing

journal homepage: www.elsevier.com/locate/apnu

The effect of Self-Regulation Based Cognitive Psychoeducation Program on emotion regulation and self-efficacy in children diagnosed with attention deficit hyperactivity disorder

Zeynep Sökmen^{*}, Semra Karaca

Marmara University, Institute of Health Science, Department of Psychiatric Nursing, Istanbul, Turkey

ARTICLE INFO

Keywords:

Self-Regulation Based Cognitive Psychoeducation Program
Emotion regulation
Self-efficacy

ABSTRACT

Aim: This study aimed to determine the effect of Self-Regulation Based Cognitive Psychoeducation Program on emotion regulation and self-efficacy in children diagnosed with attention deficit hyperactivity disorder (ADHD) and receiving medication.

Method: The sample of this study with control group and pre-test, post-test and follow-up randomized experimental design consisted of children followed in the child and adolescent mental health outpatient clinic of a state hospital. The data were evaluated by parametric and non-parametric analyses.

Results: A statistically significant increase was determined in the internal functional emotion regulation mean scores of children, who participated in the Self-Regulation Based Cognitive Psychoeducation Program, measured before, immediately after, and 6 months after the intervention ($p < 0.05$). A statistically significant increase was also found in their external functional emotion regulation mean scores measured before and 6 months after the intervention ($p < 0.05$). In addition, a statistically significant difference was found between their internal dysfunctional and external dysfunctional emotion regulation mean scores measured before and 6 months after the intervention; however the mean scores of those in the control group 6 months after the intervention were higher than those in the intervention group ($p < 0.05$). Furthermore, there was a statistically significant increase in their self-efficacy mean scores measured before and 6 months after the intervention ($p < 0.05$).

Conclusion: The Self-Regulation Based Cognitive Psychoeducation Program was found to be effective in increasing the levels of emotion regulation and self-efficacy in children with ADHD.

Introduction

Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder with early onset (Christiansen et al., 2019), which is characterized by several symptoms, including lack of attention, hyperactivity, and impulsivity that are incompatible with age and developmental level (Caye et al., 2020). It is commonly observed (Catalá-López et al., 2015) in at least two different social environments (Pffner et al., 2013) and its effects can be observed throughout life (Cassone, 2015; Pffner et al., 2013). Longitudinal studies have reported that the lifetime persistence of ADHD ranges between 20 and 80 % (Christiansen et al., 2019). The average prevalence of ADHD varies between 5 % and 7.2 % across the world (Polaczyk et al., 2014). These results suggest that ADHD is a common mental health issue in children (Storebø et al., 2019; Christiansen et al., 2019).

The majority of children with ADHD have executive dysfunctions (Cassone, 2015; Santonastaso et al., 2020), and executive functions include cognitive processes that contribute to self-regulation (Pandey et al., 2018; Silverstein et al., 2020). Therefore, children with ADHD have various disorders in their cognitive processes based on self-regulation (Reddy et al., 2018). Because of these various impairments in executive functions (impaired fronto-striatal and fronto-cerebellar circuits) (Sánchez et al., 2019) and functioning in neural networks associated with self-regulation, children with ADHD tend to have emotional regulation deficiencies. Children with emotion regulation dysfunction have difficulties in recognizing and understanding emotions, regulating emotional reactions, staying calm in difficult situations and having relationships with their peers (England-Mason, 2020). Although emotion regulation deficits are not explicitly considered in the DSM-5 or the ICD-10 (Christiansen et al., 2019), a meta-analysis found

^{*} Corresponding author.

E-mail address: zeynep.sokmen.baskent@hotmail.com (Z. Sökmen).

<https://doi.org/10.1016/j.apnu.2023.04.005>

Received 6 September 2022; Received in revised form 18 February 2023; Accepted 17 April 2023

Available online 20 April 2023

0883-9417/© 2023 Elsevier Inc. All rights reserved.

that emotion regulation deficits are one of the main signs of ADHD (Graziano & Garcia, 2016). Recent studies suggest lack of emotion regulation among children with ADHD (Monopoli et al., 2020; Bunford et al., 2020; Taskiran et al., 2018). A longitudinal study by Biederman et al. (2012) found that 57 % of young people with childhood emotion regulation deficits still had emotion regulation deficits four years later, which was positively associated with ADHD symptoms. Thompson defines emotional regulation as “the external and internal processes responsible for monitoring, evaluating and modifying our emotional reactions to meet our goals” (Thompson, 2019). By assessing whether emotion regulation in children is functionally effective in cognitive, emotional, and behavioral aspects through both internal and external factors, it is stated that those with positive evaluation regulate their emotions more effectively, while those with ineffective emotion regulation have high levels of avoidance behaviors and consider the situation as threatening. Emotion regulation can be examined with a four-dimensional structure, which can be addressed with internal or external, functional or dysfunctional ways of expressing emotions (Duy & Yildiz, 2014). Several problems in underlying executive functions (Santonastaso et al., 2020) and self-regulation-based cognitive issues in ADHD (Reddy et al., 2018) may also negatively affect children’s self-efficacy through impairments in functionality (Cattellino et al., 2021; Gambin & Świącicka, 2015). Studies of children with ADHD reported that they have lower self-efficacy beliefs compared to their peers (Heiman et al., 2015; Karadağ & Güzel, 2020). Costello and Stone (2012) define self-efficacy as the belief in one’s abilities. The first condition for applying adaptive coping strategies necessary for people’s life is their belief in coping with difficult situations (Midkiff et al., 2018). High self-efficacy belief is important for the healthy functionality of children (Karadağ & Güzel, 2020). Almasi (2016) found that social self-efficacy is low in children with ADHD compared to their peers (Almasi, 2016). Self-efficacy is the sum of one’s beliefs that define their perceptions of themselves as competent and secure (Telef & Karaca, 2012).

The National Institute for Health and Care Excellence (NICE) recommends that psychological interventions be part of the treatment plan for children with ADHD (Hannedottir et al., 2017). In children, brain regions associated with executive functions are dynamic and executive functions are sensitive to development through education (Kirk et al., 2017).

Studies have demonstrated the connection between executive dysfunction and the need for self-regulation training in ADHD and reported that self-regulation training is needed in children with ADHD (Martin, 2021). Children with ADHD have difficulty in creating self-rules for guiding their self-talk and behaviors during tasks (Rivera-Flores, 2015) are benefited from diverse approaches that develop performance control and reflection stage skills (Reddy et al., 2018). While providing the necessary psychosocial care, mental health nurses are recommended to bring evidence-based practices to the field with interventional studies and contribute to the creation of ADHD-specific care protocols or practice guides (Çam & Topcu, 2019). By Meichenbaum’s self-regulation assistive training, whose effectiveness has been proven by several studies (Campeño-Martínez et al., 2017; Rivera-Flores, 2015; Jonkman et al, 2016), children with ADHD learn how to ensure self-guidance, directing their performance and improving their cognitive processes (Resch et al., 2019). Self-regulation models offer promising approaches with drug intervention for children with ADHD (Reddy et al., 2018). Emotion regulation (England-Mason, 2020) and self-efficacy (Martin, 2012) are important indicators of mental health. Although there is a significant need for psychoeducational interventions, they are not yet widely applied for children with ADHD (Martin, 2012; England-Mason, 2020). In the literature, there are very few studies focused on Self-regulation Based Cognitive Psychoeducation accompanied by a health professional in the hospital environment. The implementation of Self-Regulation Based Cognitive Psychoeducation Program (SRBCPP) within the scope of counseling in hospital services has not been studied before in Turkey. Our study will fill an important

gap in the literature in terms of raising the awareness of the subject in the field of mental health services. This study aimed to determine the effect of SRBCPP on emotion regulation and self-efficacy in children with ADHD and taking medication.

Research hypotheses

Hypothesis 1. Children in the intervention group who received SRBCPP have higher internal and external functional emotion regulation levels immediately after and 6 months after the intervention than those in the control group.

Hypothesis 2. Children in the intervention group who received SRBCPP have lower internal and external dysfunctional emotion regulation levels immediately after and 6 months after the intervention than those in the control group.

Hypothesis 3. Children in the intervention group who received SRBCPP have higher self-efficacy levels immediately after and 6 months after the intervention than those in the control group.

Method

Design

This is a randomized experimental study with pretest-posttest control group and follow-up to determine the effect of SRBCPP on emotion regulation and self-efficacy in children with ADHD and taking medication.

Participants

The study was conducted between August 2020 and March 2022. The sample of the study consisted of children with ADHD who were followed up in the Child and Adolescent Mental Health and Diseases (CAMHD) Outpatient Clinic of a state hospital in Turkey. Study inclusion criteria are as follows: being diagnosed with ADHD according to DSM-V, having no psychiatric diagnosis or comorbidity in addition to ADHD, being between the ages of 10 and 14 years, being followed in the CAMHD outpatient clinic, agreeing to participate in the study, and getting consent from their parents, having regular medication for ADHD, being able to read and write Turkish, and having enough education and language skills to make psychiatric interviews. Study exclusion criteria are as follows: having mental retardation or learning disability detected by clinical interview, and having inability to attend more than one psychoeducation session. The number of children to be included in the sampling was determined by power analysis in the G*power 3.1.9.2 package program. In the literature, the minimum possible value for sample power is specified as 0.80 (Brydges, 2019). The sample size was determined by taking the data of the comparative study that evaluated the self-efficacy beliefs of adolescents with and without ADHD, parenting self-efficacy beliefs of their parents, and ADHD symptoms (Karadağ & Güzel, 2020). By the power analysis, the sample size was calculated as 20 for the intervention group and 20 for the control group (power: 80%). To reduce selection bias in the intervention and control groups, the groups were determined by using [randomize.net](https://www.randomize.net), a web-based randomization service. A total of 42 children were reached during the intervention process. Of them, 21 were assigned to the intervention group and 21 to the control group. The sampling process was terminated with a total of 21 children in the intervention group and 21 children in the control group (Fig. 1).

Data collection tools

The data were collected using a personal information form (PIF), the Adolescent Emotion Regulation Questionnaire (AERQ) and the Self-

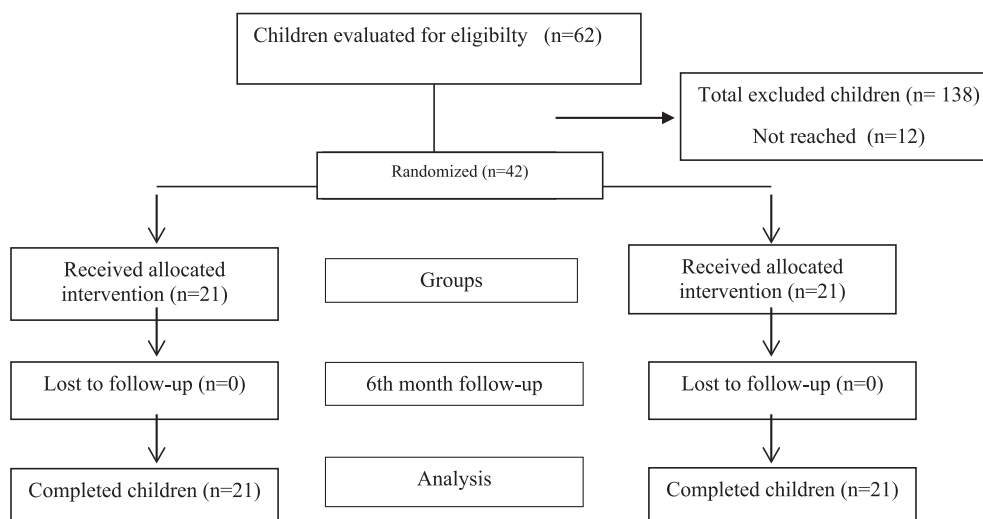


Fig. 1. Design of the research.

Efficacy Questionnaire for Children (SEQ-C). The PIF questions the socio-demographic characteristics of children with ADHD. The AERQ was developed by Philips and Power (2007) to measure emotion regulation in adolescents and adapted into Turkish by Duy and Yildiz (2014). This is a five-point Likert type scale, scoring as (1) never, (2) rarely, (3) sometimes, (4) often, and (5) always. There is no reverse scored item in the scale. The scale measures the emotion regulation methods of adolescents. In this context, it consists of 19 items and four subscales: “internal functional emotion regulation”, “external functional emotion regulation”, “internal dysfunctional emotion regulation” and “external dysfunctional emotion regulation”. According to the theoretical background of the scale, the subscale of internal functional emotion regulation includes positive emotion regulation methods such as positive reevaluation, changing goals, planning, putting in perspective, and paying attention, while the subscale of external functional emotion regulation includes positive emotion regulation methods such as expressing emotions, seeking advice, establishing physical relationships and exercising. In addition, the subscale of internal dysfunctional emotion regulation includes negative emotion regulation methods such as self-harm, rumination, suppression, negative social comparison, and derealization, while the subscale of external dysfunctional emotion regulation includes negative emotion regulation methods such as bullying, verbal aggression, physical attack, breaking things, making others feel bad, that is, the inability to control emotions adequately. As the scores obtained from the subscales increase, the frequency of the emotion regulation method in that subscale increases, and as the score decreases, the rate of using that method decreases. Four separate scores are obtained by summing the scores obtained from items in each subscale. Accordingly, the subscale with the highest score indicates the emotion regulation method most frequently used by the adolescent. The Cronbach’s alpha value, which shows the internal consistency of each subscale, was found to be 0.74 for the subscale of internal functional emotion regulation, 0.69 for the subscale of external functional emotion regulation, 0.68 for the subscale of internal dysfunctional emotion regulation, and 0.76 for the subscale of external dysfunctional emotion regulation (Duy & Yildiz, 2014). In this study, the Cronbach’s alpha value was determined as 0.72 for the subscale of internal functional emotion regulation, 0.70 for the subscale of external functional emotion regulation, 0.73 for the subscale of internal dysfunctional emotion regulation, and 0.82 for the subscale of external dysfunctional emotion regulation. The Self-Efficacy Questionnaire for Children (SEQ-C) was developed by Muris (2011) to measure the self-efficacy of adolescents aged between 12 and 19 years (Telef & Karaca, 2012). The SEQ-C is a five-point Likert-type scale, scoring from 1 = none to 5 = very good. Total self-efficacy scores are calculated by

summing the scale item scores. The highest and lowest scores on the scale are 105 and 21, respectively. A higher scale score indicates higher self-efficacy. The Turkish validity and reliability of the SEQ-C was performed by Telef and Karaca (2012). In their studies, the Cronbach’s alpha consistency coefficient of the total scale was found as 0.86 (Telef & Karaca, 2012). In this study, the Cronbach’s alpha value for the total scale was determined as 0.80.

Self-Regulation Based Cognitive Psychoeducation Program

As cited in Baloğlu, Vygotsky argues that the internalization of verbal instructions is a critical step in the development of children’s voluntary control of behavior (Ormrod, 2015). Meichenbaum suggests that it is necessary for the impulsive children to think for a few minutes just before solving a problem, replace their disorganized thoughts with useful thoughts, and voice these thoughts aloud to help them organize themselves by following some steps (Rivera-Flores, 2015). Meichenbaum’s procedures for individual management of self-regulation assistive training (Resch et al., 2019) are cognitive modeling, explicit external guidance, explicit self-guidance, and silent self-instruction. Through these verbal instructions, when children encounter something they want to learn or a problem that needs to be solved or a concept they want to grasp, they improve the cognitive process by using it to provide self-monitoring and control. By formulating rules to guide them spontaneously and guiding their performance with these formulas. This cognitive training consists of the stages of understanding, production and mediation and is applied to reduce impulsivity in children with ADHD (Rivera-Flores, 2015). The researchers developed a psychoeducation aimed at increasing emotion regulation and self-efficacy based on the self-regulation strategies developed by Meichenbaum to guide children’s behaviors (Table 1) and received expert opinions about it.

The pre-tests (PIF, AERQ and SEQ-C) were applied to children in the intervention and control groups before the psychoeducation application. The research was completed with a total of 42 children, including 21 in the intervention group and 21 in the control group. Before the intervention, children and their families were informed about the purpose of the study and their written consent was obtained. In addition to the drug used for the treatment of ADHD, the SRBCPP, consisting of eight sessions, was administered to those in the intervention group for eight weeks, one session per week and one session per day. Each psychoeducation session lasted around 45–60 min and conducted interactively using audio-visual materials (power point presentation, videos, music, and warm-up games) to attract children’s attention. Relevant

Table 1
SRBCPP content.

Session 1	• Conceptual structure of ADHD
Session 2	• Recognizing emotions
Session 3:	• Defining emotions and establishing a physiological relationship with behavior
Session 4	• Understanding the relationship between emotion and response – I (being a cognitive model) • Raising awareness about the relationship between emotion and behavior
Session 5	• Understanding the emotion and response relationship-II (open external guidance)
Session 6	• Observing and making sense of the feelings of others/empathy-I (open self-guidance)
Session 7	• Observing and making sense of the feelings of others/empathy-II (low open self-guidance)
Session 8	• Establishing an appropriate emotion-response relationship (implicit self-education) (Performing tasks while guiding own performance through the intrinsic)

Table 2
Distribution of children by group and gender.

	Intervention group n (%)	Control group n (%)	Test statistic	p value
Female	6 (28.6)	6 (28.6)	$\chi^2=0.000^a$	p=1.000
Male	15 (71.4)	15 (71.4)		

* p < 0.05.

^a Continuity correction chi-square test.

assignments were designed to reinforce the current learned strategy and facilitate learning the next strategy. At the beginning of each session, summary evaluations and explanations were provided about the previous session, and the homework assigned to children was discussed. After eight sessions, both AERQ and SEQ-C were re-administered to those in the intervention group. No intervention was applied to children in the control group. After the intervention group’s sessions were completed, AERQ and SEQ-C were applied to children in the control group again. In the sixth month after the intervention, AERQ and SEQ-C were applied to both groups and they were followed up.

Data analysis

A statistical analysis was performed using the SPSS 24 (IBM SPSS Statistics 24). Individual characteristics of children in the intervention and control groups and the conformity of their scale scores to normal

Table 2.1
Age distribution and descriptive statistics of children by groups.

	Intervention group		Control group		Test statistic	p value
	$\bar{X} + SS$	Min-max	$\bar{X} + SS$	Min-max		
Age (years)	11.67 ± 1.15	10.0–14.0	11.67 ± 1.15	10.0–14.0	Z=0.000 ^a	p=1.000

* p < 0.05.

^a Mann-Whitney U test.

Table 3
Comparison of internal functional AERQ scores of children in the intervention and control groups.

	Intervention group		Control group		Test statistic	p value
	$\bar{X} + SS$	Median	$\bar{X} + SS$	Median		
Pre-test	14.00 ± 2.64	14.0	14.62 ± 2.80	14.0	t=0.675 ^a	p=0.672
Post-test	14.07 ± 2.65	14.0	11.43 ± 2.48	11.0	t=3.303 ^a	p=0.002*
Follow-up	15.71 ± 2.59	16.0	12.00 ± 2.34	12.0	t=4.870 ^a	p=0.000*

^a Independent samples t-test.

* p < 0.05.

distribution were evaluated by Kolmogorov Smirnov and Shapiro Wilk test statistics. Accordingly, the variances in each group were found to be homogeneous and the data had normal distribution. Parametric methods were used for measurement values suitable for normal distribution. The Independent Samples t-test (t-test statistic) was used to compare the measurement values of two independent groups with normal distribution. The Mann-Whitney U test (z test statistic) was used to compare the measurement values of two independent groups without normal distribution. The Repeated-Measures test (F test statistic) was used to compare the measurement values of three or more dependent groups with normal distribution. The Friedman test (χ^2 test statistic) was used to compare the measurement values of three or more dependent groups with normal distribution. Bonferroni correction was applied for pairwise comparisons of variables with significant difference for three or more groups. The continuity correction chi-square test was used to examine the relations between two qualitative variables according to the expected values of the cross table.

Ethical considerations

For conducting this study, an approval was obtained from the ethics committee of Marmara University Faculty of Medicine (Approval Number: 09.2020.269) and an institutional permission from the institution where the study was conducted on June 01, 2020. Both written and verbal consents were obtained from all participants and their families after they were informed according to the Declaration of Helsinki. Before the scales were administered, the participants and their families were informed that all results would be used for research purposes only. They were also assured that their names would be kept confidential and that they could withdraw from the study at any time without disadvantage. A permission to use the Turkish version of the scales was obtained via e-mail from the relevant authors who conducted the validity and reliability study.

Results

In Table 2, the percentages (%) represent the gender distribution for children in the intervention and control groups. Accordingly, 28.6 % of children in the intervention group were female and 71.4 % were male, while 28.6 % of children in the control group were female and 71.4 % were male.

Table 2.1 shows the mean age of children in the intervention and control groups. The mean age of children in the intervention and control groups was 11.67 ± 1.15 years. There was no statistically significant

Table 3.1

Comparison of intra-group internal functional AERQ scores of children in the intervention and control groups at different time points.

	Test statistic	p value	The group causing the differences
Intervention group	$F=6.493^a$	$p=0.004^*$	[1, 2-3]
Control group	$F=1.049^a$	$p=0.360$	–

^a Repeated-measures test.

* $p < 0.05$.

difference between the groups in terms of gender and age ($p > 0.05$). The groups were independent and homogeneous in terms of the specified characteristics.

The children's emotion regulation outcomes

In Tables 3 and 3.1, there was no statistically significant difference in the pre-test internal functional emotion regulation mean scores of children in the intervention and control groups ($t = 0.675$; $p = 0.672$), but there was a statistically significant difference in their mean scores at post-test ($t = 3.303$; $p = 0.002$) and 6 months after the intervention ($t = 4.870$; $p = 0.000$), where those in the intervention group had significantly higher mean scores than those in the control group ($p < 0.05$).

In Tables 3.2 and 3.3, there was no statistically significant difference in the pre-test and post-test external functional emotion regulation mean scores of children in the intervention and control groups ($p > 0.05$). A statistically significant difference was found in their external functional emotion regulation mean scores measured 6 months after the intervention ($t = 4.110$; $p = 0.000$), where those in the experimental group had significantly higher mean scores than those in the control group ($p < 0.05$).

In Tables 3.4 and 3.5, there was no statistically significant difference in the pre-test and post-test internal dysfunctional emotion regulation mean scores of children in the intervention and control groups ($p > 0.05$). A statistically significant difference was found in their internal dysfunctional emotion regulation mean scores measured 6 months after the intervention ($t = -4.155$; $p = 0.000$), where those in the control group had significantly higher mean scores than those in the

Table 3.2

Comparison of external functional AERQ scores of children in the intervention and control groups.

	Intervention group		Control group		Test statistic	p value
	$\bar{X} + SS$	Median	$\bar{X} + SS$	Median		
Pre-test	12.33 ± 3.41	13.0	11.48 ± 3.71	11.0	$t=0.779^a$	$p=0.440$
Post-test	12.00 ± 3.08	12.0	11.86 ± 3.65	12.0	$t=0.137^a$	$p=0.892$
Follow-up	13.90 ± 1.99	14.0	10.76 ± 2.88	10.0	$t=4.110^a$	$p=0.000^*$

^a Independent samples *t*-test.

* $p < 0.05$.

Table 3.3

Comparison of intra-group external functional AERQ scores of children in the intervention and control groups at different time points.

	Test statistic	p value	The group causing the difference
Intervention group	$F=3.574^a$	$p=0.037^*$	[2–3]
Control group	$F=5.227^a$	$p=0.010^*$	[2–3]

^a Repeated-measures test.

* $p < 0.05$.

intervention group ($p < 0.05$).

In Tables 3.6 and 3.7, there was no statistically significant difference in pre-test and post-test external dysfunctional emotion regulation mean scores of children in the intervention and control groups ($p > 0.05$). A statistically significant difference was found in their external dysfunctional emotion regulation mean scores measured 6 months after the intervention ($t = 4.870$; $p = 0.000$), where those in the control group had significantly higher mean scores than those in the intervention group ($p < 0.05$).

The children's self-efficacy outcomes

In Tables 4 and 4.1, there was no statistically significant difference in the pre-test and post-test SEQ-C total mean scores of children in the intervention and control groups ($p > 0.05$). A statistically significant

Table 3.4

Comparison of internal dysfunctional AERQ scores of children in the intervention and control groups.

	Intervention group		Control group		Test statistic	p value
	$\bar{X} + SS$	Median	$\bar{X} + SS$	Median		
Pre-test	12.38 ± 4.77	13.0	13.33 ± 4.18	13.0	$t = -0.689^a$	$p=0.495$
Post-test	11.29 ± 4.26	11.0	13.09 ± 4.11	13.0	$t = 1.402^a$	$p=0.169$
Follow-up	8.67 ± 2.58	9.0	12.38 ± 3.19	13.0	$t = 4.155^a$	$p=0.000^*$

^a Independent samples *t*-test.

* $p < 0.05$.

Table 3.5

Comparison of intra-group internal dysfunctional AERQ scores of children in the intervention and control groups at different time points.

	Test statistic	p value	The group causing the difference
Intervention group	$F=13.518^a$	$p=0.000^*$	[1–3]
Control group	$F=4.098^a$	$p=0.056$	–

^a Repeated-measures test.

* $p < 0.05$.

Table 3.6

Comparison of external dysfunctional AERQ scores of children in the intervention and control groups.

	Intervention group		Control group		Test statistic	p value
	$\bar{X} + SS$	Median	$\bar{X} + SS$	Median		
Pre-test	9.71 ± 5.25	9.0	10.67 ± 5.38	10.0	$Z = 0.658^a$	$p=0.510$
Post-test	8.81 ± 4.03	8.0	10.23 ± 5.07	9.0	$Z = 0.051^a$	$p=0.960$
Follow-up	7.09 ± 2.11	7.0	8.98 ± 3.60	8.0	$Z = 3.322^a$	$p=0.001^*$

^a Mann-Whitney *U* test.

* $p < 0.05$.

Table 3.7

Comparison of intra-group external dysfunctional AERQ scores of children in the intervention and control groups at different time points.

	Test statistic	p value	The group causing the difference
Intervention group	$\chi^2 = 8.523^a$	$p=0.014^*$	[1–3]
Control group	$\chi^2 = 18.000^a$	$p=0.000^*$	[1–3]

^a Friedman test.

* $p < 0.05$.

Table 4
Comparison of SEQ-C scores of children in the intervention and control groups.

	Intervention group		Control group		Test statistic	p value
	$\bar{X} + SS$	Median	$\bar{X} + SS$	Median		
Pre-test	67.76 ± 12.48	67.0	61.95 ± 12.10	57.0	t=1.532 ^a	p=0.133
Post-test	69.81 ± 14.74	69.0	61.86 ± 12.02	59.0	t=1.917 ^a	p=0.062
Follow-up	77.14 ± 11.16	76.0	64.47 ± 8.72	63.0	t=4.096 ^a	p=0.000*

^a Independent samples t-test.

* p < 0.05.

Table 4.1
Comparison of SEQ-C scores of children in the intervention and control groups at different time points.

	Test statistic	p value	The group causing the difference
Intervention group	F=12.205 ^a	p=0.000*	[1, 2–3]
Control group	F=2.725 ^a	p=0.114	–

^a Repeated-measures test.

* p < 0.05.

difference was found in their SEQ-C total mean scores measured 6 months after the intervention (t = 4096; p = 0.000), where those in the intervention group had significantly higher total mean scores than those in the control group (p < 0.05).

Discussion

This study examined the effect of SRBCPP on emotion regulation and self-efficacy in children with ADHD and taking medication, using pre-test, posttest, follow-up, and control group. The results suggest that SRBCPP is effective for children with ADHD. Considering the gender distribution of children with ADHD, the majority of them were males, which is consistent with recent research. Studies have reported that the diagnosis of ADHD is 2–4 times more common in males than in females (Davies, 2014).

Emotion regulation outcomes

Educational interventions have an important role in ADHD (Chauhan et al., 2022). A systematic review and meta-analysis found that randomized clinical trials on self-regulation interventions were effective in children with ADHD (Pandey et al., 2018). Based on the self-regulation strategy, our study contributes to the functional emotion regulation skills in children with ADHD by improving their cognitive process, allowing them to guide, monitor and supervise themselves. Our results are also consistent with those in the study about the emotional regulation deficits of children aged 5–13 with ADHD, emphasizing the importance of adding an emotion regulation skills training component to their therapies (Morris et al., 2020). In our study the internal functional emotion regulation, including positive emotion regulation such as positive reappraisal, changing goals, planning, putting one's perspective, and paying attention increased among children in the intervention group. Their external functional emotion regulation, including expressing emotions, seeking advice, establishing physical relationships, and exercising also increased. These results are consistent with those in a study suggesting that children with ADHD developed better social skills, were able to regulate their emotions, and had less attention problems after randomized controlled trials in which they used cognitive-behavioral methods and working memory training together (Hannesdottir et al., 2017). Thus, the first hypothesis of the study suggesting that

positive emotion regulation would increase in the intervention group with SRBCPP was confirmed.

In our study, the internal dysfunctional emotion regulation, including negative emotion regulation such as self-harm, rumination, suppression, negative social comparison, and derealization was reduced among children in the intervention group. Their external dysfunctional emotion regulation, including negative emotion regulation such as bullying, verbal aggression, physical attack, breaking things, making others feel bad was also reduced. The SRBCPP reduces dysfunctional emotion regulation in children with ADHD. These results are consistent with those in a randomized controlled study suggesting that cognitive interventions alleviate aggressive behaviors and emotion regulation problem in children aged 7–13 years with ADHD (Vacher et al., 2022). Thus the second hypothesis of the study suggesting that negative emotion regulation would decrease in the intervention group with SRBCPP. The effects of this program may have increased because children in the intervention group received drug treatment when they participated in the program.

Self-efficacy outcomes

Children with ADHD need psychoeducational interventions for self-efficacy, which is one of the psychoeducational factors (Martin, 2012). In our study, the SRBCPP increased self-efficacy among children in the intervention group. Our result is consistent with those in a randomized controlled study conducted to determine the effect of solution-focused approach on self-efficacy and self-esteem levels in adolescents with ADHD (Karakaya & Özgür, 2019). Thus, the third hypothesis of our study suggesting that self-efficacy would increase in the intervention group with SRBCPP was confirmed. Studies mostly tend to evaluate self-efficacy in the short term (3 months after the intervention) (Hannesdottir et al., 2017). Unlike those in the literature, our study also included a 6-month follow-up. In our study, over 90 % of children attended SRBCPP sessions, their dropout rate was low. Presumably, the use of psychoeducational materials in a way that would attract children's attention, the design of strategies to facilitate teaching, and the warm-up games played before the session ensured the children's continuity in the sessions. Studies on emotion regulation and self-efficacy in children with ADHD are insufficient (Martin, 2012; Pur, 2014). Therefore, our study contributes to the literature. The SRBCPP increases functional emotion regulation and self-efficacy in children with ADHD. As an important factor in this increase, our study was post-test evidence-based study, was conducted in a hospital setting and was based on diagnostic criteria, and included care strategies specific to children with ADHD. In addition, as the psychoeducational groups were small in size, we had the opportunity to deal with each child individually during the intervention.

Conclusion

Children with ADHD need special therapeutic interventions as they are at risk for adverse health outcomes due to functional impairment (Vacher et al., 2022). Our results suggest that the SRBCPP is effective in increasing emotion regulation and self-efficacy in children with ADHD. During the research process, both children and their families were willing to participate in the training sessions and reported to want to participate in similar trainings in the future. Mental health nurses should undertake an active role in psychosocial care, pharmacological, non-pharmacological treatment, therapy and supportive programs by creating ADHD-specific care protocols (Çam & Topcu, 2019). Our study will be an application guide for nurses when working with children diagnosed with ADHD and their families. This study has several limitations. First, it is important to replicate it in a larger sample of children, as the sample is small. Second, using parent reports to evaluate program benefits and teacher reports on the children's emotional regulation and self-efficacy at school may be useful for examining the effects of the treatment in children with ADHD.

References

- Almasi, N. G. (2016). The comparison of self-efficacy dimensions in ADHD and normal students. *Open Journal of Medical Psychology*, 5(4), 88–91. <https://doi.org/10.4236/ojmp.2016.54010>
- Biederman, J., et al. (2012). Longitudinal course of deficient emotional self-regulation CBCL profile in youth with ADHD: Prospective controlled study. *Neuropsychiatric Disease and Treatment*, 8, 267. <https://doi.org/10.2147/NDT.S29670>
- Bunford, N., Dawson, A. E., Evans, S. W., Ray, A. R., Langberg, J. M., Owens, J. S., ... Allan, D. M. (2020). The Difficulties in Emotion Regulation Scale–Parent Report: A psychometric investigation examining adolescents with and without ADHD. *Assessment*, 27(5), 921–940.
- Brydges, C. R. (2019). Effect size guidelines, sample size calculations, and statistical power in gerontology. *Innovation in Aging*, 3(4), igz036. <https://doi.org/10.1093/geroni/igz036>
- Cassone, A. R. (2015). Mindfulness training as an adjunct to evidence-based treatment for ADHD within families. *Journal of Attention Disorders*, 19(2), 147–157. <https://doi.org/10.1177/1087054713488438>
- Caye, A., et al. (2020). Relative age and attention-deficit/hyperactivity disorder: Data from three epidemiological cohorts and a meta-analysis. *Journal of the American Academy of Child & Adolescent Psychiatry*, 59(8), 990–997. <https://doi.org/10.1016/j.jaac.2019.07.939>
- Campeño-Martínez, Y., et al. (2017). Efficacy of an intervention program for attention and reflexivity in children with attention deficit hyperactivity disorder. *Mind, Brain, and Education*, 11(2), 64–74. <https://doi.org/10.1111/mbe.12136>
- Catalá-López, F., et al. (2015). The pharmacological and non-pharmacological treatment of attention deficit hyperactivity disorder in children and adolescents: Protocol for a systematic review and network meta-analysis of randomized controlled trials. *Systematic Reviews*, 4(19), 1–10. <https://doi.org/10.1186/s13643-015-0005-7>
- Cattellino, E., et al. (2021). Self-efficacy, subjective well-being and positive coping in adolescents with regard to COVID-19 lockdown. *Current Psychology*, 1–12. <https://doi.org/10.1007/s12144-021-01965-4>
- Chauhan, A., et al. (2022). Burden of attention deficit hyperactivity disorder (ADHD) in Indian children: A systematic review and meta-analysis. *Indian Journal of Pediatrics*, 1–9. <https://doi.org/10.1007/s12098-021-03999-9>
- Christiansen, H., et al. (2019). Attention-deficit/hyperactivity disorder (ADHD) and emotion regulation over the life span. *Current Psychiatry Reports*, 21(3), 1–11. <https://doi.org/10.1007/s11920-019-1003-6>
- Costello, C. A., & Stone, S. L. M. (2012). Positive psychology and self-efficacy: Potential benefits for college students with attention deficit hyperactivity disorder and learning disabilities. *Journal of Postsecondary Education and Disability*, 25(2), 119–129.
- Çam, M. O., & Topcu, E. M. (2019). Childhood attention deficit hyperactivity disorder and mental health and diseases nursing. *Ege University Journal of Nursing Faculty*, 35.3, 147–154.
- Davies, W. (2014). Sex differences in attention deficit hyperactivity disorder: Candidate genetic and endocrine mechanisms. *Frontiers in Neuroendocrinology*, 35(3), 331–346. <https://doi.org/10.1016/j.yfrne.2014.03.003>
- Duy, B., & Yildiz, M. A. (2014). Adaptation of the regulation of emotions questionnaire (REQ) for adolescents. *Turkish Psychological Counseling and Guidance Journal*, 5(41), 23–35.
- England-Mason, G. (2020). Emotion regulation as a transdiagnostic feature in children with neurodevelopmental disorders. *Current Developmental Disorders Reports*, 7, 130–138. <https://doi.org/10.1007/s40474-020-00200-2>
- Gambin, M., & Świącicka, M. (2015). Relationships of self-efficacy beliefs to executive functions, hyperactivity-impulsivity and inattention in school-aged children. *Polish Journal of Applied Psychology*, 13(1), 33–42. <https://doi.org/10.1515/pjap-2015-0024>
- Graziano, P. A., & Garcia, A. (2016). Attention-deficit hyperactivity disorder and children's emotion dysregulation: A meta-analysis. *Clinical Psychology Review*, 46, 106–123. <https://doi.org/10.1016/j.cpr.2016.04.011>
- Hannedottir, D. K., Ingvarsdottir, E., & Björnsson, A. (2017). The OutSMARTers program for children with ADHD: A pilot study on the effects of social skills, self-regulation, and executive function training. *Journal of Attention Disorders*, 21(4), 353–364. <https://doi.org/10.1177/1087054713520617>
- Heiman, T., Olenik-Shemesh, D., & Eden, S. (2015). Cyberbullying involvement among students with ADHD: Relation to loneliness, self-efficacy and social support. *European Journal of Special Needs Education*, 30(1), 15–29. <https://doi.org/10.1080/08856257.2014.943562>
- Jonkman, L. M., Hurks, P. P., & Schleepen, T. M. J. (2016). Effects of memory strategy training on performance and event-related brain potentials of children with ADHD in an episodic memory task. *Neuropsychological Rehabilitation*, 26(5-6), 910–941. <https://doi.org/10.1080/09602011.2015.1070735>
- Karadağ, Y., & Güzel, H.Ş. (2020). The comparison of self-efficacy beliefs of adolescents with and without Attention-Deficit Hyperactivity Disorder (ADHD), parents' parental self-efficacy beliefs, and ADHD symptoms. *Yeni Symposium*, 58(3).
- Karakaya, D.d., & Özgür, G. (2019). Effect of a solution-focused approach on self-efficacy and self-esteem in Turkish adolescents with attention-deficit/hyperactivity disorder. *Journal of Psychosocial Nursing and Mental Health Services*, 57(11), 45–55. <https://doi.org/10.3928/02793695-20190708-01>
- Kirk, H., et al. (2017). Impact of attention training on academic achievement, executive functioning, and behavior: A randomized controlled trial. *American Journal on Intellectual and Developmental Disabilities*, 122(2), 97–117. <https://doi.org/10.1352/1944-7558.122.2.97>
- Martin, A. J. (2012). Attention-Deficit/Hyperactivity Disorder (ADHD), perceived competence, and self-worth: Evidence and implications for students and practitioners. In *Handbook of children with special health care needs* (pp. 47–72).
- Martin, G. (2021). Self-regulation interventions for Attention Deficit Hyperactivity Disorder in the Classroom. In *Proceedings of the 22nd International RAIS Conference on Social Sciences and Humanities*. Scientia Moralitas Research Institute.
- Midkiff, M. F., Lindsey, C. R., & Meadows, E. A. (2018). The role of coping self-efficacy in emotion regulation and frequency of NSSI in young adult college students. *Cogent Psychology*, 5(1), 1520437. <https://doi.org/10.1080/23311908.2018.1520437>
- Monopoli, W. J., et al. (2020). Assessment of a conceptually informed measure of emotion dysregulation: Evidence of construct validity via a vis impulsivity and internalizing symptoms in adolescents with ADHD. *International Journal of Methods in Psychiatric Research*, 29(4), 1–14. <https://doi.org/10.1002/mpr.1826>
- Morris, S. S. J., et al. (2020). Emotion regulation via the autonomic nervous system in children with attention-deficit/hyperactivity disorder (ADHD): Replication and extension. *Journal of Abnormal Child Psychology*, 48(3), 361–373. <https://doi.org/10.1007/s10802-019-00593-8>
- Ormrod, J. E. (2015). In M. Baloglu (Ed.), *Psychology of learning*. Ankara: Pearson, Nobel.
- Pandey, A., et al. (2018). Effectiveness of universal self-regulation–based interventions in children and adolescents: A systematic review and meta-analysis. *JAMA Pediatrics*, 172(6), 566–575. <https://doi.org/10.1001/jamapediatrics.2018.0232>
- Pfiffner, L. J., et al. (2013). Educational outcomes of a collaborative school-home behavioral intervention for ADHD. *School Psychology Quarterly*, 28(1), 25. <https://doi.org/10.1037/spq0000016>
- Polanczyk, G. V., et al. (2014). ADHD prevalence estimates across three decades: An updated systematic review and meta-regression analysis. *International Journal of Epidemiology*, 43(2), 434–442.
- Pur, I. G. (2014). Emotion regulation intervention for complex developmental trauma: Working with street children. *Procedia-Social and Behavioral Sciences*, 159, 697–701. <https://doi.org/10.1016/j.sbspro.2014.12.471>
- Reddy, L. A., et al. (2018). A critical review of self-regulated learning interventions for children with attention-deficit hyperactivity disorder. *Psychology in the Schools*, 55(6), 609–628. <https://doi.org/10.1002/pits.22142>
- Resch, C., et al. (2019). *Classroom interventions targeting sensory processing and executive functions of school-aged children: a systematic review comparing and contrasting different intervention approaches*. Maastricht: Maastricht University. Available online at: <https://www.nro.nl/sites/nro/files/migrate/nro eindrapportage-405-18-637.pdf> (accessed April 19, 2021).
- Rivera-Flores, G. W. (2015). Self-instructional cognitive training to reduce impulsive cognitive style in children with Attention Deficit with Hyperactivity Disorder. *Electronic Journal of Research in Educational Psychology*, 13(1), 27–46.
- Sánchez, M., et al. (2019). Emotion regulation in participants diagnosed with attention deficit hyperactivity disorder, before and after an emotion regulation intervention. *Frontiers in Psychology*, 10, 1092. <https://doi.org/10.3389/fpsyg.2019.01092>
- Santonastaso, O., et al. (2020). Clinical application of mindfulness-oriented meditation: A preliminary study in children with ADHD. *International Journal of Environmental Research and Public Health*, 17(18), 6916. <https://doi.org/10.3390/ijerph17186916>
- Silverstein, M. J., et al. (2020). The relationship between executive function deficits and DSM-5 defined ADHD symptoms. *Journal of Attention Disorders*, 24(1), 41–51. <https://doi.org/10.1177/1087054718804347>
- Storebø, O. J., Andersen, M. E., Skoog, M., Hansen, S. J., Simonsen, E., Pedersen, N., ... Gluud, C. (2019). Social skills training for attention deficit hyperactivity disorder (ADHD) in children aged 5 to 18 years. *Cochrane Database of Systematic Reviews*, (6).
- Taskiran, C., et al. (2018). Clinical features and subjective/physiological responses to emotional stimuli in the presence of emotion dysregulation in attention-deficit hyperactivity disorder. *Journal of Clinical and Experimental Neuropsychology*, 40(4), 389–404. <https://doi.org/10.1080/13803395.2017.1353952>
- Telef, B. B., & Karaca, R. (2012). The self-efficacy scale for children: a validity and reliability study. *Journal of Buca Faculty of Education*, 32(2), 169–187.
- Thompson, R. A. (2019). Emotion dysregulation: A theme in search of definition. *Development and Psychopathology*, 31(3), 805–815. <https://doi.org/10.1017/S0954579419000282>
- Vacher, C., et al. (2022). Efficacy of cognitive behavioral therapy on aggressive behavior in children with attention deficit hyperactivity disorder and emotion dysregulation: Study protocol of a randomized controlled trial. *Trials*, 23(1), 124. <https://doi.org/10.1186/s13063-022-05996-5>