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Development and Validation of a Self-Regulation Training Package for Children with Attention Deficit/Hyperactivity Disorder

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ABSTRACT

Objective: The purpose of the present study was to develop and validate a self-regulation training package for children with attention deficit/hyperactivity disorder.

Methods: The research method was a mixed-method, which was exploratory with the content analysis method. The research community included books, articles, and theses, both domestic and foreign (from 2011 to 2024) in the field of hyperactivity/attention deficit, including interventions developed to treat and modify the behavior of hyperactive children and exploratory studies of the characteristics of hyperactive children. Also, experts in the field of educational psychology examined and confirmed the validity of the developed training package. The sample size included 15 specialists in the treatment of hyperactive children who were selected through purposive sampling to comment on the content validity of the self-regulation training package for children with attention deficit/hyperactivity disorder. In the section of the studied documents, the purposive sampling method was also used to select relevant articles, books, and theses.

Results: Based on the content analysis, 26 organizing themes were obtained. In order to examine the validity of the themes and developed package, a questionnaire was prepared and given to therapists of ADHD children with attention deficit/hyperactivity disorder. The content validity coefficient (CVR = 0.866) and (CVI = 0.933) were obtained, which can be said that the developed educational package had a desirable internal validity.

Conclusions: In general, the findings obtained can be used by elementary school teachers and therapists of ADHD children in improving memory, attention, and emotion regulation skills in these children.

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Introduction

Attention occupies a pivotal position in the domains of cognitive, social, and communicative processes (Janzen & Thaut, 2018). Attention, recognized as one of the most significant challenges faced by children diagnosed with attention deficit hyperactivity disorder (ADHD), encompasses selective attention, sustained attention, attention shifting, and divided attention. The inability to concentrate on a specific task represents one of the principal manifestations of individuals afflicted with this disorder (Darvishi et al., 2021). Children diagnosed with attention deficit hyperactivity disorder frequently encounter challenges in directing and sustaining attention towards incoming stimuli and distractions (Dobrean et al., 2021). The three predominant classifications of this disorder are the inattentive type, the hyperactive/impulsive type, and the combined type. In the context of attention deficit disorder, attentional difficulties are prevalent, such that the affected child often exhibits a lack of meticulousness in attending to details or demonstrates carelessness in executing school assignments, occupational tasks, or other activities necessitating attention; additionally, they frequently struggle to maintain focus during homework or recreational activities, appear to be inattentive when conversed with, and misplace personal belongings, all of which signify a failure to adequately allocate attention (Epstein & Loren, 2013).

Working memory has also been posited as a significant cognitive construct and an etiological factor contributing to learning disabilities. Working memory transcends the notion of a mere short-term storage facility (Khorasani Zadeh et al., 2018; Rafat et al., 2022). Working memory serves as a theoretical construct within cognitive psychology, referring to the system and mechanisms that facilitate the retention of task-relevant information during cognitive operations. It may also represent the most consequential advancement in the evolution of the human cognitive apparatus, serving as a central construct within cognitive psychology and, more recently, cognitive neuroscience (Constantinidis & Klingberg, 2016). Although the capacity of working memory is generally regarded as fixed, the association between working memory deficits and hyperactivity has been corroborated in the theoretical frameworks proposed by Barkley and Rapport; furthermore, attention and working memory are identified as critical cognitive deficits prevalent among hyperactive individuals (Kofler et al., 2008). Numerous studies substantiate this correlation, indicating that working memory can be enhanced through deliberate practice ((Khorasani Zadeh et al., 2018). In an investigation examining the interplay between impulsive

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behaviors—another deficit observed in individuals with attention deficit/hyperactivity disorder—and working memory, Kofler et al. (2020) demonstrated an inverse relationship between these two cognitive dimensions in individuals diagnosed with ADHD. Anderson and Bolden (2018) established through their research that children with attention deficit/hyperactivity disorder exhibit pronounced deficits in behavioral inhibition, working memory, motivational and emotional self-regulation, and inner speech when contrasted with typically developing children; these deficits manifest behaviorally as impulsivity, hyperactivity, and compromised academic performance. Additionally, existing research indicates that a majority of children exhibiting hyperactivity encounter challenges relating to emotional regulation, including stress, anxiety, depression, impulsivity, and motivational factors, as well as deficiencies in problem-solving abilities and executive function, which may adversely influence their overall health, interpersonal relationships, and academic achievement.

Emotion management encompasses a series of internal and external mechanisms tasked with the regulation, assessment, and modification of an individual's emotional responses, thereby facilitating the attainment of their objectives. Deficiencies or challenges in emotional regulation may render an individual susceptible to psychological disorders, including anxiety and depression (Kahle et al., 2016). Indeed, emotional regulation functions analogously to a regulator of balance, enabling the adjustment of emotions and maintaining them within a manageable spectrum, so that individuals are equipped to cope with them effectively (Mohamadi Bolbanabad et al., 2024). Numerous scholars have posited that inadequacies in cognitive emotion regulation can significantly contribute to the intensification of symptoms associated with attention deficit/hyperactivity disorder (Mohamadi Bolbanabad et al., 2024). In a similar context, Ghasempour et al. (2014) demonstrated in their research that adolescents diagnosed with attention deficit/hyperactivity disorder exhibited a statistically significant disparity in maladaptive cognitive emotion regulation strategies when compared to their neurotypical counterparts, whereas no notable difference was observed between the two groups concerning adaptive cognitive emotion regulation strategies. Conversely, it is pertinent to recognize that cognitive emotion regulation strategies, which serve as coping mechanisms aimed at alleviating the repercussions of traumatic and stressful experiences and the associated emotional responses, may effectively mitigate the impacts of adverse conditions within the familial environment (Gardner et al., 2017).

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Children experiencing these challenges also encounter a multitude of difficulties, including aggression, diminished self-esteem, lack of motivation, subpar academic performance, and various comorbid disorders. Consequently, the therapeutic intervention for these children presents intricate challenges (Pelham Jr & Fabiano, 2008). A relatively limited proportion of individuals diagnosed with ADHD receive adequate treatment for their condition, which often encounters obstacles such as the ephemeral nature of treatment effects, insufficient familial support, and the lack of consistent practice and reinforcement (Nagae et al., 2015). While pharmacological treatments utilizing stimulant medications like Ritalin have demonstrably alleviated the severity of this disorder's symptoms to a considerable degree, they have not substantially impacted symptoms related to hyperactivity/inattention deficit, memory, response inhibition, or executive functioning (Coghill et al., 2014). Thus, to enhance therapeutic efficacy, it is imperative that psychological methodologies and interventions, such as the Dawson and Guare (2018) approach, be employed in conjunction with pharmacological treatment. The Dawson and Guare method fundamentally prioritizes educational components, imparting skills in task initiation, memory enhancement, attention modulation, planning, behavioral regulation, emotional control, time management, and problem-solving capabilities. This educational framework embodies both preventive and interventional characteristics (Sivoshifar et al., 2020).

This educational program enhances inhibitory control by instructing on daily objectives and mitigating daily distractions that may lead to procrastination, while underscoring the importance of fully accomplishing set goals. It fosters attention transfer through a commitment to daily schedules and the completion of assigned tasks, enhances emotional regulation by instructing individuals to maintain composure in the face of various barriers encountered in the pursuit of their objectives, and promotes initiative by stressing the importance of defining specific start times for homework and adhering to these timelines. Furthermore, it improves working memory through the application of daily planning techniques, incorporating various tools and cues that serve as reminders. It also advances planning and organizational skills through the establishment of objectives and systematic daily homework organization (Ghasemi, 2019).

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Numerous investigations, including the research conducted by Madani et al. (2017), have demonstrated that a training program focusing on response inhibition and sustained attention significantly alleviates the symptoms associated with attention deficit/hyperactivity disorder in pediatric populations. Nonetheless, the investigator's inquiry revealed that the educational interventions implemented in this domain have predominantly concentrated on facets of attention and working memory, while insufficient emphasis has been placed on the emotional regulation of children diagnosed with attention deficit/hyperactivity disorder. Moreover, no studies were identified that aimed to create a self-regulation educational program. Conversely, the administration of pharmacological treatments is frequently linked with adverse effects; thus, researchers have persistently sought methodologies to attain maximal therapeutic benefits with minimal side effects and detrimental repercussions in the management of hyperactive children, including the modalities of storytelling and play therapy (Brandeis, 2011). Play therapy is recognized as an appropriate intervention for children, as these individuals often encounter challenges in articulating their emotions verbally, thereby allowing the child to manifest their distressing feelings and internal conflicts (Drewes, 2009). Storytelling also serves as a versatile technique that offers an effective outlet for emotional expression, enhances comprehension, and bolsters the imaginative capacities of children, representing a crucial resource for addressing their challenges (Shaw et al., 2013). Consequently, given the extensive array of methodologies, indigenous games, and storytelling practices, alongside the intricate indigenous factors that influence and perpetuate attention, working memory, and emotional regulation in these children, it is imperative to conduct research aimed at developing a self-regulation educational package tailored for children with attention deficit/hyperactivity disorder.

It is also pertinent to acknowledge that attention deficit/hyperactivity disorder frequently engenders significant obstacles in the academic advancement of affected children; the degree of resemblance between these children and their neurotypical peers is considerably greater than the extent of their differences. Therefore, in the assessment of the characteristics of these children, it is essential to delineate certain distinctive traits. Additionally, it is noteworthy that these children typically encounter difficulties in domains where such challenges manifest in educational contexts. Specifically, mathematics, reading, and written expression are recognized as areas where learning disabilities commonly emerge. It is postulated that these children experience enduring impairments

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in one or more fundamental cognitive processes, which manifest as inattention, diminished comprehension, compromised auditory perception, impaired cognitive functioning, articulation, literacy, orthography, numeracy, and other related skills, attributable to a dysfunction within the central nervous system that impacts all facets of the individual's existence (Re & Cornoldi, 2015). Consequently, in light of the prevalence of attention deficit hyperactivity disorder within the nation, ranging from a minimum of 0.95% to a maximum of 17%, with a mean prevalence of 8.7% (Abedi, 2023), it is imperative to conduct an investigation focused on the identification of symptoms associated with this disorder in children and the appropriate interventions. Accordingly, the formulation of the educational package in the current research was an integration of narrative therapy and play therapy tailored for hyperactive children. Furthermore, the efficacy of this educational package was juxtaposed with the educational framework proposed by Dawson and Guare (2018), which boasts considerable credibility in empirical research. Thus, the present study aims to address the following inquiries: what are the essential components involved in the development of a self-regulation educational package for children diagnosed with attention deficit/hyperactivity disorder? Does the self-regulation educational package for children with attention deficit/hyperactivity disorder possess the requisite credibility?

Material and Methods

The research method for developing a self-regulation training package for children with attention deficit/hyperactivity disorder was a mixed method, which was exploratory with the content analysis method. The statistical population, books, articles, and theses (from 2011 to 2024) in the field of hyperactivity/attention deficit, including interventions developed to treat and modify the behavior of hyperactive children and exploratory studies of the characteristics of hyperactive children, were studied. Also, experts in the field of educational psychology examined and confirmed the validity of the above training package. The sample size included 15 specialists in the treatment of hyperactive children who were selected through purposive sampling to comment on the content validity of the self-regulation training package for children with attention deficit/hyperactivity disorder. In the studied texts, the purposive sampling method was also used to select related articles, books, and theses. The research implementation method is the inductive method, that is, from part to whole. That is, by studying related texts (articles and books published

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abroad and domestically) with hyperactive/attention deficit children, interventions developed to treat and modify the behavior of hyperactive children, and exploratory studies of the characteristics of hyperactive children, first the basic themes are obtained from the initial statements. Then the basic themes are categorized and placed in groups of organizing themes, and all of these organizing themes are gathered in the final category of comprehensive theme. Using the organizing themes, the concepts required for developing the package are obtained. Data analysis method to determine the agreement of the evaluators to determine the content validity of the self-regulation educational package for children with attention deficit/hyperactivity disorder, the content validity ratio (CVR) and content validity index (CVI) were used. To analyze the data related to the review of articles, books, and theses, the content analysis method (theme network) in *MaxQda software* was used.

Results

This section delineates the investigation of the research inquiries:

1 (What constitutes the elements of a self-regulation training framework for children diagnosed with attention deficit/hyperactivity disorder?

To effectively address this inquiry, a thorough analysis of the literature encompassing 22 scholarly articles yielded 26 organizing themes, which are enumerated as follows:

1 (Attributes of children diagnosed with attention deficit/hyperactivity disorder, 2) Attention deficit, 3) Hyperactivity, 4) Impulsivity, 5) Conceptualization of attention: 1.5) Focused attention, 2.5) Sustained attention, 3.5) Selective attention, 4.5) Alternating attention, 5.5) Divided attention, 6) Working memory, 1.6) Activities pertaining to working memory, 2.6) Acquisition of information, 3.6) Review processes, 4.6) Retention and storage of information, 5.6) Processing of information, 6.6) Regulation of attention, 7.6) Sustained focus and attention, 8.6) Reflection and inhibition of responses, 9.6) Methods for enhancing working memory, 7) Assessment of divided attention through tracking tests, 8) Games aimed at reducing attention deficits, 9) Visual memory span assessments, 10) Auditory memory span assessments, 11) Memory-enhancing games, 12) Training focused on impulse control, 13) Exercises aimed at visual memory enhancement, 14) Exercises pertaining to auditory memory, 15) Tasks involving auditory sequencing, 16) Computer-based exercises, 17) Utilization of sentences to bolster working memory, 18) Employment of numerical tasks in memory span evaluations, 19) Auditory memory tasks, 20) Activities targeting

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visual-spatial memory (utilizing cards), 21) Visual memory tasks (employing pictures), 22) Games focused on anger management, 23) Narrative techniques to enhance attention and concentration, 24) Narrative strategies for emotion and feeling regulation, 25) Narrative interventions to mitigate impulsivity, and 26) Storytelling methodologies.

Given that one integral function of working memory pertains to the regulation of attention, the majority of training sessions incorporate both visual and auditory memory exercises. Consequently, the synthesis of the training sessions can be articulated as follows:

In a broad sense, one may assert that the self-regulation components pertinent to children diagnosed with attention deficit/hyperactivity disorder include: Attributes of children diagnosed with attention deficit/hyperactivity disorder, attention deficit, hyperactivity, impulsivity, the conceptual framework of attention: (1) focused attention, 2) sustained attention, 3) selective attention, 4) alternating attention, 5) divided attention), working memory: (1) activities related to working memory, 2) information acquisition, 3) processes of reviewing, 4) retention and storage of information, 5) information processing, 6) regulation of attention, 7) sustained attention and focus, 8) processes of reflection and response inhibition, 9) methods for enhancing working memory), assessments of divided attention through tracking tests, games aimed at diminishing attention deficits, visual memory span assessments, auditory memory span assessments, memory-enhancing games, training focused on impulse control, exercises directed towards visual memory enhancement, auditory memory exercises, tasks pertaining to auditory sequencing, computer-based exercises, the utilization of sentences for working memory enhancement, the application of numerical tasks in memory span evaluations, auditory memory tasks, activities targeting visual-spatial memory (utilizing cards), visual memory tasks (employing pictures), games for anger management, narrative techniques to enhance attention and concentration, narrative strategies for the regulation of emotions and feelings, narrative interventions to mitigate impulsivity, and storytelling methodologies.

2- How are the identified components assigned in the self-regulation training package for children with attention deficit/hyperactivity disorder?

Based on the above explanations and based on the themes obtained, the structure and content of the self-regulation training package for children with attention deficit/hyperactivity disorder are included in Table 1.

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Table 1. Results of the identified components assigned in in the self-regulation training package

Session	Subject	Content
1	Familiarity and introduction	Getting to know the group members and each other, stating the rules for participating in the group, stating the goals of the training course, and conducting a pre-test
2	Story recall using storytelling	In this session, the trainer reads a story that includes 30 phrases and 10 questions. The subject is asked to listen carefully to the story and recall the story. Part two of the training: a) Throwing the ball into the basket (to reduce attention deficit), b) Collecting the specified colored balls. Part three of the training: Teaching emotion recognition through games and stories. Presenting the assignment
3	Attention enhancement (finding differences in images)	The trainer prepares a book or notebook containing 12 pairs of pictures. The pictures have between 5 and 10 differences and the students must find these differences. Part 2 of the training: Jumping into squares with specific numbers (the child first hears the instructor's command and then executes it (attention shifting). Part 3 of the training: Training in emotional feedback, presenting the task
4	Attention enhancement and inhibition (color word story)	Colored word story: The student first reads from a story. Then reads it for the second time and this time, whenever he comes to a green word, instead of reading that word once, and whenever he comes to red words, he taps the table twice with a pen. Part 2 of the training: Play sit and walk in a straight and reverse way (the child first hears the instructor's command and then executes it (attention shifting). Part 3: Training in anger and how to control it (stopping), presenting the task
5	Attention enhancement and memory (making sentences with words)	The instructor writes between 4 and 5 words on each card and gives it to the student. After memorizing the words, the student must make a sentence on the back of the card that uses at least 3 of the words on the card in that sentence. Part 2 of the training: Remembering names after Their definition. Part Three of the Training: Teaching Anxiety and How to Manage It, Presenting the Assignment
6	Visual memory enhancement and accuracy, recalling the location of objects	10 slides are displayed on a screen. The child is asked to look at them carefully and then explain them with his eyes closed. Then the child must find those images among the cards. Part Two of the Training: Recalling the Location of Objects. The trainer arranges a number of objects on the table and asks the child to look at them. Then, in the child's absence, he rearranges them and asks the child to recall their previous location. Part Three of the Training: Teaching Interpersonal Conflict Resolution (Using the Traffic Light Technique), Presenting the Assignment
7	Attention enhancement auditory memory and auditory sequence	In the auditory memory exercise, a word is said to the child that he must repeat. Then two words are said that the child must repeat. And in the same way, the number of words is added, when they reach a four-word word, a meaningless word is added to the vocabulary. Part Two: Auditory Sequence Memory Exercise: Auditory A word is told to the child that he must repeat, then the word is pronounced incompletely and the child is asked to complete it. The child is asked to state a list of words that have been read to him in order. After hearing the number 1, the student throws the ball against the wall and after hearing the number 2, the ball is thrown to the ground. Part Three of the Training: Teaching the skill of courage (the story of "No Firm"), presenting the task
8	Attention enhancement visual memory and visual sequence	Presenting a picture to the person (for a few seconds), and asking the person what was in the picture. Presenting three to five words to the person and asking them to name them. The trainer puts out some cards and asks the child to look at them for a few seconds and then closes his eyes. The instructor changes the location of the cards and asks the person to explain the changes. Then he/she wants to state the order of the previous cards. Part two: Presenting two sets of images on a page, comparing the shapes on both sides by the child and recounting the images embedded in the images on the right. Part three: Teaching empathy, presenting the task
9	Attention enhancement of auditory and visual verbal memory span	In the forward digit memory task, the instructor asks the child to repeat the numbers stated in the order they heard. In the backward digit memory task, the instructor asks the child to state the numbers stated from the end to the beginning. In the visual memory task, the instructor asks the child to state the images of the cards he/she saw in order. Quickly showing several cards and turning them over, the person must choose similar cards. Part two of the training: Teaching problem solving to children, presenting the task.
10	Final activities to end the sessions	Telling a story and retelling it by children (to measure their attention and working memory), games related to increasing the level of cooperation in children (playing chairs and near or far activities). Celebration of the end of the sessions

3- What is the content validity of the educational package of components of the self-regulation educational package for children with attention deficit/hyperactivity disorder?

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In order to examine the internal validity of the educational package, after the reviewers approved the organizing themes of the self-regulation educational package for children with attention deficit/hyperactivity disorder, a survey form was given to fifteen experts in the field of educational psychology who were involved in the treatment of this disorder and had also conducted research in this field. Based on the opinions obtained, their agreement coefficients were obtained in five areas: content compatibility, suitability of sessions with structure, adequacy of time allocated to training sessions, adequacy of the educational package in terms of content, and an overall evaluation of the self-regulation educational package for children with attention deficit/hyperactivity disorder, which is described in Table 2.

Table 2. Overall evaluation of the content of the self-regulation educational package

Experts	Matching the content of the arranged sessions with the educational process	Adapting sessions to the structure and steps required in training	Adequacy of time allocated for training	Adequacy of the training package	Overall evaluation of the training package
1	1	1	1	1	1
2	1	0.80	0.90	0.90	1
3	0.80	1	1	1	0.90
4	1	0.90	0.90	1	1
5	0.90	1	0.70	1	1
6	1	0.80	0.70	0.90	0.90
7	0.90	1	1	1	1
8	0.60	0.70	0.90	0.80	1
9	1	0.60	1	1	0.90
10	0.80	1	1	1	0.90
11	1	0.70	1	0.70	1
12	1	1	1	1	0.70
13	1	0.80	0.70	0.90	0.90
14	0.60	0.90	1	0.70	1
15	0.90	1	1	0.80	1
CVR	0.733	0.60	0.60	0.733	0.866
CVI	0.866	0.80	0.80	0.866	0.933

The empirical findings presented in Table 2 elucidate that the perspectives of expert professors regarding the comprehensive assessment of the training package aimed at enhancing attention, working memory, and emotional regulation were predominantly affirmative. Furthermore, it is noteworthy that the requisite Content Validity Ratio (CVR), given the cohort of 15 evaluators, must exceed the threshold of 0.49, while the acceptable Content Validity Index (CVI) for this quantity of evaluators should surpass 0.70. Consequently, it can be asserted that the formulated training package demonstrates commendable internal validity.

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The findings derived to explore the overarching research inquiries are as follows:

1 -What are the components of the self-regulation training package designed for children diagnosed with attention deficit/hyperactivity disorder?

2 -Does the self-regulation training package for children diagnosed with attention deficit/hyperactivity disorder possess the requisite validity?

In addressing the first overarching inquiry, the following can be articulated: Based on the insights garnered from the qualitative analysis, it can be inferred that the self-regulation training package tailored for children with attention deficit/hyperactivity disorder encompasses the subsequent components: (1) focused attention, (2) sustained attention, (3) selective attention, (4) alternating attention, (5) divided attention; working memory: (1) working memory activities, (2) information acquisition, (3) reviewing, (4) information retention and storage, (5) information processing, (6) attention control, (7) sustained focus and attention, (8) reflection and response inhibition, (9) methodologies for enhancing working memory, tracking assessments for divided attention, games aimed at reducing attention deficits, visual memory span assessments, auditory memory span assessments, memory-related games, training for impulse control, visual memory exercises, auditory memory exercises, auditory sequence exercises, computer-based activities, employing sentences to bolster working memory, utilizing numerical tasks in span memory assessments, auditory memory tasks, visual-spatial memory activities (incorporating cards), visual memory tasks (utilizing images), games for anger management, narrative techniques for enhancing attention and concentration, narratives for emotional regulation, narratives for mitigating impulsivity, and techniques for storytelling.

In response to the second overarching inquiry, the following can be articulated: Analysis of the data presented in Table 2 indicates that the self-regulation training package for children diagnosed with attention deficit/hyperactivity disorder possesses a favorable Content Validity Ratio (CVR = 0.866).

Discussion

The current investigation sought to create and authenticate a self-regulation training program specifically designed for children diagnosed with attention deficit/hyperactivity disorder. To derive the components constituting the educational package, a comprehensive review and analysis

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of 22 scholarly articles were undertaken, culminating in the identification of 15 organizing themes delineated as follows:

1) Traits characteristic of children with attention deficit/hyperactivity disorder, 2) Deficits in attention, 3) Hyperactivity manifestations, 4) Impulsivity phenomena, 5) Attention components encompassing (focused attention, sustained attention, selective attention, alternating attention, divided attention), 6) Working memory (encompassing activities related to working memory, such as: information receipt, information review, maintenance and storage of information, information processing, attention regulation, concentration and sustained attention, reflective thought and response inhibition, methodologies for enhancing working memory), 7) Assessment of divided attention via tracking tests, 8) Games designed to diminish attention deficits, 9) Activities aimed at enhancing working memory, 10) Utilization of sentences to bolster working memory, 11) Exercises targeting visual memory, 12) Assessment of visual memory span, 13) Tasks pertaining to visuospatial memory (employing cards), 14) Visual memory assessments (utilizing images), 15) Auditory memory exercises, 16) Auditory memory span assessments, 17) Exercises focusing on auditory sequences, 18) Digital exercises, 19) Training aimed at impulse control, 20) Games designed to regulate anger, 21) Incorporation of storytelling techniques (in enhancing attention and concentration, in modulating emotions and feelings, in ameliorating impulsivity). The identified themes align with the research conducted by numerous studies (Buhrs et al., 2024; Madani et al., 2017; Sevincer et al., 2024; Sivoshifar et al., 2020).

Given that children with attention deficit/hyperactivity disorder exhibit significant deficits in attention and considering that "attention" constitutes a fundamental prerequisite for learning and is a pivotal element for adaptive responses to environmental stimuli, its significance is particularly pronounced in educational contexts. Consequently, in the assembly of the aforementioned self-regulation training package, scholarly articles that encapsulated the theme of "attention" were thoroughly examined. Subsequent to the extraction of the concept of attention and its various forms from diverse articles, the focus shifted to cognitive tasks capable of enhancing "attention" in children experiencing attention deficit/hyperactivity disorder. The constructs of "attention" were found to be congruent with the investigations of Sivoshifar et al. (2020) and Sevincer et al. (2024). Among the reviewed literature, games aimed at mitigating attention deficits were identified, such as ball exercises targeting aiming accuracy and jumping within designated squares as described by

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Kheirolah Bayatiani et al. (2020); Sit and walk games executed in both direct and reverse sequences and activities involving the identification of differences in images and color word narratives (Sorkhy & Sharif Daramadi, 2023). These activities were subsequently incorporated into the educational package to enhance various forms of attention.

One of the paramount constituents of executive functions is working memory, which can be characterized as a cognitive workspace that facilitates the temporary retention and manipulation of information within the cognitive domain. Working memory comprises a constellation of cognitive processes that engage in reciprocal interactions to uphold and process information requisite for executing quotidian tasks. The operational capacity of this component is indispensable for enabling and accurately executing the functions of other facets of executive functions, and its optimal operation engenders concentration, sustained attention, reflective responses to stimuli, and the suppression of impulses that are extraneous to the context (Holmes et al., 2014; Kofler et al., 2011). Several scholars have posited that the initial deficits observed in attention deficit/hyperactivity disorder are attributable to an impairment in "working memory." The function of memory storage is integral to the learning process and, consequently, holds considerable significance in both motor and social performance. Overall, effective memory functioning in children is crucial for navigating the challenges associated with academic endeavors and daily living (Holmes et al., 2014).

Given that children diagnosed with attention deficit/hyperactivity disorder exhibit deficits in executive functions, particularly in working memory, enhancing this cognitive function is vital for their optimal performance across diverse contexts. The scholarly articles referenced for the development of the educational package targeting working memory include Sevincer et al. (2024), Sivoshifar et al. (2020) and Madani et al. (2017). The activities derived from these scholarly articles aimed at reinforcing working memory encompass: constructing sentences with designated words, recollecting words presented on a card, and recalling names post-definition; auditory processing of sentences followed by noting the terminal word of each sentence; visual memory tasks, visual sequencing activities, and auditory sequencing exercises; the digit memory span assessment; working memory span involving forward digit recall, backward digit recall, presenting words to children with subsequent repetition, and displaying a card for the child to identify its contents after viewing; auditory memory activities; auditory recall of numbers followed by

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immediate repetition, and auditory recall of numbers followed by reverse repetition; the activity of recounting a narrative based on 30 phrases followed by 10 inquiries concerning those phrases. Given that children diagnosed with attention deficit/hyperactivity disorder exhibit deficits in attention, cognitive processes, and behavioral regulation, which frequently leads to challenges within their social environments, these individuals often experience heightened levels of distress and manifest behaviors characterized by impulsiveness and aggression. Consequently, behavioral self-regulation training is pivotal in assisting these individuals to comprehend the relationship between their actions and the potential repercussions associated with those actions. To elucidate themes pertinent to this domain, a comprehensive review of pertinent studies was conducted wherein methodologies addressing impulse control, emotional expression, anger management, cessation techniques, relaxation training, along with responsibility and compromise training were incorporated into the self-regulation training framework.

Subsequent to the formulation of the training package, a synthesis of the session content, accompanied by a structured questionnaire, was disseminated to esteemed academics specializing in this area for the purpose of soliciting their insights regarding the initiative. Following this feedback, the issues highlighted by the professors were addressed, and the package was subsequently executed as a pilot program involving a select group of students diagnosed with attention deficit/hyperactivity disorder. To address the research inquiry, the themes derived from the analysis and the educational package developed were systematically organized through a questionnaire, which was then administered to psychological specialists engaged in therapeutic practices for children with attention deficit/hyperactivity disorder, resulting in the rectification of identified shortcomings within the educational package. Upon re-evaluation by these specialists, a content validity coefficient and a content validity index were established, indicating that the educational package developed possesses commendable internal validity.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

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The studies involving human participants were reviewed and approved by the ethics committee of Allameh Tabataba'i University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

All authors contributed to the study conception and design, material preparation, data collection, and analysis. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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